

Stem Gymnasium Improvements at the Region % Stem Center

Calcasieu Parish School System

Project documents obtained from www.CentralBidding.com

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Project manual

FOR:

STEM Gymansium Improvements at the Region 5 STEM Center

for the calcasieu parish school board

General funds and the City of Lake charles LC Rebound Projct

cpsb project no: 2027-03PC

1509 Enterprise Blvd, Lake Charles, LA 70601

CEH Project #2401



PROJECT MANUAL
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Bid may also be submitted by electronic means security/password protected to this location, ensuring the following information is included on all pages of all correspondence: www.centralauctionhouse.com.

The Owner reserves the right to reject any and all bids for just cause as permitted by LA. R.S. 38:2214 (B). The ability of an entity to reject any bid is applicable only when administered in accordance with the Public Bid Law. 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 public entity.

A fee may be required for the Bidding Documents in accordance with LA. R.S. 38:2212 (D).

Dr. Jason VanMetre Secretary
Calcasieu Parish School Board

Pc: Bent, Brown, Barrentine, Architect or Designer, State License Board for Contractors, Daily Journal of Commerce, F. W. Dodge, File

Publish in the American Press New **October 8th, 15th, and 22nd.**

Calcasieu Parish School Board
BUILDING FOUNDATIONS FOR THE FUTURE
Dr. Jason VanMetre, Superintendent

NOTICE TO BIDDERS

The Calcasieu Parish School Board will receive sealed bids before **2:00.P.M November 2, 2026**at the **Calcasieu Parish School Board, Planning & Construction Department, Chennault Facilities, 3800 Mallard Cove Drive, P.B. #506, Lake Charles, Louisiana 70615** for **Stem Gymnasium Improvements at the Region 5 Stem Center for the Calcasieu Parish School Board General Funds and the City of Lake Charles LC Rebound Project , Project No 2027-03PC** Complete plans and specifications may be obtained from **Champeaux, Evans, Hotard, APAC, 702 Dr. Michael DeBakey Drive Lake Charles, La. 70601.**

No Bid shall be considered or accepted unless the bid is accompanied by bid security in an amount not less than five percent (5%) of the Base Bid and all Additive Alternates. The bid security shall be in the form of certified check or cashier's check drawn on a bank insured by the FDIC, or Calcasieu Parish School Board Bid Bond Form contained in the Front End Documents written by a surety company licensed to do business in Louisiana with a A.M. Best rating of "A" or better, countersigned by a person who is under contract with the surety company or bond insurer as a licensed agent.

Bids shall be accepted only from Contractors who are licensed under LA. R.S. 37:2150-2163, Act 635, effective January 1, 1989, for the classification Building Construction. No bid may be withdrawn for a period of thirty (30) days after receipt of bids, except under the provisions of LA. R.S. 38:2214. Evidence of authority to submit the bid shall be required in accordance with LA. R.S. 38:2212 (B) (2), (5) and/or LA. R.S. 39:1594 (C) (4).

Each bid must be placed in an envelope, sealed and marked on the outside, **"Stem Gymnasium Improvements at the Region 5 Stem Center for the Calcasieu Parish School Borad, General Funds and the City of Lake Charles LC Rebound project, Project No" 2027-03PC" to be opened at at the Calcasieu Parish School Board, Planning & Construction Department, Chennault Facilities, P.B. #506, Lake Charles, Louisiana 70615".**

MANDATORY Pre-Bid for Region 5 Stem Center will be at 1509 Enterprise Blvd, Lake Charles, La.70601 on October 19th at 1:00 P.M. Meet at the parking lot to the left of front entrance.

Calcasieu Parish School Board
INSTRUCTIONS TO BIDDERS

ARTICLE 1 - DEFINITIONS

1.1 The Bid documents include the following:

Advertisement for Bids.
Instructions to Bidders.
List of Required Documents.
Louisiana Uniform Public Works Bid Form and Unit Price Form.
Bid Bond Form.
Resolution.
CPSB Non-Collusion Affidavit.
Louisiana Non-Collusion Affidavit (LRS 38:2224).
Verification of Employees Affidavit (LRS 38:2212.10).
Attestation Form – Past Criminal Conviction of Bidders (LRS 38:2227).
Certification Regarding Unpaid Worker's Compensation Insurance (LRS 23:1726(B)).
Subcontractor Approval List.
Contract Between Owner & Contractor including Payment and Performance Bond.
General Conditions of the Contract for Construction AIA Document A201-2017.
Supplementary Conditions.
Change Order Form.
Application for Payment Documents.
Beneficial Occupancy Form.
Recommendation of Acceptance Form.
Louisiana Dept. of Revenue Sales Tax Exemption Form
CPSB HL Roofing Guarantee (if applicable).
Specifications
Drawings
Addenda issued during bid period and acknowledged on the Bid Form

1.2 All definitions set forth in the General Conditions of the Contract for Construction, AIA Document A201-2017 as amended, or in other Contract Documents, 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 The 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 for sums stated in Alternate Bids.

1.6 An Alternate Bid (or Alternate) is an amount stated in the Bid to be added to or subtracted from 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 proposed Contract 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, a state-licensed Architect, Engineer or Landscape Architect.

ARTICLE 2 - BIDDER'S REPRESENTATION

2.1 Each Bidder by making his Bid represents that:

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

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

2.1.3 His Bid is based upon the materials, systems, and equipment described in the Bid Documents as advertised and as modified by Addenda.

2.2 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 Statute 37:2150 et. seq. will be considered, if applicable. Contractor shall be responsible for determining that all of his sub-bidders or prospective subcontractors are duly licensed in accordance with law.

2.3 The Bidder must not be debarred as determined by the Federal Government's Excluded Parties List, and it is the responsibility of the Contractor to verify subcontractor eligibility based on factors such as past performance, proof of liability insurance, possession of a federal ID tax number, debarment, and state and local licensing requirements. The prime contractor may use the web site: https://www.sam.gov/SAM to determine if a subcontractor has been debarred at the federal level.

ARTICLE 3 - BID DOCUMENTS

3.1 Bid Documents.

3.1.1 Complete Bid Documents for this Project are available in electronic form. They may be obtained in electronic form from www.centralbidding.com for a nominal charge or subscription, or from the office of the Architect, free of charge. Printed copies are not available from the Owner or Architect, but arrangements can be made to obtain printed Bid Documents through most reprographic firms. Bidders are responsible for any subscription, downloading, reproduction or mailing costs.

3.1.2 Complete sets of Bid Documents shall be used in preparing Bids; neither the Owner nor the Architect assumes any responsibility for error of misinterpretation resulting from the use of incomplete sets of Bid Documents.

3.1.3 The Owner and Architect make the Bid Documents available to Bidders only for the purpose of obtaining bids on the work and do not confer a license or grant for any other use.

3.2 Interpretation or Correction of Bid Documents

3.2.1 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.

3.2.2 Bidders requiring clarification or interpretation of Bid Documents shall make a written request to the Architect to reach him at least seven (7) days prior to the date and time of receipt of bids.

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

3.3 Substitutions

3.3.1 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.

3.3.2 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 seven (7) days prior to the date and time for receipt of bids. Each such request shall include the name of the material or equipment for which it is to be substituted and complete description of the proposed substitute including model numbers, drawings, cuts,

performance and test data, and other information necessary for evaluation. A statement setting forth any changes in any other materials, equipment or work that incorporation of the substitute would require shall be included. The burden of proof of the merit of the proposed substitute is upon the Proposer. The Architect's decision of approval or disapproval of a proposed substitution shall be final.

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

3.4 Addenda.

3.4.1 Addenda will be posted on www.cpsb.org/depts/purchasing/currentbids and www.centralbidding.com. Printed copies are not available from the Owner or Architect, but arrangements can be made to obtain printed Addenda through most reprographic firms. Bidders are responsible for any subscription, downloading, reproduction or mailing costs.

3.4.2 Bidders are responsible for obtaining Addenda online. Addenda will not be mailed or distributed by Architect or Owner.

3.4.3 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 legal holidays; however, if the necessity arises to issue 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 exactly one (1) week, without the requirement of re-advertising.

3.4.4 Each Bidder shall ascertain from www.cpsb.org/depts/purchasing/currentbids and/or www.centralbidding.com prior to submitting his Bid that he has received (via download) all Addenda issued, and he shall acknowledge their receipt on the Bid Form.

ARTICLE 4 - BIDDING PROCEDURES

4.1 Form and Style of Bids

4.1.1 Bids shall be submitted on the forms provided in the Bid Documents. Refer to **List of Required Documents** for other items required to be submitted with Bid.

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

4.1.3 Where so indicated by the makeup of the Bid Form, sums shall be expressed in both words and figures, and in case of discrepancy between the two, the written words shall govern.

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

4.1.5 Bidders are cautioned to complete all Alternates should such be required in the Bid Form. Failure to submit alternate prices will render the Proposal informal and may cause its rejection.

4.1.6 Bidder shall make no additional stipulation on the Bid Form nor qualify his Bid in any other manner.

4.1.7 The Bid shall include the legal name of Bidder and statement whether the Bidder is a sole proprietorship, partnership, corporation, or any other legal entity and his Bid shall be signed by the person or person legally authorized to bind the Bidder to a contract. Bid submitted by an agency shall have a current Power of Attorney attached certifying the agent's authority to bind Bidder.

4.1.8 On any Bid in excess of Fifty Thousand Dollars & no cents ($50,000.00), the Contractor shall certify that he is licensed under LA R.S. 37:2150-2163 and show his license number on the Bid above his signature or signature of his duly authorized representative.

4.2 Bid Security

4.2.1 No Bid shall be considered or accepted unless the bid is accompanied by bid security in an amount of not less than five percent (5%) of the Base Bid and all additive 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 on the Calcasieu Parish School Board Bid Bond contained in the Front End Documents written by a surety company licensed to do business in Louisiana and with a current A.M. Best rating of "A- VII" or better, countersigned by a person who is under contract with the surety company or bond insurer as a licensed agent/broker in this state and who is residing in this state and accompanied by appropriate Power of Attorney in Fact or of the State of Louisiana.

4.2.2 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 Contract Documents, within ten (10) days after written notice that the instrument is ready for his signature.

4.2.3 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.

4.2.4 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.

4.3 Submission of Bid

4.3.1 Bids shall be sealed in an opaque envelope 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 the Calcasieu Parish School Board 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 U.S. Mail or express delivery, shall disqualify the Bid.

4.3.2 The sealed bid envelope shall be marked on the outside with: "**Bid Enclosed – Stem Gymnasium Improvements at the Region 5 Stem Center for the Calcasieu Parish School Board, General Funds and the City of Lake Charles LC Rebound project, Project No. 2027-03PC**", to be opened at the Calcasieu Parish School Board, Planning and Construction Department, Chennault Facilities, 3800 Mallard Cove Drive, Lake Charles, LA 70615, on the day and time identified in the Bid Advertisement, or as officially modified by Addendum. Note: The outside of the bid envelope shall include the name, address and Contractor's license number of the Bidder as required by LA. R.S. 37:2163.

4.3.3 If the Bid is sent by mail, the sealed envelope shall be enclosed in a separate mailing envelope with the same notation described at 4.3.2 on the face thereof. Such bids shall be sent by Registered or Certified Mail, Return Receipt Requested, and addressed to: Calcasieu Parish School Board, Planning and Construction Department, Chennault Facilities, 3800 Mallard Cove Drive, Lake Charles, LA 70615.

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

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

4.3.6 Oral, telephonic or telegraphic bids or modifications to bids are invalid and will not receive consideration. Owner will not consider notation written on outside of bid envelope which has the effect of amending the Bid.

4.3.7 Bid may also be submitted by electronic means via website www.centralbidding.com. Free registration is required in order to submit a bid via the Central Bidding website.

4.4 Modification or Withdrawal of Bid

4.4.1 A Bid may not be modified, withdrawn or cancelled 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 Act Ill of 1983 which states, in part, "Bids containing patently obvious mechanical, clerical or mathematical errors 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."

4.4.2 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.

4.4.3 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.

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

ARTICLE 5 - CONSIDERATION OF BIDS

5.1 Opening of Bids

5.1.1 The properly identified bids received on time will be opened publicly and read aloud, and a tabulation abstract of the amounts of the Base Bid and Alternates, if any, will be made available to Bidders.

5.2 Rejection of Bids

5.2.1 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.

5.3 Acceptance of Bid

5.3.1 Any bid shall include no more than three alternates. Alternates, if accepted, shall be accepted in the order in which they are listed on the bid form. Determination of the low bidder shall be on the basis of the sum of the base bid and any alternates accepted. However, the Owner reserves the right to accept alternates in any order which does not affect determination of the low bidder, per LA. R.S. 38:2212 (J).

5.3.2 It is the intent of the Owner to award a contract to the lowest responsible bidder in accordance with the requirements of the Bid Documents, and if the bid does not exceed

the funds available.

5.3.3 Due to the nature of potential Project funding sources, full funding may not be readily-available at the time the bids are received. As a result, pursuant to Louisiana Revised Statute 38:2215, the Owner is exempt from the requirement of acting to award the Contract or reject all bids within forty-five (45) calendar days of receipt of the bids. Pursuant to this Statute, the Owner specifically reserves the right to hold all bids for greater than forty-five (45) calendar days.

ARTICLE 6 - POST BID INFORMATION

6.1 Refer to **List of Required Documents** for other items required to be submitted by the apparent low bidder within ten (10) days after bid opening. Where forms are required, blank forms are included in the Bid Documents.

6.2 The apparent low Bidder has a maximum of ten (10) days from the bid opening to produce any required post bid submittals. If the apparent low Bidder does not submit the proper information or documentation as required by the Bid documents within the ten-day period, such Bidder shall be declared non-responsive, which will result in automatic disqualification of bid.

6.3 Proposed list of subcontractors, materials suppliers, and superintendents.

6.3.1 Within 24 hours after bids are opened, the Contractor identified as the apparent low bidder shall make the following submittals to the Architect: A tentative list of all subcontractors or other persons or organizations (including those who are to furnish materials or equipment fabricated to special design) proposed for principal portions of the work, as well as the proposed superintendent. Also provide a designation of the work to be performed by the Contractor with his own forces.

6.3.2 It is recognized that the acceptance or rejection of alternates contained in the bid proposal may ultimately determine the low bidder on the project. In the event a Contractor, other than the Contractor identified as the apparent low bidder at the bid opening, becomes the low bidder as a result of such selection of alternates, this contractor shall make the submittals required by this section within 24 hours after notification by the Owner.

6.3.3 The Contractor will be required to establish to the satisfaction of the Architect and the Owner the reliability and responsibility of the proposed subcontractors to furnish and perform the work described in the section of the specifications pertaining to such proposed subcontractors' respective trades.

6.3.4 The Architect will notify the Contractor if the Owner, after due investigation, has reasonable and substantial objection to any person or organization on the Contractor's list of proposed subcontractors. If there are objections the Contractor shall submit alternative subcontractor(s) for their approval.

6.3.5 Subcontractors and other persons and organizations proposed by the Bidder and accepted by the owner and the Architect upon the awarding of a contract must be used on the work for which they were proposed and accepted and shall not be changed except upon the recommendation of the Architect and approved by the Owner in the form of a change order. Any changes on the tentative 24 hour list submitted by the Contractor prior to the awarding of the contract must be requested in writing to the Architect with proper justification. Any change in the tentative list of subcontractors will require recommendation from the Architect to the Owner. The recommendation and approval of the Owner must be made in writing.

6.3.6 The lowest responsible bidder shall submit to the Architect and the Owner prior to award of the contract a letter from the manufacturer that the manufacturer will issue the roof system guarantee based on the specified roof system and include the name of the applicator acceptable to the manufacturer for installing the specified roof system. This manufacturer shall be one that has received prior approval or is named in the specifications.

6.4 Additional Submissions

6.4.1 A Schedule of Values segregating the entire Contract Sum into the divisions of the Specifications shall be provided to the Architect. No payments will be made to the Contractor until this is received.

6.4.2 A copy of applicable state, parish, or municipal licenses legally required for Contractor and subcontractors shall be provided to the Architect. No payments will be made to the Contractor until this is received.

6.4.3 Federal and state tax identification numbers on General Contractors and subcontractors shall be provided to the Architect. No payments will be made to the Contractor until this is received.

ARTICLE 7 - PERFORMANCE & PAYMENT BONDS

7.1 Bond Required

7.1.1 The Contractor shall furnish and pay for a Performance & Payment Bond written by a company licensed to do business in Louisiana, which shall be countersigned by a person who is contracted with the surety company or bond issuer or approved broker, and who is licensed as an insurance agent/broker of the company or issuer, and who is licensed as an insurance agent in this State, and who is residing in this State, in an amount equal to the 100% of the Contract amount. By issuing such Performance and Payment Bond, the surety acknowledges they are on the current U.S. Department of the Treasury Financial Management Service List of approved bonding companies, and complies with all other provisions of R.S. 38:2219.

7.2 Time of Delivery and Form of Bond

7.2.1 The Bidder shall deliver the required bond to the Owner simultaneous with the execution of the contract.

7.2.2 Bond shall be in form furnished by the Calcasieu Parish School Board, entitled Performance & Payment Bond, a copy of which is included in the Bid Documents.

7.2.3 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 8 - FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR

8.1 Form to be Used

8.1.1 Form of the contract to be used shall be furnished by Calcasieu Parish School Board, a copy of which is included in the Bid Documents.

8.2 Award

8.2.1 In accordance with Louisiana Law, if the Contract is awarded to the Bidder, he shall at the time of the signing of the Contract or prior, execute the Non-Collusion Affidavit included in the Bid Documents, and shall execute the Byrd Anti-Lobbying Certification contained in Exhibit A to Contract Between Owner and Contractor.

8.2.2 Before award of the contract, the successful Bidders shall furnish to the Owner a certified copy of the minutes of the corporation or partnership meeting which authorized the party executing the Bid to sign on behalf of the Contractor.

8.2.3 When a project is financed either partially or entirely with School Board bonds, the award of a contract is contingent upon the sale of bonds by the School Board. The School Board shall incur no obligation to the Contractor until the Contract between the Owner and Contractor is duly executed.

ARTICLE 9 - COMPLETION TIME & LIQUIDATED DAMAGES

9.1 The completion of the contract must be as stated below, subject to such extensions as may be granted under Paragraph 8.3, Delays and Extensions of Time: in the General Conditions and the Supplementary Conditions, or the Contractor will be subject to pay to the Owner Liquidated Damages in the amount of **Five Hundred Dollars & no/100 ($500.00) per calendar day.** Time is of the essence in performance of this Contract and satisfactory completion of this Project.

9.2 Bidder acknowledges that all phases of the Project shall be Substantially Complete in **240 calendar days** from receipt of written Notice to Proceed from Owner.

ARTICLE 10 - BUILDING MATERIAL EXCLUSIONS

10.1 All building materials shall be free of asbestos.

10.2 All plumbing materials shall be free of lead.

10.3 All paints shall be free of lead.

10.4 All contractors should use the least hazardous materials on all jobs. Material Safety Data Sheets (MSDS) shall be given to the Owner on all materials used.

ARTICLE 11 - PRE-BID CONFERENCE

11.1 A pre-bid conference shall be held at the project site at least ten (10) days before the date for receipt for bids. Refer to the Advertisement for Bids to determine if attendance at the pre-bid conference is mandatory and a pre-requisite for submitting a bid, or if attendance is non-mandatory. The Architect shall coordinate the setting of the date, time and place for the pre-bid conference. The purpose of the pre-bid conference is to familiarize Bidders with the requirements of the Project and the intent of the Contract Documents, and to receive comments and information from interested Bidders.

11.2 Any revision of the Bid Documents made as a result of the pre-bid conference shall not be valid unless included in an Addendum issued in accordance with Paragraph 3.4 of the Instructions to Bidders.

ARTICLE 12 - APPLICABILITY

12.1 Any article located in the Instructions to Bidders found to be in conflict with the General Conditions and/or Supplementary Conditions will take precedence over the latter of the two set of Articles.

ARTICLE 13 - FEDERALLY FUNDED PROJECTS

13.1 The Owner intends to pursue reimbursement of eligible Project costs from funding sources including Federal Emergency Management Agency (FEMA) Public Assistance Program, therefore compliance with applicable Federal Contract Clauses (attached as Exhibit A to Contract Between Owner and Contractor) is required.

ARTICLE 14 - MISCELLANEOUS PROVISIONS

14.1 The Contractor shall repair, replace or pay for the relocation of telephones and wiring, fire alarms, intercoms, bells, TV cable, security system, wiring and equipment and any other cable type installation that may be damaged, cut or removed during the construction.

14.2 The Contractor will be responsible for the removal, reinstallation and/or relocation of any playground equipment that needs to be moved due to construction.

14.3 The Calcasieu Parish School Board is hereby recognized as a statutory employer of Contractor's employees, including but not limited to Contractor's direct employees, immediate employees, and statutory employees. This contract recognizes the existence of a statutory employer relationship between Calcasieu Parish School Board and Contractor in accord with Act 315 of 1997.

14.4 The costs of any required construction, demolition or other permits from any authority having jurisdiction over the Project are to be included in the Base Bid.

ARTICLE 15 - SALES AND USE TAX EXEMPTION

15.1 In accordance with applicable rules adapted and promulgated by the Louisiana Department of Revenue, the Owner shall designate the contractor and all subcontractors as its agents for the purchase and lease of materials, supplies or equipment for the project. The Contractor and all subcontractors shall accept the agency designation. The designation and acceptance thereof shall be made on the form prescribed by the Louisiana Department of Revenue which form shall be part of the contract between the Owner, Calcasieu Parish School Board, and the Contractor. A copy of this form is available at the Architect's office.

The agency relationship between the Owner and the contractor and all subcontractors shall relieve the Contractor and subcontractors (1) from paying any state or local sales or state or local use taxes on materials, supplies or equipment which is affixed to and/or made a part of the real estate of the project or work or which is permanently incorporated into the project or work and, (2) from paying any state or local use taxes on any materials, supplies or equipment which are leased and used exclusively for the project or work. Accordingly, in preparing their bids and computing costs the contractor and subcontractors shall not consider sales and or use taxes which would otherwise be due.

The Owner will furnish to the contractor and subcontractors its Certificate of Sales/Use Tax Exemption/Exclusion on the form prescribed by the Louisiana Department of Revenue. The contractor and subcontractors shall furnish a copy of such certificate to all vendors or suppliers of any of the materials, supplies or equipment described above,

The Contractor and subcontractors shall make all purchases and leases on behalf of and as the agent of the Calcasieu Parish School Board.

Rules and regulations of the Louisiana Department of Revenue shall prevail over any conflicting provisions or specifications of the contract.

End of Instructions to Bidders

LIST OF REQUIRED DOCUMENTS

The following items are required to be submitted as part of the Contractor's Bid:

1. Louisiana Uniform Public Works Bid Form
2. Louisiana Uniform Public works Bid Form – Unit Price Form (when applicable).
3. Bid Bond Form, with Power of Attorney Form attached.
4. Evidence of Corporate Authority of the person signing the Bid, in accordance with LA. R.S. 38:2212(5).

The following items are required to be submitted by the Apparent Low Bidder to the Architect or Owner within ten (10) days of the Bid, and prior to award of the project:

Note: The Calcasieu Parish School Board requires that 6 original, signed and/or notarized copies (as is applicable) of each item listed below be submitted.

1. Resolution
2. CPSB Non-Collusion Affidavit
3. Louisiana Non-Collusion Affidavit (La.R.S. 38:2224)
4. Verification of Employees Affidavit (La.R.S. 38:2212.10)
5. Attestation Form – Past Criminal Conviction of Bidders (La.R.S. 38:2227)
6. Certification Regarding Unpaid Workers Compensation (La.R.S. 23:1726(B))
7. Subcontractor Approval List
8. Roofing Manufacturer's Certification and Compliance Letter

END OF SECTION

BID BOND

PROJECT NAME: **Stem Gymnasium Improvements at the Region 5 Stem Center for the Calcasieu Parish School Board**
LOCATION: **1509 Enterprise Blvd, Lake Charles, LA 70601**
PROJECT NUMBER: **2027-03PC**

Date: _____

KNOW ALL MEN BY THESE PRESENTS:

That_____of_____, as Principal,

and_____, as Surety,

are held and firmly bound unto the Calcasieu Parish School Board, (Obligee), in the full and just sum of five (5%) percent of the total amount of this bid 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 and that it is listed thereon as approved for an amount equal to or greater that the amount for which it obligates itself in this instrument, that surety currently is licensed to do business in the State of Louisiana, and that this bond is countersigned by a person who is under contract with the surety as a licensed agent/broker in this state.

This Bid Bond shall be 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:

Stem Gymnasium Improvements
at the Region 5 Stem Center
for the Calcasieu Parish School Board
CPSB Project No.: 2027-03PC

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.

PROJECT NAME: **Stem Gymnasium Improvements at the Region 5 Stem Center for the Calcasieu Parish School Board**
LOCATION: **1509 Enterprise Blvd, Lake Charles, LA 70601**
PROJECT NUMBER: **2027-03PC**

BOND CERTIFICATION: The Principal certifies that he meets all bonding requirements of the Calcasieu Parish School Board, as set forth in paragraph 4.2.1 of the Instructions To Bidders, found in the General Guide for Front End Documents for the Calcasieu Parish School Board.

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

INCLUDE THIS FORM WITH BID UNLESS BID SECURITY CHECK IS INCLUDED

RESOLUTION

PROJECT NAME: **Stem Gymnasium Improvements at the Region 5 Stem Center for the Calcasieu Parish School Board**
LOCATION: **1509 Enterprise Blvd, Lake Charles, LA 70601**
PROJECT NUMBER: **2027-03PC**

BE IT RESOLVED that _____ ,

Officer / Owner of _____ ,

is hereby authorized to sign any Contract or document on behalf of:

Company Name: _____

_____
Name of Officer/Owner

_____
Title of Officer/Owner

_____
Signature

SWORN TO AND SUBSCRIBED before me this_____day of_____,
20____, in Lake Charles, Louisiana.

_____
Notary Public

My Commission Expires _____

SUBMIT THIS FORM TO OWNER WITHIN TEN (10) DAYS AFTER BID OPENING

LOUISIANA UNIFORM PUBLIC WORK BID FORM

TO: **Calcasieu Parish School Board**
P. O. Box 800
Lake Charles, Louisiana 70602

FOR: **Stem Gymnasium Improvements**
at the Region 5 Stem Center
for the Calcasieu Parish School Board
1509 Enterprise Blvd
Lake Charles, Louisiana 70601
Parish of Calcasieu
State of Louisiana

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: **Champeaux, Evans, Hotard, APAC**, and dated **October 8, 2026**.

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 – *(Owner to provide description of alternate and state whether add or deduct),* for the lump sum of:

****** NOT APPLICABLE ***** Dollars ($ ** NOT APPLICABLE **)

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 **)

LOUISIANA UNIFORM PUBLIC WORK BID FORM

BID FOR:
Stem Gymnasium Improvements
at the Region 5 Stem Center
for the Calcasieu Parish School Board
1509 Enterprise Blvd,
Lake Charles, Louisiana 70601
Parish of Calcasieu
State of Louisiana

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. 2218(A) attached to and made part of this bid.

CPSB NON-COLLUSION AFFIDAVIT

PROJECT NAME: **Stem Gymnasium Improvements at the Region 5 Stem Center for the Calcasieu Parish School Board**
LOCATION: **1509 Enterprise Blvd, Lake Charles, LA 70601**
PROJECT NUMBER: **2027-03PC**

Appearer does hereby attest that:

(1) Bidder is_____of_____, the Bidder that has submitted the above referenced Bid:

(2) Bidder is fully informed respecting the preparations and contents of the attached Bid and of all pertinent circumstances respecting such Bid:

(3) Such Bid is genuine and is not a collusive or sham Bid:

(4) Neither the said Bidder nor any of its officers, partners, owners, agents, representatives, employees or parties in interest, including this affiant, has in any way colluded, conspired, connived or agreed, directly or indirectly with any other Bidder, firm or person to submit a collusive or sham Bid in connection with the Contract for which the attached Bid has been submitted or to refrain from bidding in connection with such Contract, or has in any manner, directly or indirectly, sought by agreement or collusion or communications or conference with any other Bidder or to fix any overhead, profit or cost element of the Bid price or the Bid price of any other Bidder, or to secure through the collusion, conspiracy, connivance or unlawful agreement any advantage against the CALCASIEU PARISH SCHOOL BOARD, or any person interested in the proposed Contract; and

(5) The price or prices quoted in the attached Bid are fair and proper and are not tainted by any collusion, conspiracy, connivance or unlawful agreement on the part of the Bidder or any of its agents, representatives, owners, employees or parties in interest, including this affiant.

_____ _____
NAME OF BIDDER **NAME OF AUTHORIZED SIGNATORY OF BIDDER**

_____ _____
DATE **TITLE OF AUTHORIZED SIGNATORY OF BIDDER**

_____
SIGNATURE OF AUTHORIZED SIGNATORY OF BIDDER

SWORN TO AND SUBSCRIBED before me this_____day of_____, 20____, in Lake Charles, Louisiana.

_____
Notary Public

My Commission Expires _____

SUBMIT THIS FORM TO OWNER WITHIN TEN (10) DAYS AFTER BID OPENING

NON-COLLUSION AFFIDAVIT

PROJECT NAME: **Stem Gymnasium Improvements at the Region 5 Stem Center for the Calcasieu Parish School Board**
LOCATION: **1509 Enterprise Blvd, Lake Charles, LA 70601**
PROJECT NUMBER: **2027-03PC**

Appearer, as a Bidder on the above-entitled Public Works Project, does hereby attest that:
In accordance with the requirements of **Louisiana Revised Statute 38:2224**:

(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.

_____ _____
NAME OF BIDDER **NAME OF AUTHORIZED SIGNATORY OF BIDDER**

_____ _____
DATE **TITLE OF AUTHORIZED SIGNATORY OF BIDDER**

_____
SIGNATURE OF AUTHORIZED SIGNATORY OF BIDDER

SWORN TO AND SUBSCRIBED before me this_____day of_____,
20____, in Lake Charles, Louisiana.

_____
Notary Public

My Commission Expires _____

SUBMIT THIS FORM TO OWNER WITHIN TEN (10) DAYS AFTER BID OPENING

VERIFICATION OF EMPLOYEES AFFIDAVIT

PROJECT NAME: **Stem Gymnasium Improvements at the Region 5 Stem Center for the Calcasieu Parish School Board**
LOCATION: **1509 Enterprise Blvd, Lake Charles, LA 70601**
PROJECT NUMBER: **2027-03PC**

Appearer, as a Bidder on the above-entitled Public Works Project, does hereby attest that:
In accordance with the requirements of **Louisiana Revised Statute 38:2212.10**:

A. Appearer is registered and participates in a status verification system (E-Verify) to verify that all new employees 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 (E-Verify) 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.

_____ _____
NAME OF BIDDER **NAME OF AUTHORIZED SIGNATORY OF BIDDER**

_____ _____
DATE **TITLE OF AUTHORIZED SIGNATORY OF BIDDER**

_____
SIGNATURE OF AUTHORIZED SIGNATORY OF BIDDER

SWORN TO AND SUBSCRIBED before me this_____day of_____,
20____, in Lake Charles, Louisiana.

_____
Notary Public

My Commission Expires _____

SUBMIT THIS FORM TO OWNER WITHIN TEN (10) DAYS AFTER BID OPENING

ATTESTATION - PAST CRIMINAL CONVICTIONS OF BIDDERS

PROJECT NAME: **Stem Gymnasium Improvements at the Region 5 Stem Center for the Calcasieu Parish School Board**
LOCATION: **1509 Enterprise Blvd, Lake Charles, LA 70601**
PROJECT NUMBER: **2027-03PC**

Appearer, as a Bidder on the above-entitled Public Works Project, does hereby attest that: In accordance with the requirements of **Louisiana Revised Statute 38:2227**:

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)
   (b) Corrupt influencing (R.S. 14:120)
   (c) Extortion (R.S. 14:66)
   (d) Money laundering (R.S. 14:23)

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)
   (b) Identity Theft (R.S. 14:67.16)
   (c) Theft of a business record (R.S.14:67.20)
   (d) False accounting (R.S. 14:70)
   (e) Issuing worthless checks (R.S. 14:71)
   (f) Bank fraud (R.S. 14:71.1)
   (g) Forgery (R.S. 14:72)
   (h) Contractors; misapplication of payments (R.S. 14:202)
   (i) Malfeasance in office (R.S. 14:134)

_____ _____
NAME OF BIDDER **NAME OF AUTHORIZED SIGNATORY OF BIDDER**

_____ _____
DATE **TITLE OF AUTHORIZED SIGNATORY OF BIDDER**

_____
SIGNATURE OF AUTHORIZED SIGNATORY OF BIDDER

SUBMIT THIS FORM TO OWNER WITHIN TEN (10) DAYS AFTER BID OPENING

CERTIFICATION REGARDING UNPAID WORKER'S COMPENSATION INSURANCE

PROJECT NAME: **Stem Gymnasium Improvements at the Region 5 Stem Center for the Calcasieu Parish School Board**
LOCATION: **1509 Enterprise Blvd, Lake Charles, LA 70601**
PROJECT NUMBER: **2027-03PC**

Appearer, as a Bidder on the above-entitled Public Works Project, does hereby certify that: In accordance with the requirements of **Louisiana Revised Statute 23:1726(B)**:

A. L.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 below, 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

SUBMIT THIS FORM TO OWNER WITHIN TEN (10) DAYS AFTER BID OPENING

SUBCONTRACTOR APPROVAL LIST

PROJECT NAME: **Stem Gymnasium Improvements**
at the Region 5 Stem Center
for the Calcasieu Parish School Board
LOCATION: **1509 Enterprise Blvd, Lake Charles, LA 70601**
PROJECT NUMBER: **2027-03PC**

WORK DESCRIPTION	SUBCONTRACTOR	LICENSE NUMBER	FED. I.D. NUMBER

CONTRACT BETWEEN OWNER & CONTRACTOR

and

PERFORMANCE & PAYMENT BOND

This agreement, entered into this **<< day >>** day of **<<month>>, 2026**, by and between **<< insert name of Contractor >>**, hereinafter called the "Contractor", whose business address is **<< insert Contractor's address >>**, and the **Calcasieu Parish School Board**, 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:

Stem Gymnasium Improvements
at the Region 5 Stem Center
for the Calcasieu Parish School Board

1500 Enterprise Blvd, Lake Charles, LA 70601

CPSB Project No.: 2027-03PC

in strict accordance with the Contract Documents prepared by:

Champeaux Evans Hotard, APAC
702. Dr. Michael Debakey Drive
Lake Charles, LA 70601

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 **October 8, 2026**, Addenda **<< # and dated of Addenda >>**, the Instructions To Bidders, the Bid Form, the General Conditions Of The Contract For Construction, the 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 **###** consecutive calendar days from and after the said date. Time is of the essence.

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 **<< insert Contract Sum >> Dollars and no/100 Dollars ($###,###.00)**, which sum represents the **Base Bid, including Alternate No(s). ############**.

PERFORMANCE & 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 **<< insert Contract Sum >> and no/100 Dollars ($###,###.00)**.

The condition of this Performance & 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 of 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.

In witness hereof, the parties herein on the day and year first written above 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.

WITNESSES:

_____ **##########**
CONTRACTOR

_____ By: _____

_____
Title

_____ **Calcasieu Parish School Board**
OWNER

_____ By: _____
Dr. Jason Vanmetre
Superintendent
Title

_____ **##########**
SURETY

_____ By:_____

_____
ATTORNEY IN FACT

DRAFT

AIA® Document A201® – 2017

General Conditions of the Contract for Construction

for the following PROJECT:
(Name and location or address)

« »
« »

THE OWNER:
(Name, legal status and address)

« »« »
« »

THE ARCHITECT:
(Name, legal status and address)

« »« »
« »

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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.

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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User Notes: (1262048584)

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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.

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§ 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 protocols governing the transmission and use of Instruments of Service or any other information or documentation in digital form. The parties will use AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, to establish the protocols for the development, use, transmission, and exchange of digital data.

§ 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 protocols governing the use of, and reliance on, the information contained in the model and without having those protocols set forth in AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, and the requisite AIA Document

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G202™–2013, Project Building Information Modeling Protocol Form, 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.

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§ 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.

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§ 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.

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§ 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.

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§ 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

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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

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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.

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§ 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.

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§ 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.

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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.

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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.

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§ 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 7.3.3.3, 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:

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.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.

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§ 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.

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§ 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;

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.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.

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§ 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.

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§ 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

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.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

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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

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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

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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.

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§ 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

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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.

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§ 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.

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§ 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.

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§ 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.

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§ 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.

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User Notes: (1262048584)

§ 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.

DRAFT

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User Notes: (1262048584)

CHANGE ORDER

Change Order No.: ##
Date: ########## ##, 202#
Contract Date: ########## ##, 202#

Project Name: **Stem Gymnasium Improvements at the Region 5 Stem Center for the Calcasieu Parish School Board**

CPSB Project No.: **2027-03PC**

To: ##########################
##########################
##########################

You are hereby directed to make the following change(s) in this Contract:
Refer to attached Itemized Recap Sheet.

The Original Contract Sum	$ #,###,###.##
Net Change by Previous Change Order	$ ##,###.##
Contract Sum Prior to this Change Order	$ #,###,###.##
Contract Sum will be **INCREASED** by this Change Order	$ ###,###.##
New Contract Sum Including this Change Order	$ #,###,###.##
Contract Time will be **INCREASED** by:	## **days**

Notes: ##################################
##################################

Revised Contract Completion Date: ######## ##, 202#

RECOMMENDED	ACCEPTED	APPROVED
Champeaux Evans Hotard, APAC	##################	**Calcasieu Parish School Board**
(ARCHITECT)	################## **(CONTRACTOR)**	**(OWNER)**
702 Dr. Michael Debakey Dr.	##################	**P. O. Box 800**
Lake Charles, LA 70601	#########, ## #####	**Lake Charles, LA 70615**
By: _____	By: _____	By: _____
Dated: _____	Dated: _____	Dated: _____

AIA® Document G702™ – 1992

Application and Certificate for Payment

TO OWNER:

PROJECT: DRAFT

APPLICATION NO: 001

Distribution to:
OWNER:
ARCHITECT:
CONTRACTOR:
FIELD:
:

PERIOD TO:

CONTRACT FOR: General Construction

CONTRACT DATE:

PROJECT NOS: / /

FROM CONTRACTOR:

VIA ARCHITECT:

CONTRACTOR'S APPLICATION FOR PAYMENT

Application is made for payment, as shown below, in connection with the Contract.
Continuation Sheet, AIA Document G703, is attached.

1. ORIGINAL CONTRACT SUM	$0.00
2. NET CHANGE BY CHANGE ORDERS	$0.00
3. CONTRACT SUM TO DATE (Line 1 ± 2)	$0.00
4. TOTAL COMPLETED & STORED TO DATE (Column G on G703)	$0.00
5. RETAINAGE:	
a. 0 % of Completed Work (Column D + E on G703: $0.00)=	$0.00
b. 0 % of Stored Material (Column F on G703: $0.00)=	$0.00
Total Retainage (Lines 5a + 5b or Total in Column I of G703)	$0.00
6. TOTAL EARNED LESS RETAINAGE (Line 4 Less Line 5 Total)	$0.00
7. LESS PREVIOUS CERTIFICATES FOR PAYMENT (Line 6 from prior Certificate)	$0.00
8. CURRENT PAYMENT DUE	$0.00
9. BALANCE TO FINISH, INCLUDING RETAINAGE (Line 3 less Line 6)	$0.00

CHANGE ORDER SUMMARY	ADDITIONS	DEDUCTIONS
Total changes approved in previous months by Owner	$0.00	$0.00
Total approved this Month	$0.00	$0.00
TOTALS	$0.00	$0.00
NET CHANGES by Change Order		$0.00

The undersigned Contractor certifies that to the best of the Contractor's knowledge, information and belief the Work covered by this Application for Payment has been completed in accordance with the Contract Documents, that all amounts have been paid by the Contractor for Work for which previous Certificates for Payment were issued and payments received from the Owner, and that current payment shown herein is now due.

CONTRACTOR:

By: _____ Date: _____

State of:
County of:
Subscribed and sworn to before me this day of
Notary Public:
My Commission expires:

ARCHITECT'S CERTIFICATE FOR PAYMENT

In accordance with the Contract Documents, based on on-site observations and the data comprising this application, the Architect certifies to the Owner that to the best of the Architect's knowledge, information and belief the Work has progressed as indicated, the quality of the Work is in accordance with the Contract Documents, and the Contractor is entitled to payment of the AMOUNT CERTIFIED.

AMOUNT CERTIFIED $0.00

(Attach explanation if amount certified differs from the amount applied. Initial all figures on this Application and on the Continuation Sheet that are changed to conform with the amount certified.)

ARCHITECT:

By: _____ Date: _____

This Certificate is not negotiable. The AMOUNT CERTIFIED is payable only to the Contractor named herein. Issuance, payment and acceptance of payment are without prejudice to any rights of the Owner or Contractor under this Contract.

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AIA® Document G703™ – 1992

Continuation Sheet

AIA Document, G702™–1992, Application and Certification for Payment, or G736™–2009, Project Application and Project Certificate for Payment, Construction Manager as Adviser Edition, containing Contractor's signed certification is attached.
In tabulations below, amounts are in US dollars.
Use Column I on Contracts where variable retainage for line items may apply.

APPLICATION NO:	001
APPLICATION DATE:	
PERIOD TO:	
ARCHITECT'S PROJECT NO:	

A	B	C	D	E	F	G		H	I
			WORK COMPLETED						
ITEM NO.	DESCRIPTION OF WORK	SCHEDULED VALUE	FROM PREVIOUS APPLICATION (D + E)	THIS PERIOD	MATERIALS PRESENTLY STORED (NOT IN D OR E)	TOTAL COMPLETED AND STORED TO DATE (D + E + F)	% (G ÷ C)	BALANCE TO FINISH (C - G)	RETAINAGE (IF VARIABLE RATE)
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
	GRAND TOTAL	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00%**	**0.00**	**0.00**

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User Notes:
(1177251379)

BENEFICIAL OCCUPANCY

*** Not for Recordation ***

Date: **########## ##, 202#**

Project Name: **Stem Gymnasium Improvements**
at the Region 5 Stem Center
for the Calcasieu Parish School Board
1509 Enterprise Blvd, Lake Charles, LA 70601

Project No.: **CPSB Project No.: 2027-03PC**

Architect: **Champeaux Evans Hotard, APAC**
702 Dr. Michael DeBakey Drive
Lake Charles, LA 70601

Contractor: **##########**
##########
##########

Owner: **Calcasieu Parish School Board**
P. O. Box 800
Lake Charles, LA 70615

The Owner desires to utilize the portion(s) of the Project described below prior to Substantial Completion.

The portion(s) of the Project described below is/are, to the best of my knowledge and belief, complete to a point that they may be legally occupied, and utilized as intended, in accordance with the requirements of the Contract Documents.

The Owner's occupancy of any portion of this project shall not violate any applicable warranties, and does not constitute Acceptance of the Project, as a whole.

The portion(s) of the subject Project described below is, to be best of my knowledge and belief, complete to a point that the Owner desires to use in accordance with the requirements of the Contract Documents.

Portion(s) Occupied: **<< describe portions of Project >>**

Date Occupied: **<< insert date of Beneficial Occupancy >>**

Warranty Items Covered by Occupancy: **##########**
##########

Punch List attached, dated: **######### ##, 202#** *(or, indicate "Not Applicable")*

Value of Punch List dated : **$##,###.##** *(or, indicate "Not Applicable")*

BENEFICIAL OCCUPANCY
*** Not for Recordation ***

########## ##, 202#

Stem Gymnasium Improvements
at the Region 5 Stem Center
for the Calcasieu Parish School Board
1509 Enterprise Blvd, Lake Charles, LA 70601

CPSB Project No.: 2027-03PC

Accepted by:

_____
Architect
Champeaux Evans Hotard, APAC

_____
Contractor
##########

_____
Owner
Calcasieu Parish School Board

*** Not for Recordation ***

RECOMMENDATION OF ACCEPTANCE

Date: **########## ##, 202#**

Project Name: **Stem Gymnasium Improvements**
at the Region 5 Stem Center
for the Calcasieu Parish School Board
1509 Enterprise Blvd, Lake Charles, LA 70601

Project No.: **CPSB Project No.: 2027-03PC**

Architect: **Champeaux Evans Hotard, APAC**
702 Dr. Michael DeBakey Drive
Lake Charles, LA 70601

Contractor: **##########**
##########
##########

Owner: **Calcasieu Parish School Board**
P. O. Box 800
Lake Charles, LA 70602

I hereby certify that, to the best of my knowledge and belief, this project is complete or substantially complete, in accordance with the plans and specifications to a point that it can be used for the purpose intended, and I hereby recommend that this project be accepted.

Date of Acceptance by Architect: **######## ##, 202#**

Contract Date of Completion: **######## ##, 202#**

Number of Days **Over Run / Under Run: ######### (##) Days**

Liquidated Damages Per Day Stipulated in Contract: **$500.00**

Value of Punch Lists (Itemized List Attached): **$##,###.##**

Was Part of the Project Occupied Prior To Acceptance: **Yes / No**

Portion(s) Occupied Prior To Acceptance (Attach Beneficial Occupancy Forms):

##########

Acceptance Recommended by: _____
Champeaux Evans Hotard, APAC

For Use By Owner:

I concur in the Acceptance of this project: _____
Calcasieu Parish School Board

LOUISIANA DEPARTMENT of REVENUE

Public Projects Contractor/Subcontractor

Sales Tax Certification and Exemption Application
Louisiana Revised Statute 47:305.7(A)(1)(b)

For questions about this form, please contact:
Louisiana Department of Revenue
Taxpayer Compliance - SES Division
Phone: (855) 307-3893
Email: LDRSales.ExemptionApplications@la.gov

This form is for use by contractors and subcontractors when applying for certification and exemption from the collection of sales tax in accordance with La. R.S. 47:305.7(A)(1)(b).

Please complete the application below and return it via email to LDRSales.ExemptionApplications@la.gov along with a copy of the executed contract.

Applicant Information

Contractor Legal Name	LDR Sales Tax Account Number		
Contractor Trade Name			
Physical Address	City	State	ZIP
Mailing Address	City	State	ZIP
Contact Person	Contact Number		
Email Address			

Public Entity Information

Public Entity	LDR Sales Tax Account Number *(if applicable)*

Contract Information

Contract Number	Contract Beginning Date *(mm/dd/yyyy)*	Contract End Date *(mm/dd/yyyy)*
Contract Description		

Please select the legal status of the public entity listed above:

- ☐ State agency, board, or commission
- ☐ Municipal government or instrumentality thereof
- ☐ Public charter school (La. R.S. 17:3971-4001)
- ☐ Hospital service district
- ☐ Public housing authority
- ☐ Parish government or instrumentality thereof
- ☐ Parish school board or public school
- ☐ Law enforcement district
- ☐ Waterworks district
- ☐ Parish and municipal libraries
- ☐ Other _____

Under the penalty of perjury, I declare that I am authorized to sign this application on behalf of the above named contractor, and that I have examined this application, and to the best of my knowledge, it is true, correct, and complete.

Name *(Please print)*	Title
Signature	Date *(mm/dd/yyyy)*

A copy of the contract with all parties' signatures must be attached to the application. Failure to provide a copy of the contract will result in delays in the evaluation process.

LOUISIANA DEPARTMENT of REVENUE

TAX POLICY & PLANNING

Revenue Information Bulletin

Revenue Information Bulletin No. 25-023
August 14, 2025

Sales Tax

2025 Regular Session
Exemption for General Contractors and Subcontractors of Public Projects

Act 384 of the 2025 Regular Session of the Louisiana Legislature extended the governmental sales tax exemption in La. R.S. 47:305.7(A), effective July 1, 2025. The state and local sales and use tax exemption now applies to certain purchases made by general contractors and their subcontractors when performing work pursuant to construction contracts for the state, local governments, or any agency, board, commission or instrumentality of the state ("public projects")[1]. The exemption is limited to purchases of materials and equipment rentals for the construction contract.

General contractors and their subcontractors must each complete and submit a separate Form R-85012, *Public Projects Contractor/Subcontractor Certification and Exemption Application*[2], electronically, through Louisiana Taxpayer Access Point ("LaTAP"),[3] along with a copy of the contract. The application shall include the job description, contract number, state or local government entity identifying information, and valid dates or a date range for the construction project. Taxpayers must have a LaTAP account to use the electronic application and access their exemption certificate. An application may be submitted for a public project contract that was executed prior to July 1, 2025. However, the exemption does not apply to purchases made prior to July 1, 2025.

Upon approval, Form R-85014, *Public Projects Contractor/Subcontractor Certification and Sales Tax Exemption Certificate* will be issued and must be presented to vendors when making purchases. Local sales and use tax collectors shall accept the exemption certificates issued by the Department of Revenue. General contractors and subcontractors may not use the Form R-1056, *Purchases by Political Subdivisions of the State of Louisiana*. Form R-1056 may only be used by political subdivisions of Louisiana. Also, general contractors and subcontractors who have been designated as an agent of a governmental entity by using the Form R-1020, *Designation of Construction Contractor as Agent of a Governmental Entity* are

[1] La. R.S. 47:305.7(A)(1)(b)

[2] Pending availability of the electronic application in LaTAP, taxpayers may use the paper form, Form R-85012-T, *Public Projects Contractor/Subcontractor Sales Tax Certification and Exemption Application*. Upon approval, an exemption certificate will be mailed to the taxpayer if not yet available in LaTAP.

[3] A LaTAP account can be created by following this link.

A Revenue Information Bulletin (RIB) is issued under the authority of LAC 61:III.101.D. A RIB is an informal statement of information issued for the public and employees that is general in nature. A RIB does not have the force and effect of law and is not binding on the public or the Department.

not required to obtain a Form R-85014. The R-1020 allows for the purchase of construction materials, services, leases and rentals without the payment of tax.

Pursuant to La. R.S. 47:305.7(A)(1)(c), the exemption does not apply to general contractors or subcontractors making purchases related to payment in lieu of taxes ("PILOT") agreements or other similar agreements executed after July 1, 2025, unless the agreement is approved by the secretary of the Department of Revenue ("LDR") and the secretary of the Louisiana Economic Development ("LED"). Requests for approval of PILOT agreements should be submitted to LDR first at LDRPILOTrequests@la.gov. Once approved by LDR, the request will be forwarded to LED.

Questions about completing the Form R-85012 should be emailed to LDRSales.ExemptionApplications@la.gov. Questions concerning this Bulletin should be directed by e-mail to Policy@la.gov.

Richard Nelson
Secretary

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LOUISIANA DEPARTMENT of REVENUE
Tax Policy & Planning
Revenue Information Bulletin

Revenue Information Bulletin No. 26–010
March 17, 2026
Sales Tax

Qualifying Purchases for Contractors and Subcontractors on Public Construction Projects

Act 384 of the 2025 Regular Session of the Louisiana Legislature extended the governmental sales and use tax exemption in R.S. 47:305.7(A). Effective July 1, 2025, the state and local sales and use tax exemption applies to certain purchases made by general contractors and their subcontractors related to performing work pursuant to construction contracts for the state, local governments, or any agency, board, commission, or instrumentality of the state ("public projects").[1]

The exemption is limited to purchases of materials and equipment rentals for public projects. This RIB explains the conditions under which general contractors and subcontractors ("contractors") may qualify for the exemption when making purchases related to public construction projects, clarifies the ownership and use requirements necessary for exemption eligibility, and provides examples of purchases that do and do not qualify for the exemption.

Purchases Eligible for Exemption

To qualify for the exemption, the tangible personal property must be purchased for exclusive and direct use in performing a public construction contract and, upon completion of the public project, be incorporated into and owned by the public entity as part of the completed immovable property. Examples include, but are not limited to, nails, sheetrock, HVAC systems, and concrete retained by the public entity upon completion of the contract.

The exemption also applies to leases and rentals of tangible personal property, but only when the leased or rented property is used exclusively in the construction of the public project and would have qualified for exemption if leased or rented directly by the public entity. Illustrative examples include cranes for structural framing, concrete pump trucks, and excavators leased solely for use on the public project.

Purchases Not Eligible for Exemption

Leases or rentals of tangible personal property that are used to support the general operations but are not directly used in the performance of the public construction contract

[1] La. R.S. 47:305.7(A)(1)(b). See Revenue Information Bulletin 25-023 for more information about the application process and exemption certificate requirements.

do not qualify for the exemption. Some examples are bus rentals to transport workers to the site, office trailers or job site offices, portable restroom facilities, and temporary storage containers used in the performance of the contract.

Materials, consumables, and equipment that remain the property of the contractor upon completion of the contract do not qualify for the exemption. Such examples may include hammers, reciprocating saws, ladders, generators, and other small equipment or tools that remain the property of the contractor upon completion of the contract.

Materials and consumables used to operate or maintain equipment in support of the construction process do not qualify for the exemption. Examples may include fuel, lubricants, coolants, and cleaning solvents used on equipment in support of completion of the contract.

Materials and consumables used as worker safety or protective equipment do not qualify for the exemption. Examples may include hard hats, safety gloves, safety glasses, fall protection, and other personal protective equipment used in support of completion of the contract.

Charges for services or labor do not qualify for the exemption because they do not constitute purchases of tangible property under R.S. 47:305.7(A).

Additionally, the exemption does not apply to property owned by a public entity and leased to a private party under a payment in lieu of taxes or other similar agreement unless the agreement is approved by the Secretary of the Department of Revenue and the Secretary of the Louisiana Department of Economic Development.[2]

Questions concerning this publication should be directed by email to PolicySales@La.gov.

Jarrod Coniglio
Secretary

[2] La. R.S. 47:305.7(A)(1)(c). See Revenue Information Bulletin 25-022 for more information.

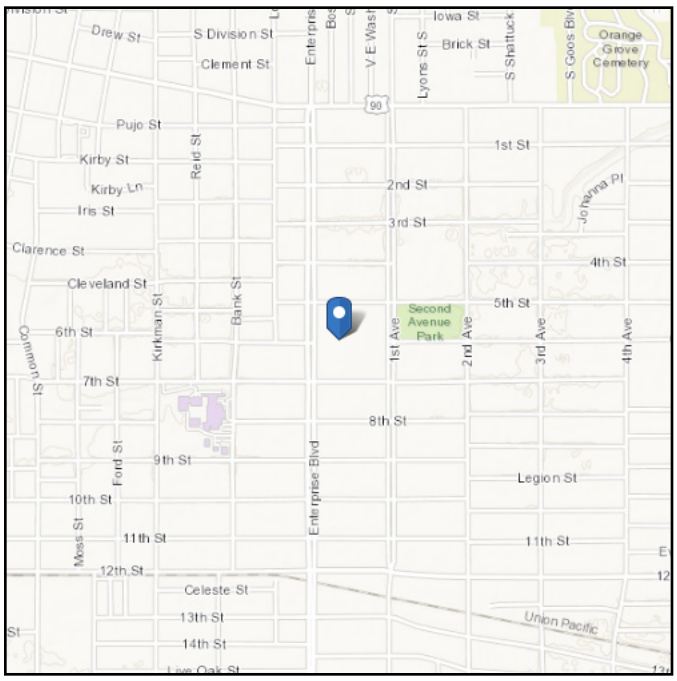
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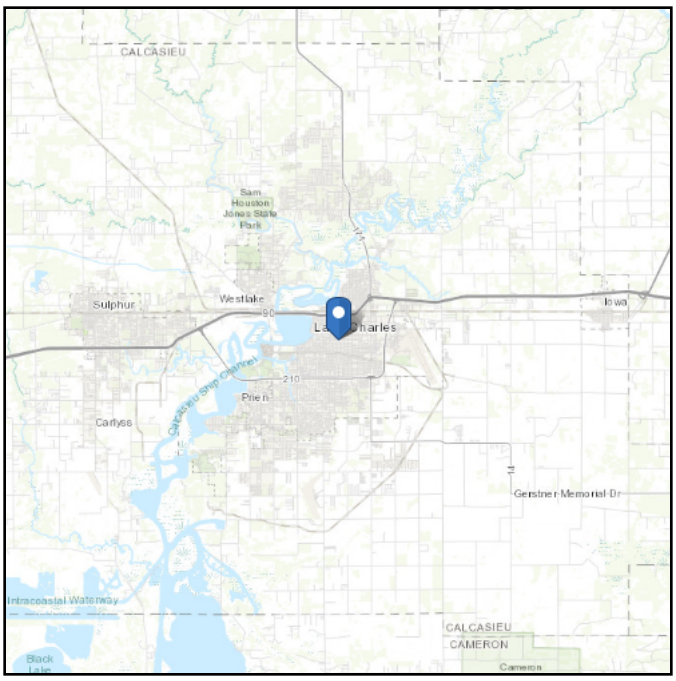
ASCE Hazards Report

Address:
1509 Enterprise Blvd
Lake Charles, Louisiana
70601

Standard: ASCE/SEI 7-16
Risk Category: III
Soil Class: undefined

Latitude: 30.220276
Longitude: -93.203302
Elevation: 13.652860459857399 ft (NAVD 88)





Wind

Results:

Wind Speed	141 Vmph
10-year MRI	75 Vmph
25-year MRI	87 Vmph
50-year MRI	97 Vmph
100-year MRI	106 Vmph

Data Source: ASCE/SEI 7-16, Fig. 26.5-1C and Figs. CC.2-1–CC.2-4, and Section 26.5.2
Date Accessed: Tue Jun 16 2026

Value provided is 3-second gust wind speeds at 33 ft above ground for Exposure C Category, based on linear interpolation between contours. Wind speeds are interpolated in accordance with the 7-16 Standard. Wind speeds correspond to approximately a 3% probability of exceedance in 50 years (annual exceedance probability = 0.000588, MRI = 1,700 years).

Site is in a hurricane-prone region as defined in ASCE/SEI 7-16 Section 26.2. Glazed openings in health-care facilities shall be protected against wind-borne debris as specified in Section 26.12.3.

The ASCE Hazard Tool is provided for your convenience, for informational purposes only, and is provided “as is” and without warranties of any kind. The location data included herein has been obtained from information developed, produced, and maintained by third party providers; or has been extrapolated from maps incorporated in the ASCE standard. While ASCE has made every effort to use data obtained from reliable sources or methodologies, ASCE does not make any representations or warranties as to the accuracy, completeness, reliability, currency, or quality of any data provided herein. Any third-party links provided by this Tool should not be construed as an endorsement, affiliation, relationship, or sponsorship of such third-party content by or from ASCE.

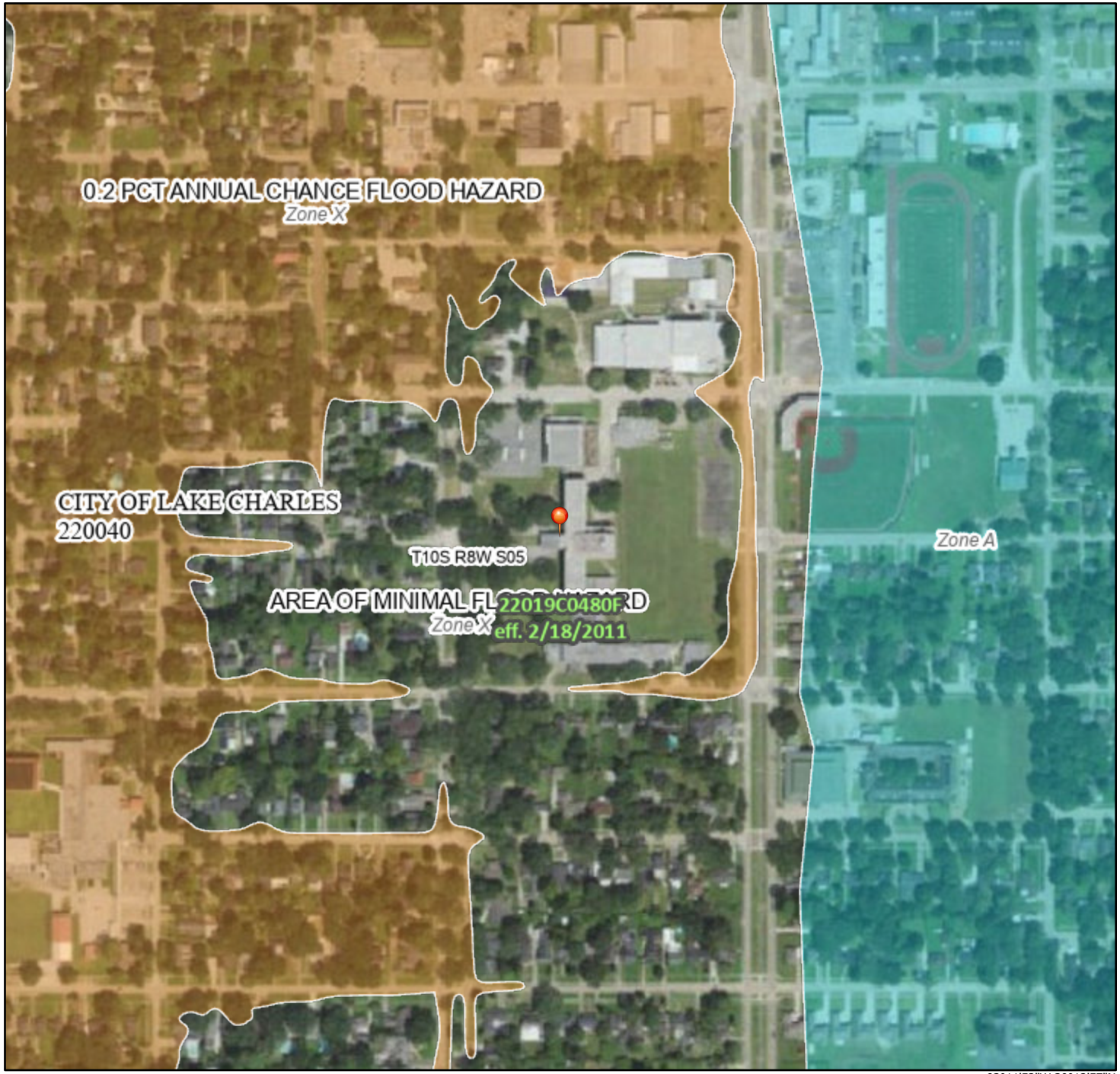
ASCE does not intend, nor should anyone interpret, the results provided by this Tool to replace the sound judgment of a competent professional, having knowledge and experience in the appropriate field(s) of practice, nor to substitute for the standard of care required of such professionals in interpreting and applying the contents of this Tool or the ASCE standard.

In using this Tool, you expressly assume all risks associated with your use. Under no circumstances shall ASCE or its officers, directors, employees, members, affiliates, or agents be liable to you or any other person for any direct, indirect, special, incidental, or consequential damages arising from or related to your use of, or reliance on, the Tool or any information obtained therein. To the fullest extent permitted by law, you agree to release and hold harmless ASCE from any and all liability of any nature arising out of or resulting from any use of data provided by the ASCE Hazard Tool.

National Flood Hazard Layer FIRMette

FEMA

93°12'31"W 30°13'29"N



93°11'53"W 30°12'57"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

Basemap Imagery Source: USGS National Map 2023

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 9/30/2026 at 6:14 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

SECTION 011000 – PROJECT SUMMARY

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. The Project shall include all work as detailed in and/or as described by the Contract Documents.

1.2 WORK COVERED BY THE CONTRACT DOCUMENTS

A. The Work of the Project is defined by the Contract Documents and consists of, but is not necessarily limited to, the following:

1. The project is broken up into two parts for bidding purposes:
   - Base Bid – This project consists of the renovation of the existing "small" gymnasium at the former Lake Charles Boston campus, currently referred to as the "Stem Gym." The project also includes renovations to support spaces surrounding the gym, including the addition of new restroom facilities and a concession area. The project further includes exterior site improvements to the area immediately west of the gym.
   - Add Alternate #1- N/A.

1.3 ALTERNATES

B. There is NO (0) Alternate(s).

1. Add Alternate No.1 –N/A.
2. Refer to Specification Section 012300 "Alternates".

1.4 PROJECT BUDGET

A. Project Budget for bonding purposes is **Two Million Six Hundred Thousand Dollars ($2,600,000.00)**

a. Budgets are solely for bonding purposes. These budgets do not guarantee acceptance of any specific amount. The actual awarding of the project will be decided by the Owner and will depend on the funds available at the time of bidding.

1.5 COMPLETION TIME

A. The Bidder shall agree to fully complete the contract within **240 consecutive calendar days**, subject to such extensions as may be granted and acknowledges that this construction time will start on or before the date specified in the written "Notice to Proceed" from the Owner.

1.6 LIQUIDATED DAMAGES

A. The Bidder shall agree to pay as Liquidated Damages the amount of **Five Hundred Dollars ($ 500.00)**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.

1.7 UNIT PRICES

A. There is NO(0) Unit Prices and associated Unit Price Allowances, as noted below:

1. ~~Unit Price No.1 – Furnish and Install Additional Excavation & Compacted, Structural Fill, Per Cubic Yard, Measured In-Place (Actual quantity to be verified and documented in the field).~~

~~*Note: The Unit Price **Extension shall be included as an Allowance** included in the Contractor's Bid, as directed in Specification Section 012100 "Allowances" and 012400 "Unit Prices".*~~

2. ~~Refer to Specification Section 012100 "Allowances" and 012400 "Unit Prices".~~

1.8 ALLOWANCES

A. There are TWO (2) Allowances, as noted below:

1. Contingency Allowance - **$100,000.00**
2. Landscaping Allowance - **$20,000.00**
3. ~~Arborist Allowance -~~
4. ~~Unit Price Extension Allowance - Furnish and Install **0 Cubic Yards** of Additional Excavation & Compacted, Structural Fill, Measured In-Place~~.
5. Refer to Specification Section 012100 "Allowances" and 012400 "Unit Prices".

1.9 UTILITY SERVICES AND ASSOCIATED FEES

A. Utility Services. Responsibility for the following utility services and associated fees will be as noted below, and that party shall bear the cost of any applicable utility service fees for the same:

~~a. Electrical Service to the Meter Location – *N/A.*~~

~~b. Domestic Water Tap & Service to the Meter Location – *N/A.*~~

~~c. Fire Water Tap & Service to the Meter Location – *N/A.*~~

~~d. *Irrigation Water Tap & Service to the Meter Location – N/A.*~~

~~e. Gas Tap & Service to the Meter Location – *N/A.*~~

~~f. Sewer Tap & Service to the site - *NA.*~~

~~g. Telephone Service – *Not Required*~~

~~*a. Fire Alarm Monitoring shall be provided by Cellular Communicator.*~~
~~*b. Elevator Monitoring shall be provided by Cellular Communicator.*~~

h. DATA Service – *Owner.*

1.10 TESTING

A. ALL testing is to be provided by OWNER. Reference Section 014000 "Quality Requirements" for additional information.

1.11 REQUIRED DOCUMENTS

A. **Bid Day Documents**: Reference "List of Required Documents" in Project Manual.

a. Louisiana Uniform Public Works Bid Form
b. Louisiana Uniform Public works Bid Form – Unit Price Form (when applicable)
c. Bid Bond Form (with Power of Attorney if applicable)
d. Evidence of Corporate Authority of the person signing the Bid, in accordance with LA. R.S. 38:2212(5).

B. **Ten Day Documents**: Reference "List of Required Documents" in the Project Manual.

a. Resolution
b. Non-Collusion Affidavit of Prime Bidder
c. Affidavit (R.S. 38:2224, 38:2190, and 38:2290-2296, as amended)
d. Attestation Form – Past Criminal Conviction of Bidders (R.S. 38:2227)
e. Affidavit - Verification of Employees (R.S. 38:2212.10)
f. Subcontractor Listing
g. Roofing Manufacturer's Certification and Compliance Letter

C. **Pre-Construction Documents**: To be provided prior to receiving an approved first Application for Payment, preferably at the Pre-Construction Conference.

a. Critical Path Schedule
b. Schedule of Values
c. Fixed Job Site Overhead Costs
d. Insurance & Bond Premium Overhead Rates
e. Labor Burden

f. Internal Rate Charges for all Significant Company Owned Equipment

g. Recordation of Contract Receipt

h. Proof of Insurance(s) (Reference Insurance Requirements in the Project Manual)

i. Proof of Builders Risk

j. Proof of Workers Compensation

1.12 COORDINATION & INTERACTION WITH SITE AND OCCUPANTS

A. Owner Occupancy: The Owner WILL occupy the premises during the construction period.

END OF SECTION 011000

SECTION 01 21 00 - ALLOWANCES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements governing the following:

1. **THERE IS A CONTINGENCY ALLOWANCE OF $100,000.00.**

2. **THERE IS A LANDSCAPING ALLOWANCE OF $20,000.**

~~3. THERE IS AN ARBORIST ALLOWANCE OF N/A.~~

1.2 SELECTION AND PURCHASE

A. At the earliest practical date after award of the Contract, advise Architect of the date(s) when final selection and purchase of any product(s) and/or system(s) described by an allowance must be completed, in order to avoid delays to the Work.

B. At the Architect's request, obtain multiple proposals for each item to be included provided for by use of the allowance.

C. Purchase and install products and/or systems selected by Architect from the designated and approved supplier(s).

1.3 SUBMITTALS

A. Submit proposals for purchase of products or systems included in allowances, in the format and with supporting documentation, as required by the Owner for all Change Order Requests.

B. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.

C. Coordinate and process submittals for items related to allowances in the same manner as required for other portions of the Work.

1.4 COORDINATION

A. Coordinate allowance items with other portions of the Work. Furnish templates as required to coordinate installation.

1.5 LUMP-SUM, UNIT-COST, AND QUANTITY ALLOWANCES

A. Allowance shall include cost to Contractor of specific products and materials ordered by Owner under allowance and shall include taxes, freight, and delivery to Project site.

B. Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, and similar costs related to products and materials ordered by Owner under allowance shall be included as part of the Contract Sum and not part of the allowance.

1.6 **CONTINGENCY ALLOWANCE**

A. **The Contractor shall include in his Bid Amount a Contingency Allowance in the lump sum amount of :**

$100,000.00 (ONE HUNDRED THOUSAND DOLLARS AND NO CENTS)

B. The amount of the Contingency Allowance is to be included in the Contractor's Bid Amount, in such a way that the total amount of the Contingency Allowance is incorporated PRIOR to the application of the Contractor's Overhead and Profit, Insurances, Bonds, Permits, Fees, Supervision, field expenses, and other related costs.

C. The Contractor's Overhead and Profit, Insurance, Bonds, Permits, Fees, Supervision, field expenses, and other related costs associated with the work to be applied to the Contingency Allowance are to be included in the Original Contract Sum, but are not part of the Contingency Allowance.

D. Change Orders to be applied to the Contingency Allowance will include only the actual Materials, Sales and Use Taxes (if applicable), Labor, Labor Taxes, and Equipment Rental costs directly associated with the work being applied to the Contingency Allowance. No Overhead, Profit, Insurance, Bonds, Permits, Fees, Supervision, field expenses, or other similar costs will be applied to the Contingency Allowance.

E. The Contingency Allowance shall be listed as a separate line item on the Contractor's Application for Payment.

F. The contingency allowance shall be used only as directed by the Architect, and as approved by the Owner. Amounts to be charged to the Contingency Allowance shall be applied only upon receipt and approval of a formal written Change Order Request detailing the Change, along with all required supporting information.

G. Change Orders authorizing the use of funds from the Contingency Allowance will not include the Contractor's Overhead and Profit margins, Insurance, Bonds, Permits, Fees, Supervision, Field Expenses, or related costs.

H. At Project closeout, any unused amounts remaining in the Contingency Allowance will be credited to Owner by a formal, written Change Order.

1.7 LANDSCAPING ALLOWANCE

A. **The Contractor shall include in his Bid Amount a Contingency Allowance in the lump sum amount of :**

$20,000.00 (TWENTY THOUSAND DOLLARS AND NO CENTS).

B. The amount of the Landscaping Allowance is to be included in the Contractor's Bid Amount, in such a way that the total amount of the Contingency Allowance is incorporated PRIOR to the application of the Contractor's Overhead and Profit, Insurances, Bonds, Permits, Fees, Supervision, field expenses, and other related costs.

C. The Contractor's Overhead and Profit, Insurance, Bonds, Permits, Fees, Supervision, field expenses, and other related costs associated with the work to be applied to the Landscaping Allowance are to be included in the Original Contract Sum, but are not part of the Landscaping Allowance.

D. Change Orders to be applied to the Landscaping Allowance will include only the actual Materials, Sales and Use Taxes (if applicable), Labor, Labor Taxes, and Equipment Rental costs directly associated with the work being applied to the Landscaping Allowance. No Overhead, Profit, Insurance, Bonds, Permits, Fees, Supervision, field expenses, or other similar costs will be applied to the Landscaping Allowance.

E. The Landscaping Allowance shall be listed as a separate line item on the Contractor's Application for Payment.

F. The Landscaping allowance shall be used only as directed by the Architect, and as approved by the Owner. Amounts to be charged to the Landscaping Allowance shall be applied only upon receipt and approval of a formal written Change Order Request detailing the Change, along with all required supporting information.

G. Change Orders authorizing the use of funds from the Landscaping Allowance will not include the Contractor's Overhead and Profit margins, Insurance, Bonds, Permits, Fees, Supervision, Field Expenses, or related costs.

H. At Project closeout, any unused amounts remaining in the Landscaping Allowance will be credited to Owner by a formal, written Change Order.

~~1.8 ARBORIST ALLOWANCE~~

~~A. **The Contractor shall include in his Bid Amount a Contingency Allowance in the lump sum amount of :**~~

~~**$N/A**~~

~~B. The amount of the Arborist Allowance is to be included in the Contractor's Bid Amount, in such a way that the total amount of the Contingency Allowance is incorporated PRIOR to the application of the Contractor's Overhead and Profit, Insurances, Bonds, Permits, Fees, Supervision, field expenses, and other related costs.~~

~~C. The Contractor's Overhead and Profit, Insurance, Bonds, Permits, Fees, Supervision, field expenses, and other related costs associated with the work to be applied to the Arborist Allowance are to be included in the Original Contract Sum, but are not part of the Arborist Allowance.~~

~~D. Change Orders to be applied to the Arborist Allowance will include only the actual Materials, Sales and Use Taxes (if applicable), Labor, Labor Taxes, and Equipment Rental costs directly associated with the work being applied to the Landscaping Allowance. No Overhead, Profit, Insurance, Bonds, Permits, Fees, Supervision, field expenses, or other similar costs will be applied to the Arborist Allowance.~~

~~E. The Arborist Allowance shall be listed as a separate line item on the Contractor's Application for Payment.~~

~~F. The Arborist allowance shall be used only as directed by the Architect, and as approved by the Owner. Amounts to be charged to the Arborist Allowance shall be applied only upon receipt and approval of a formal written Change Order Request detailing the Change, along with all required supporting information.~~

~~G. Change Orders authorizing the use of funds from the Arborist Allowance will not include the Contractor's Overhead and Profit margins, Insurance, Bonds, Permits, Fees, Supervision, Field Expenses, or related costs.~~

~~H. At Project closeout, any unused amounts remaining in the Arborist Allowance will be credited to Owner by a formal, written Change Order.~~

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

3.2 PREPARATION

A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

END OF SECTION 01 21 00

SECTION 01 26 00 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section specifies administrative and procedural requirements for handling and processing Contract modifications.

B. See Division 1 Section 012100 "Allowances" for procedural and administrative requirements for handling and processing allowances.

C. See Division 1 Section 012300 "Alternates and Unit Prices" for procedural and administrative requirements for using unit prices.

1.2 MINOR CHANGES IN THE WORK

A. Architect will issue supplemental instructions authorizing Minor Changes in the Work, which do not involve an adjustment to the Contract Sum or the Contract Time.

1.3 PROPOSAL REQUESTS

A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.

1. Proposal Requests issued by Architect are for information only. Do not consider them instructions either to stop work in progress or to execute the proposed change.
2. Within the time period specified in the Proposal Request, after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.

    a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
    b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
    c. Include costs of labor and supervision directly attributable to the change.
    d. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.

B. Contractor-Initiated Proposals: If latent or unforeseen conditions require modifications to the Contract, the Contractor may propose changes by submitting a request for a change to Architect.

1. Include a statement outlining reasons for the change and detailing the effect that the change will have on the Work.

    a. Provide a complete description of the proposed change.
    b. Indicate the effect of the proposed change on both the Contract Sum and the Contract Time.

2. Include a list of quantities of products required, or eliminated, and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Include detailed breakdown of costs of labor and supervision directly attributable to the change.
5. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
6. Comply with requirements in Division 1 Section "Product Requirements" if the proposed change requires substitution of one product or system for product or system specified.

C. Submit claims for increased costs related to a change in scope or nature of the unit price or allowance described in the Contract Documents, whether for the Purchase Order amount or Contractor's handling, labor, installation, overhead, and profit. Submit claims within **21** days of receipt of the Change Order Request or Construction Change Directive authorizing work to proceed. Owner will reject claims submitted later than **21** days after such authorization.

1. Do not include any Contractor's or Subcontractor's indirect expense in the Change Order cost, amount unless it is clearly shown that the nature or extent of work has changed from what could have been foreseen from information in the Contract Documents.
2. No change to the Contractor's indirect expense is permitted for selection of higher- or lower-priced materials or systems of the same scope and nature as originally indicated.

1.4 UNIT PRICES

A. Unit Price Adjustment: To adjust the Contract Amount based on unit price quantities, base each Change Order proposal on the difference between the estimated quantity provided as part of the Contract Documents and the actual documented quantity of work in-place, multiplied by the unit price amount.

1. All Overhead, Profit, Bonds, Insurances, Permits, Fees, Supervision, and other related costs are to be included in the Unit Cost.
2. Submit substantiation of any time impact to the Contract Duration due to the change in scope of work, if any, claimed in Change Orders related to unit-cost allowances.
3. The Owner reserves the right to verify the quantity of work-in-place by independent quantity survey, measure, or count.

1.5 ALLOWANCES

A. Allowance Adjustment: To allowance amounts, base each Change Order proposal on the difference between the per-unit purchase price amount and the allowance, multiplied by the final measurement or quantity of work-in-place.

1. Include installation costs in the purchase price amount only where indicated as part of the allowance.
2. If requested, prepare an explanation and supporting documentation to substantiate the distribution of additional labor, equipment, profit, overhead, bonds, insurances, permits, fees, or other related costs claimed on the difference between the original allowance amount or quantity provided in the Contract Documents and the actual amount or quantity of work-in-place.
3. Submit substantiation of a change in scope of work, if any, claimed in Change Orders related to unit-cost allowances.
4. The Owner reserves the right to establish the quantity of work-in-place by independent quantity survey, measure, or count.

1.6 CHANGE ORDER PROCEDURES

A. On Owner's approval of a Proposal Request, Architect will issue a Change Order for signatures of Owner and Contractor on AIA Document G701, or the Owner's standard Change Order Form, if applicable.

1.7 FIELD ORDER

A. Field Order: The Architect may issue a Field Order on the Owner's standard form, if applicable.

1. The Field Order is a directive to the Contractor for changes to the Work which, if not implemented expeditiously, might cause delays to the project, or result in damage or harm to property or individuals, and where the Owner and Contractor have not yet come to an agreement on changes in the Contract Sum or Contract Time. Upon receipt of a Field Order, the contractor shall promptly proceed with the change in the Work described therein.

2. The Field Order shall instruct the Contractor to proceed immediately with a change in the Work, pending subsequent documentation and inclusion in a formal written Change Order.

3. The Field Order shall contain a description of the nature or scope change in the Work. It will also designate the method to be followed to determine the change in the Contract Sum and/or the Contract Time.

4. The Field Order shall be prepared and issued by the Architect, however, the Field Order shall not be valid without the Owner's authorization, as indicated by the Owner's Facility Manager or Project Manager signature on the Field Order.

5. Documentation: Maintain detailed records on a time and material basis of work required by the Field Order.

6. After completion of the work, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.
7. Failure to provide thorough, detailed, and complete documentation of the work performed as part of the Field Order will result in the disqualification of the parts of the Contractor's request for compensation in question.

1.8 CONSTRUCTION CHANGE DIRECTIVE

A. Construction Change Directive: The Architect may issue a Construction Change Directive on AIA Document G714, or the Owner's standard form, if applicable.

1. The Construction Change Directive instructs the Contractor to proceed immediately with a change in the Work, pending subsequent documentation and inclusion in a formal written Change Order.

2. The Construction Change Directive shall contain a description of the nature or scope change in the Work. It will also designate the method to be followed to determine the change in the Contract Sum and/or the Contract Time.

B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.

1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.
2. Failure to provide thorough, detailed, and complete documentation of the work performed as part of the Construction Change Directive will result in the disqualification of the parts of the Contractor's request for compensation in question.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 26 00

SECTION 01 26 10 - WEATHER-RELATED DELAYS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section specifies administrative and procedural requirements for handling and processing modifications to the Contract Time, specifically related to inclement weather and weather-related delays.

1.2 REQUESTS FOR EXTENSION OF CONTRACT TIME DUE TO WEATHER

A. If adverse weather conditions are the basis for a claim for additional time, the Contractor shall document both the weather conditions causing the delay, and that those weather conditions had an adverse effect on the scheduled construction.

B. At the end of each month, the Contractor shall make one claim for any adverse weather days occurring within that month. The claim must be accompanied by sufficient documentation evidencing the adverse days, as well as the direct impact on the scheduled construction. Failure to make such Claim within 14 days of the last day of the month shall prohibit any future claims for adverse days for that month.

C. Contractor-Initiated Requests for Extension of Time due to weather: If inclement weather or weather-related conditions cause a delay to the project, the Contractor may request an Extension of Time by submitting a written request to the Architect. Such request shall comply with all requirements of this Section.

1. Include a statement outlining the nature of the weather delay and detailing the effect that the change will have on the Work.

    a. Provide a description of the weather delay for each day claimed.
    b. Indicate the effect of the weather delay on the work scheduled for each day claimed.
    c. Indicate the effect of the weather delay on the Contract Time.
    d. Provide documentation to substantiate the weather delay.

        1. Examples of such documentation may include the following:

            a. Climate/Data Reports issued by the National Weather Service
            b. Copies of the Contractor's Daily Log indicating the weather conditions for each day claimed, the work scheduled for that day, any work performed on site that day, and the portion of the day worked, if any.

2. Include an updated Contractor's Construction Schedule that indicates the effect of the delay, including, but not limited to, changes in activity duration, start and finish times, and activity relationship.

D. Claims for lost time due to inclement weather or weather-related conditions, shall be submitted as detailed in Specification Section 012600 "Contract Modification Procedures".

E. **Claims for lost time due to inclement weather shall take into account the Reasonably Anticipated Days of Inclement Weather per month, as stipulated in the Supplementary Conditions, or elsewhere in the Contract Documents.**

1. **Claims for additional time shall clearly indicate the total number of adverse weather or site conditions in the previous month, minus the stipulated number or reasonably anticipated adverse weather days, resulting in the number of days requested for the month.**

F. **Days with inclement weather that do not adversely impact the critical path as indicated on the Contractor's submitted construction schedule shall not be considered as a delay to the project by the Owner.**

G. **Submit claims for lost time due to inclement weather or weather-related conditions to the Architect, on a monthly basis, with pay application for the same time period and no later than the 10th day of the following month.**

H. **The Owner retains the right to reject claims for lost time due to inclement weather or weather-related conditions submitted later than the 10th day of the following month.**

I. **An increase in the Contract Time due to weather-related delays shall not be cause for an increase in the Contract Amount**.

1.3 CHANGE ORDER PROCEDURES

A. Upon the Owner's approval of a Request for Extension of the Contract Time due to Weather-Related Delays, the Architect will prepare and issue a Change Order for the signatures of the Owner and Contractor on AIA Document G701, or the Owner's standard Change Order Form, if applicable.

B. At the Owner's request, or with the Owner's approval, the Architect may approve the Contractor's Request in writing, but delay the issuance of the associated Change Order, pending other outstanding items to be included in the Change Order. Such delay, shall not be considered detrimental to the Contractor.

END OF SECTION 01 26 10

SECTION 01 29 00 – CONTRACT PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section specifies administrative and procedural requirements for preparation and processing of the Contractor's Certificate and Application(s) For Payment.

1.2 RELATED DOCUMENTS

A. Drawings
B. Project Manual and Specifications
C. General Conditions and Supplementary Conditions (if applicable).
D. Other special instructions or requirements, contained within Division 1.
E. Refer to Division 1 Section 012100 "Allowances" for procedural and administrative requirements for handling and processing allowances.
F. Refer to Division 1 Section 012300 "Alternates and Unit Prices" for procedural and administrative requirements for using unit prices.
G. Refer to Division 1 Section 012600 "Contract Modification Procedures" for procedural and administrative requirements for changes to the Contract Amount and Contract Time.

1.3 DEFINITIONS

A. Contractor's Application for Payment: A standardized form, provided by the Owner and utilized by the Contractor, for requesting payment from the Owner for Work in place, or Materials properly stored on site.

1. The Contractor's Application for Payment shall provide a detailed recap of the Original Contract Sum, any changes to the Contract Amount by Change Orders, the revised Contract Sum to Date, any Materials Stored on Site, the Total Completed and Stored To Date, the Retainage withheld, the Total Earned Less Retainage, the Previous Payments to the Contractor, the Current Payment Due to the Contractor, and the Balance to Finish Including Retainage.
2. The Application For Payment shall incorporate the Schedule of Values, as the basis for payment of the Work Completed To Date, and Materials Stored On Site, as further described below.
3. Schedule of Values: A detailed listing of the allocation of costs for the various portions or component parts of the project, and totaling the Contract Sum. The Schedule of Values will be used as the basis for reviewing and approving the Contractor's Application for Payment, therefore, the Schedule of Values will include sufficient detail that the Architect can readily review, approve, and substantiate to the Owner that the Contractor's request for payment is generally in line with the Work Completed to Date, as well as the Materials Stored on Site.

1.4 FORMAT FOR PAYMENT REQUESTS

A. The form to be utilized for payment request will be the American Institute of Architects, AIA Form G702 “Application and Certificate For Payment”, and AIA Form G703 “Continuation Sheet”. A copy of the form is attached for reference. NO OTHER FORM WILL BE ACCEPTED.

   1. 1 signed original and two copies of the Application for Payment shall be required each month.

   2. One original Application for Payment shall be signed and sealed by a Notary Public, duly registered in the State of Louisiana.

   3. The original, signed, and notarized Application for Payment, and copies, shall be delivered to the office of the Architect, no later than the last day of the month, for which the Contractor is requesting payment. Within 7 days, the Architect will review and either:

      a. Certify the request for payment, and forward to the Owner with his recommendation to process and pay the request.

      b. Notify the Contractor of questions or concerns which will require revision or additional information, prior to making a recommendation to the Owner.

B. The Continuation Sheet shall contain a detailed breakdown of the costs associated with the project, by Specification Section, and/or portion of the work, in order to allow for a detailed review and approval of the materials and labor that the Contractor is requesting payment for. BREAKDOWN BY SPECIFICATION DIVISON WILL NOT BE ACCEPTABLE.

   1. Refer to the (2) attached sample Application & Certificate for Payment with Continuation Worksheets, for reference. Specific line items may be modified as is applicable to the project.

1.5 APPLICATION FOR PAYMENT

A. Each Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.

   1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.

B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.

C. Payment Application Forms: Unless the Owner requires a proprietary standardized form of Application For Payment, AIA Document G702 "Application And Certificate For Payment" shall be utilized, with AIA Document G703 "Application For Payment - Continuation Sheet" attached to include the items contained within the Schedule of Values.

D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.

1. Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions were made.

2. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.

E. Transmittal: Submit one (1) signed and notarized original and (2) copies of each Application for Payment to Architect by a method ensuring receipt within 24 hours.

1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.

F. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:

1. List of subcontractors.
2. Schedule of Values.
3. Contractor's Construction Schedule (preliminary if not final).
4. Copies of building permits.

G. Application for Payment at Substantial Completion: After issuing the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.

1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.

2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designed portions of the Work.

H. Final Payment Application: Submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:

1. Evidence of completion of Project closeout requirements.
2. Updated final statement, accounting for final changes to the Contract Sum.
3. Evidence that claims have been settled (No-lien certificate).
4. Final, liquidated damages settlement statement.

1.5 SCHEDULE OF VALUES

A. Coordination: **Submit the Schedule of Values to the Architect for review and approval, at the earliest possible date, but in no case later than 14 days prior to preparing and submitting the first Application for Payment**.

1. No Application for Payment will be reviewed or processed by the Architect, prior to approval of the Contractor's proposed Schedule of Values.

2. Refer to the attached Sample Schedule(s) of Values for representative examples and level of detailed breakdown that shall be considered acceptable.

B. Format: Unless the Owner requires a proprietary standardized form of Application For Payment, AIA Document G702 "Application And Certificate For Payment" shall be utilized, with AIA Document G703 "Application For Payment - Continuation Sheet" attached to include the items contained within the Schedule of Values.

C. Content:

1. Arrange the Schedule of Values in tabular form, with separate columns to include the following:
   a. Item Number
   b. Description of Work
   c. Value
   d. Work Completed From Previous Application
   e. Work Completed This Period
   f. Materials Presently Stored
   g. Total Completed and Stored To Date
   h. Percentage Complete
   i. Balance To Finish
   j. Retainage

2. Provide breakdown of the Contract Sum in sufficient detail to facilitate initial and ongoing evaluation, review, and approval of the Contractor's Application For Payment, relative to the progress observed at the project site.

3. The Schedule of Values shall include a minimum of one line item for each Specification, Section, Item, Product Category, or Trade, however, large or complex trades or areas of work, or subcontract work incorporating second-tier subcontractors shall be broken-down into multiple sub-categories, in order to facilitate review and approval.

   For example:

Metal Stud Framing	$$$$$
Sheetrock & Accessories	$$$$$
Firestopping	$$$$$
Acoustical Ceilings	$$$$$
Plumbing - Rough-In	$$$$$
Plumbing - Top-Out	$$$$$
Plumbing - Equipment	$$$$$
Plumbing - Fixtures	$$$$$
Electrical - Below Grade	$$$$$
Electrical - Above Grade	$$$$$
Electrical - Site	$$$$$
Electrical - Gear & Equipment	$$$$$
Electrical - Fixtures	$$$$$
Electrical - Fire Alarm	$$$$$
Electrical - Security System	$$$$$

4. Round line item values to the nearest whole dollar, the total of which shall equal the original or revised (if applicable) Contract Sum.

5. Stored materials shall be indicated for each line item, in the appropriate column, until incorporated into the work.
    a. Differentiate between items stored on-site and items stored off-site, if allowable by the Owner.
    b. Include evidence to substantiate the value of such items, such as invoices, as is appropriate.
    c. Include evidence to substantiate that items stored off-site are insured or stored in a bonded warehouse, if allowable by the Owner.
6. Temporary facilities, utilities, security measures, and similar cost items that are not directly incorporated into the Work may be shown either as separate line items, or included together as General Conditions, at the Contractor's option.
7. Upon issuance of a Change Order by the Architect, and execution by all parties, the work contained within the Change Order shall be added to the Contract Sum, as well as the Schedule of Values, with the heading "Change Order No. #" with an associated dollar value of $0.00. The heading "Change Order No. #" shall be accompanied by a listing of the individual items comprising the Change Order as separate line items, with the appropriate associated value for each.
8. Individual items contained within each Change Order shall be billed separately.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 29 00

SECTION 01 31 00 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative provisions for coordinating construction operations on
Project including, but not limited to, the following:

1. Coordination
2. Project meetings
3. Postings

1.2 COORDINATION

A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different sections that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.

2. Coordinate installation of different components with other contractors to ensure maximum accessibility for required maintenance, service, and repair.

3. Make adequate provisions to accommodate items scheduled for later installation.

4. Where availability of space is limited, coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair of all components, including mechanical and electrical.

B. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of Contractor's Construction Schedule.
2. Preparation of the Schedule of Values.
3. Installation and removal of temporary facilities and controls.
4. Delivery and processing of submittals.
5. Progress meetings.
6. Pre-Construction and Pre-Installation conferences.

7. Project closeout activities

1.3 PROJECT MEETINGS

A. General: Schedule and conduct meetings and conferences at Project site, unless otherwise indicated.

1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.

2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.

3. Minutes: Record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within three days of the meeting.

B. Pre-Construction Conference: Schedule a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 7 days after execution of the Agreement. Hold the conference at Project site.

1. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.

2. Agenda: Utilize Agenda provided by the **Calcasieu Parish School Board**, if applicable.

Additional items of discussion will include items of significance that could affect progress, including, but not limited to the following:

a. Tentative construction schedule.
b. Phasing.
c. Critical work sequencing and long-lead items.
d. Designation of key personnel and their duties.
e. Procedures for processing field decisions and Change Orders.
f. Procedures for requests for information. (RFIs).
g. Procedures for testing and inspecting.
h. Procedures for processing Applications for Payment.
i. Submittal procedures.
j. Work restrictions.
k. Owner's occupancy requirements.
l. Responsibility for temporary facilities and controls.
m. Parking availability.
n. Office, work, and storage areas.
o. Equipment deliveries and priorities.
p. Security.

q. Labor compliance for state building repairs.

3. Minutes: Architect will record and distribute meeting minutes.

C. Progress Meetings: Conduct progress meetings at weekly intervals on a day and time to be determined, unless otherwise scheduled by the Architect. Coordinate dates of meetings with preparation of payment requests.

1. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and 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 Project and authorized to conclude matters relating to the Work.

2. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's Construction Schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.

1. Review schedule for next period.

b. Review present and future needs of each entity present, including the following:

1. Interface requirements.
2. Sequence of operations.
3. Status of submittals.
4. Deliveries.
5. Off-site fabrication.
6. Access.
7. Site utilization.
8. Temporary facilities and controls.
9. Work hours.
10. Hazards and risks.
11. Progress cleaning.
12. Quality and work standards.
13. Status of correction of deficient items.
14. Field observations.
15. Requests for interpretations (RFIs).
16. Status of proposal requests.
17. Pending changes.

18. Status of Change Orders.
19. Pending claims and disputes.
20. Documentation of information for payment requests.

3. Minutes: Contractor will be responsible for will recording and distributing the meeting minutes.

4. Reporting: Distribute minutes of the meeting to each party present and to parties who should have been present.

a. Schedule Updating: Revise Contractor's Construction Schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

1.4 POSTINGS

A. If applicable, the wage decision for the project and/or the Project Wage Rate Determination Sheet shall be posted at the worksite in a prominent location, readily accessible to all employees, for the duration of construction.

B. All posters required by law shall be posted at the jobsite including, but not limited to, the "Federal Minimum Wage", “Notice to All Employees Working on Federal or Federally Financed Construction Projects”, and “Equal Opportunity is the Law.”

Refer to Federal, State, and Local requirements for additional information and/or posters that may be required to be posted.

END OF SECTION 01 31 00

SECTION 01 32 00 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:

1. Contractor's Construction Schedule.
2. Submittals Schedule.
3. Daily construction reports.
4. Field condition reports.

1.2 DEFINITIONS

A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.

1. Critical activities are activities on the critical path. They must start and finish on the planned early start and finish times.
2. Predecessor Activity: An activity that precedes another activity in the network.
3. Successor Activity: An activity that follows another activity in the network.

B. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.

C. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.

D. Float: The measure of leeway in starting and completing an activity.

E. Fragnet: A partial or fragmentary network that breaks down activities into smaller activities for greater detail.

F. Major Area: A story of construction, a separate building, or a similar significant construction element.

1.3 SUBMITTALS

A. Submittal Schedule: Submit three copies of the Submittal schedule. Arrange the following information in a tabular format:

1. Scheduled date for first submittal.
2. Specification Section number and title.
3. Submittal category (action or informational).
4. Name of subcontractor.
5. Description of the Work covered.
6. Scheduled date for Architect's final release or approval.

B. Contractor's Construction Schedule: Submit three opaque copies of initial schedule, large enough to show the entire schedule for entire construction period.

1. Submit an electronic copy of schedule, using software indicated, on CD-R, and labeled to comply with requirements for submittals. Include type of schedule (Initial or Updated) and date on label.
2. Format for each activity in reports shall contain activity number, activity description, cost and resource loading, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.
3. Define preceding and succeeding activities for all activities, sorted in ascending order by activity number and then early start date, or actual start date if known.

C. Daily Construction Reports: Submit three copies at **weekly** intervals.

D. Field Condition Reports: Submit three copies at time of discovery of differing conditions.

1.4 COORDINATION

A. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate contractors.

B. Coordinate Contractor's Construction Schedule with the Schedule of Values, list of subcontracts, Submittals Schedule, progress reports, payment requests, and other required schedules and reports.

1. Secure time commitments for performing critical elements of the Work from parties involved.
2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 2 - PRODUCTS

2.1 SUBMITTAL SCHEDULE

A. Preparation: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, resubmittal, ordering, manufacturing, fabrication, and delivery when establishing dates.

1. Coordinate Submittal Schedule with list of subcontracts, the Schedule of Values, and Contractor's Construction Schedule.
2. Submit concurrently with the first complete submittal of Contractor's Construction Schedule.

2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

A. Time Frame: Extend schedule from date established for the Notice to Proceed to date of Acceptance.

1. Contract completion date shall not be changed by submission of a schedule that shows an early or late completion date, unless specifically authorized by Change Order.

B. Activities: Treat each story or separate area as a separate numbered activity for each principal element of the Work. Comply with the following:

1. Activity Duration: Define activities so no activity is longer than **28** days, unless specifically allowed by Architect.
2. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
    a. List delivery dates of major items of word or pieces of equipment separately, as milestones.
3. Submittal Review Time: Include review and resubmittal times indicated in Division 1 Section "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's Construction Schedule with Submittals Schedule.
4. Startup and Testing Time: Include days required for startup and testing.
5. Acceptance: Indicate completion in advance of date established for Acceptance, and allow time for Architect's administrative procedures necessary for certification of Acceptance.

C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.

1. Phasing: Arrange list of activities on schedule by phase.

2. Work under More Than One Contract: Include a separate activity for each contract.

3. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.

4. Work Restrictions: Show the effect of the following items on the schedule:

   a. Coordination with existing construction.
   b. Limitations of continued occupancies.
   c. Uninterruptible services.
   d. Partial occupancy before Substantial Completion.
   e. Use of premises restrictions.
   f. Provisions for future construction.
   g. Seasonal variations.
   h. Environmental control.

5. Work Stages: Indicate important stages of construction for each major portion of the Work.

6. Other Constraints, as may be applicable to the Project.

D. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Acceptance, Final Completion, delivery dates of major items and critical pieces of equipment, and other significant dates, as may be applicable to the completion of the Project.

E. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using fragnets to demonstrate the effect of the proposed change on the overall project schedule.

2.3 CONTRACTOR'S CONSTRUCTION SCHEDULE (GANTT CHART)

A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal Gantt-chart-type, Contractor's Construction Schedule within **30** days of date established for **the Notice to Proceed**. Base schedule on the Preliminary Construction Schedule and whatever updating and feedback was received since the start of Project.

B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.

1. For each construction activity, indicate an estimated completion percentage in percent increments within time bar.

2. Indicate each milestone event with a unique symbol, having a duration of 0 days or 1 day.

3. Indicate at the left side of each activity bar or milestone symbol the Estimated/Actual Start Date.

4. Indicate at the right of each activity bar or milestone symbol the Task Name.

2.4 CONTRACTOR'S CONSTRUCTION SCHEDULE (CPM SCHEDULE)

A. General: Prepare network diagrams using AON (activity-on-node) format.

B. Provide a cash requirement prediction (cash flow analysis) based on indicated activities, if required by the Owner.

C. CPM Schedule: Prepare Contractor's Construction Schedule using a computerized, cost- and resource-loaded, time-scaled CPM network analysis diagram for the Work.

1. Develop network diagram in sufficient time to submit CPM schedule so it can be accepted for use no later than **30** days after date established for **the Notice to Proceed**.

a. Failure to include any work item required for performance of this Contract shall not excuse Contractor from completing all work within applicable completion dates, regardless of Architect's approval of the schedule.

2. Establish procedures for monitoring and updating CPM schedule and for reporting progress. Coordinate procedures with progress meeting and payment request dates.

3. Use "one workday" as the unit of time. Include list of nonworking days and holidays incorporated into the schedule.

D. CPM Schedule Preparation: Prepare a list of all activities required to complete the Work. Using the preliminary network diagram, prepare a skeleton network to identify probable critical paths.

1. Activities: Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Include estimated time frames for the following activities:

a. Preparation and processing of submittals.
b. Mobilization and demobilization.
c. Purchase of materials.
d. Delivery.
e. Fabrication.
f. Utility interruptions.
g. Installation.
h. Work by Owner that may affect or be affected by Contractor's activities.
i. Testing and commissioning.

2. Critical Path Activities: Identify critical path activities, including those for interim completion dates. Scheduled start and completion dates shall be consistent with Contract milestone dates.

3. Processing: Process data to produce output data on a computer-drawn, time-scaled network. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the CPM schedule within the limitations of the Contract Time.

4. Format: Mark the critical path. Locate the critical path near center of network; locate paths with most float near the edges.

    a. Sub-networks on separate sheets are permissible for activities clearly off the critical path.

E. Initial Issue of Schedule: Prepare initial network diagram from a list of straight "early start-total float" sort. Identify critical activities. Prepare tabulated reports showing the following:

1. Contractor or subcontractor and the Work or activity.
2. Description of activity.
3. Principal events of activity.
4. Immediate preceding and succeeding activities.
5. Early and late start dates.
6. Early and late finish dates.
7. Activity duration in workdays.
8. Total float or slack time.
9. Average size of workforce.

F. Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:

1. Identification of activities that have changed.
2. Changes in early and late start dates.
3. Changes in early and late finish dates.
4. Changes in activity durations in workdays.
5. Changes in the critical path.
6. Changes in total float or slack time.
7. Changes in the Contract Time.

2.5 REPORTS

A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:

1. List of subcontractors at Project site.
2. Equipment at Project site.
3. Material deliveries.
4. High and low temperatures and general weather conditions.

5. Accidents.
6. Stoppages, delays, shortages, and losses.
7. Meter readings and similar recordings.
8. Orders and requests of authorities having jurisdiction.
9. Services connected and disconnected.
10. Equipment or system tests and startups.

B. Field Condition Reports: Immediately on discovery of a difference between field conditions and the Contract Documents, prepare and submit a detailed report. Submit with a request for interpretation, if necessary. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Contractor's Construction Schedule Updating: At no more than **monthly** intervals, update schedule to reflect actual construction progress and activities. Issue schedule **one week** before each regularly scheduled progress meeting.

1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
3. As the Work progresses, indicate Actual Completion percentage for each activity.

B. Distribution: Distribute copies of approved schedule to Architect Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.

1. Post copies in Project meeting rooms and temporary field offices.
2. When revisions are made, distribute updated schedules 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 performance of construction activities.

C. **Each month, an updated schedule, reflecting the progress of the Project as of the last day of the Month, shall be included with the Contractor's Request and Application for Payment. The Contractor's Request and Application for Payment**

will not be reviewed and processed if not accompanied by the required updated Schedule.

END OF SECTION 01 32 00

SECTION 01 32 31 - PRE-CONSTRUCTION DOCUMENTATION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for the following:

1. Pre-Construction photographs and/or video.

B. See Division 1 Section "Closeout Procedures" for submitting digital media as part of Project Record Documentation at Project closeout.

1.2 SUBMITTALS

A. Key Plan: Submit key plan of Project site and building with notation of vantage points marked for location and direction of each photograph. Indicate elevation or story of construction. Include same label information as corresponding set of photographs.

B. Construction Photographs: Submit electronic copies of each photographic view within **seven** days of taking photographs.

1. Identification: On back of each photo, or as part of electronic documents, provide an applied label or rubber-stamped impression with the following information:

   a. Name of Project.
   b. Name and address of photographer.
   c. Name of Architect.
   d. Name of Contractor.
   e. Date photograph was taken if not date stamped by camera.
   f. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.
   g. Unique sequential identifier.

2. Digital Images: Submit a complete set of digital image electronic files on CD-ROM. Identify electronic media with date photographs and/or videos were taken. Submit images that have same aspect ratio as the sensor, uncropped.

3. Image Requirements: Provide sufficient photographs and/or video to fully and sufficiently document all existing conditions, including any and all existing damage, which may be necessary to substantiate conditions pre-dating the Contractor's mobilization on-site. Provide temporary lighting, if required, to produce clear, well-lit photographs without obscuring shadows.

1.3 COPIES

A. Provide the Owner, 1 original, unaltered, dated copy for file purposes.

PART 2 - PRODUCTS

2.1 PHOTOGRAPHIC MEDIA

A. Digital Images: Provide images in uncompressed TIFF or JPG format produced by a digital camera with minimum sensor size of 4.0 megapixels, and at an image resolution of not less than **1600 by 1200** pixels.

PART 3 - EXECUTION

3.1 PRE-CONSTRUCTION PHOTOGRAPHS AND/OR VIDEO

A. Preconstruction Photographs and/or Video: **Prior to mobilization on site** (before commencement of demolition, excavation or construction operations)] take color digital photographs and/or video of the Project site, existing structures, paving, walks, etc., including all existing items to remain during construction, as well as the surrounding properties, from different vantage points, as directed by the Architect and/or Owner.

1. Flag construction limits before taking construction photographs.
2. Take photographs or video as required to show existing conditions adjacent to property before starting the Work.
3. Take photographs or video of existing buildings or other structures, either on or adjoining the site, to accurately record physical conditions at start of construction.

END OF SECTION 01 32 31

SECTION 013300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

B. See Division 1 Section "Construction Progress Documentation" for submitting schedules and reports, including Contractor's Construction Schedule.

C. See Division 1 Section "Closeout Procedures" for submitting warranties.

D. See Division 1 Section "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.

1.2 DEFINITIONS

A. Action Submittals: Written and graphic information that requires Architect's responsive action.

B. Informational Submittals: Written information that does not require Architect's responsive action.

1.3 SUBMITTAL PROCEDURES

A. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

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 parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.

    a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

B. Submittal Schedule: Comply with requirements in Division 1 Section "Construction Progress Documentation" for list of submittals and time requirements for scheduled performance of related construction activities.

C. Processing Time: Allow enough time for submittal review, including time for re-submittals, as follows. Time for review shall commence on Architect's receipt of submittal. No

extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including re-submittals.

1. Initial Review: Allow no less than 21 days for initial review of each submittal. The Contractor shall allow additional time if coordination with subsequent submittals is required. Architect will advise the Contractor when a submittal being processed must be delayed for coordination.
2. Preliminary or Intermediate Review: If a preliminary or intermediate submittal is necessary, process it in same manner as for initial submittal.
3. Re-submittal Review: Allow no less than 28 days for review of each re-submittal.

D. Transmittal: If physical submittals are required below, package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form.

1. Transmittal Form: The Contractor may utilize their standard transmittal form to transmit documents to the Architect and indicating the specification section as well a listing of documents being transmitted.

E. Number of Copies: Submit all submittals to the Architect, in electronic (PDF) format. For submittals of large format or requiring physical samples or color samples, the Contractor shall provide up to six (6) original copies, as required by the Architect. The Architect and his Consultants will retain copies in sufficient quantities for file and distribution. Additional copies may be submitted by the Contractor, Subcontractor, or Suppliers as required for file and field distribution.

F. Identification: Each copy of each submittal shall include a Cover Sheet, providing the following information:

1. Include the following information on Cover Sheet for processing and recording action taken:

    a. Project name.
    b. Date.
    c. Name and address of Architect.
    d. Name and address of Contractor.
    e. Name and address of Subcontractor.
    f. Name and address of Supplier.
    g. Name of Product Manufacturer.
    h. Submittal number or other unique identifier, including revision identifier.

        1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 06100.01).

        2) Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 06100.01.A).

    i. Number and title of appropriate Specification Section.
    j. Drawing number and detail references, as appropriate.
    k. Location(s) where product is to be installed, as appropriate.

l. Other necessary identification.

2. Provide a space approximately 6 by 8 inches on the Cover Sheet to record Contractor's review and approval markings and action taken by Architect.

G. Deviations: Highlight, encircle, or otherwise clearly note all identify deviations from the Contract Documents on submittals.

H. Items requiring the Architects response: Highlight, encircle, or otherwise clearly note all items requiring specific response from the Architect, such as: Options, Finishes, Color Selections, or other items

I. Additional Copies: Unless additional copies are required for final submittal, and unless Architect observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.

1. Additional copies submitted for maintenance manuals will be marked with action taken and will be returned.

J. Submittal Review:

1. Submittals received directly from sources other than through the Contractor (i.e. - material supplier or subcontractor), may be returned to the Contractor, without review by the Architect.
2. Submittals forwarded to the Architect other than as indicated herein, or without the proper format may be returned to the Contractor, without review by the Architect.
3. Submittals forwarded to the Architect which have not been thoroughly reviewed and coordinated by the Contractor, including all items coordinated and dimensions verified, and with deviations and variations clearly noted, shall be returned marked “Revise & Resubmit”.
4. Submittals or re-submittals requiring coordination with the work of other trades, shall be submitted in sequence, so that the necessary coordination shall be completed by the Contractor, prior to submitting to the Architect for review.
5. Submittals or re-submittals requiring coordination with the work of other trades, but forwarded for review out-of-sequence, shall be returned “Revise & Resubmit”.
6. Re-submittals returned to the Architect for review which have not addressed ALL of the previously noted or requested items shall be returned to the Contractor without review, or noted “Revise & Resubmit”.
7. Resubmittal shall be required until the returned submittal is marked either "Approved”, or "Approved As Noted."
8. NOTE: Submittals that require review by the Architect more than two (2) times, shall be subject to assessment of additional review fees by the Architect. These charges shall be assessed at the Architect’s standard hourly and/or overtime rate(s), and shall be at the sole expense of the Contractor. The Architect shall submit invoice for additional hourly fees for additional submittal reviews to the Owner, and those amount(s) shall be deducted from the Contractor’s payment by the Owner.

K. Resubmittals: Make resubmittals in same form and number of copies as initial submittal, unless noted otherwise.

1. Note date and content of previous submittal.
2. Note date and content of revision in label or title block and clearly indicate extent of revision.
3. Re-submittals returned to the Architect for review which have not addressed ALL of the previously noted or requested items shall be returned to the Contractor without review, or noted “Revise & Resubmit”.
4. Resubmittal shall be required until the returned submittal is marked either "Approved”, or "Approved As Noted."

L. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

M. Use for Construction: Use only final submittals with mark indicating "Approved" or "Approved As Noted" taken by Architect.

N. Field File Copies: Maintain in the Project Field Office a file, organized by specification section, complete with at least one clean copy of all Submittals noted "Approved" or "Approved As Noted", for use by the Architect, Engineers, and Owner. These copies will be in addition to those maintained on the Project site for Field Use.

O. Project Closeout: Clean original copies or photocopies of all submittals will be required to be included in the Operation and Maintenance Manuals, organized by Specification Section, for all items provided for or installed in the Project.

1.4 CONTRACTOR'S USE OF ARCHITECT'S CAD FILES

A. General: At Contractor's written request, copies of Architect's CAD files may be provided to Contractor for Contractor's use in connection with Project, subject to the following conditions:

1. If acceptable to the Architect and/or Engineer, the Contractor or Subcontractor will be required to sign an Electronic Document Release Form prepared by the Architect and/or Engineer, releasing the Architect and/or Engineer from any and all liability, which potentially may arise from the use of the Architect's drawings in the preparation of Shop Drawings, Working Drawings, or other submittals or documents, relating to the project.
2. Should the Contractor or Subcontractor refuse to sign the required document, without condition or exception, the requested files will not be provided for use.
3. Upon executing the document, the Contractor or Subcontractor agrees that the documents provided are for the sole use and benefit of the party requesting the documents, and for use only in association with the performance of this Contract.

The documents provided may not be used in association with any other project, duplicated, or provided or distributed to any other party(s), under penalty of law.

PART 2 - PRODUCTS

2.1 ACTION SUBMITTALS

A. General: Prepare and submit Action Submittals required by individual Specification Sections.

B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

1. If information must be specially prepared for submittal because standard printed data are not suitable for use, submit as Shop Drawings, not as Product Data.
2. Mark each copy of each submittal to show which products and options are applicable.
3. Include the following information, as applicable:

a. Manufacturer's written recommendations.
b. Manufacturer's product specifications.
c. Manufacturer's installation instructions.
d. Manufacturer's catalog cuts.
e. Wiring diagrams showing factory-installed wiring.
f. Printed performance curves.
g. Operational range diagrams.
h. Compliance with specified referenced standards.
i. Testing by recognized testing agency.

4. Number of Copies: Submit all submittals to the Architect, in electronic (PDF) format. For submittals of large format or requiring physical samples or color samples, the Contractor shall provide up to six (6) original copies, as required by the Architect.

C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data, unless submittal of Architect's CAD Drawings is otherwise permitted.

1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:

a. Dimensions.
b. Identification of products.
c. Fabrication and installation drawings.
d. Roughing-in and setting diagrams.
e. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring.
f. Shopwork manufacturing instructions.
g. Templates and patterns.
h. Schedules.

i. Notation of coordination requirements.
j. Notation of dimensions established by field measurement.
k. Relationship to adjoining construction clearly indicated.
l. Seal and signature of professional engineer if specified.
m. Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring.

2. 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 30 by 42 inches (750 by 1000 mm).

3. Number of Copies: Submit all submittals to the Architect, in electronic (PDF) format. For submittals of large format or requiring physical samples or color samples, the Contractor shall provide up to six (6) original copies, as required by the Architect.

D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.

1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
2. Identification: Attach label on unexposed side of Samples that includes the following:

a. Generic description of Sample.
b. Product name and name of manufacturer.
c. Sample source.
d. Number and title of appropriate Specification Section.

3. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.

4. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.

a. Number of Samples: Submit no less than two full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will retain 1 sample set; remainder will be returned.

5. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.

a. Number of Samples: no less than 2 sets of Samples. Architect will retain one Sample sets; remainder will be returned.

E. Product Schedule or List: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location.

F. Submittals Schedule: Comply with requirements specified in Division 1 Section "Construction Progress Documentation."

G. Application for Payment: Comply with requirements specified in Division 1 Section "Payment Procedures."

H. Schedule of Values: Comply with requirements specified in Division 1 Section "Payment Procedures."

I. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:

1. Number of Copies: Submit one copy of the subcontractor list, unless otherwise indicated.

2.2 INFORMATIONAL SUBMITTALS

A. General: Prepare and submit Informational Submittals required by other Specification Sections.

1. Number of Copies: Submit no less than 6 copies of each submittal, unless otherwise indicated. Architect will not return copies.
2. Certificates and Certifications: Provide a notarized statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
3. Test and Inspection Reports: Comply with requirements specified in Division 1 Section "Quality Requirements."

B. Coordination Drawings: Comply with requirements specified in Division 1 Section "Project Management and Coordination."

C. Contractor's Construction Schedule: Comply with requirements specified in Division 1 Section "Construction Progress Documentation."

D. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

E. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding

Procedure Specification (WPS) and Procedure Qualification Record (PQR) on AWS forms. Include names of firms and personnel certified.

F. Installer Certificates: Prepare written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.

G. Manufacturer Certificates: Prepare written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.

H. Product Certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

I. Material Certificates: Prepare written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.

J. Material Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.

K. Product Test Reports: Prepare written reports indicating current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

L. Research/Evaluation Reports: Prepare written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project.

M. Preconstruction Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.

N. Compatibility Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.

O. Field Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.

P. Maintenance Data: Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment. Comply with requirements specified in Division 1 Section "Operation and Maintenance Data."

Q. Design Data: Prepare written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

R. Manufacturer's Instructions: Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer.

S. Manufacturer's Field Reports: Prepare written information documenting factory-authorized service representative's tests and inspections. Include the following, as applicable:

1. Statement on condition of substrates and their acceptability for installation of product.
2. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
3. Results of operational and other tests and a statement of whether observed performance complies with requirements.

T. Insurance Certificates and Bonds: Prepare written information indicating current status of insurance or bonding coverage. Include name of entity covered by insurance or bond, limits of coverage, amounts of deductibles, if any, and term of the coverage.

U. Construction Photographs and Videotapes: Comply with requirements specified in Division 1 Section "Photographic Documentation" (IF APPLICABLE).

V. Material Safety Data Sheets (MSDS's): Submit information directly to Owner. Do not submit MSDS Sheets to the Architect. Maintain copies of MSDS's on the Project Site throughout the course of Construction, and include the same in the Project Closeout Documentation, Operation and Maintenance Manuals.

1. The Architect's review of Submittal Packages will specifically exclude the review of MSDS's which are included with submittals.

2.3 DELEGATED DESIGN SUBMITTALS

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.

1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.

B. Delegated-Design Submittal: In addition to Shop Drawings, Product Data, and other required submittals, submit a Design Certification Letter, signed and sealed by the

responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional. Refer to Specification Sections for individual requirements for submittals, drawings, technical data, design calculations, etc. specific to the Delegated-Design Submittal.

1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

A. Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.

B. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

C. Submittals forwarded to the Architect without the proper format, and/or which have not been thoroughly reviewed by the Contractor, including all items coordinated and dimensions verified, and with deviations and variations clearly noted, shall be returned to the Contractor, without review by the Architect.

D. NOTE: Submittals that require review by the Architect more than two (2) times, will be subject to assessment of additional review fees by the Architect. These charges will be assessed at the Architect’s standard hourly rate, and shall be at the expense of the Contractor. The Architect shall submit invoice for additional hourly fees to the Owner, and the same will be deducted from the Contractor’s payment by the Owner.

3.2 ARCHITECT'S ACTION

A. General: Architect will not review submittals that do not bear Contractor's approval stamp and will return them without action.

B. Action Submittals: Architect will review each submittal, make marks to indicate corrections or modifications required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken, as follows:

1. "Approved Without Comment", "Approved As Noted", "Revise and Resubmit", "Rejected", or "Returned Without Review".

C. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.

D. Partial submittals are not acceptable, will be considered nonresponsive, and will be returned without review.

E. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

END OF SECTION 013300

SECTION 014000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for quality assurance and quality control.

B. **ALL TESTING IS TO BE PROVIDED FOR BY THE OWNER**.

C. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.

1. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
2. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.

D. See Divisions 2 through 16 Sections for specific test and inspection requirements.

1.2 DEFINITIONS

A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect.

C. Mockups: Full-size, physical assemblies that are constructed on-site. Mockups are used to verify selections made under sample submittals, to demonstrate aesthetic effects and, where indicated, qualities of materials and execution, and to review construction, coordination, testing, or operation; they are not Samples.

D. Preconstruction Testing: Tests and inspections that are performed specifically for the Project before products and materials are incorporated into the Work to verify performance or compliance with specified criteria.

E. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with industry standards.

F. Source Quality-Control Testing: Tests and inspections that are performed at the source, i.e., plant, mill, factory, or shop.

G. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

I. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.

J. Experienced: When used with an entity, "experienced" means having successfully completed a minimum of five previous projects similar in size and scope to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.3 CONFLICTING REQUIREMENTS

A. General: If 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 uncertainties and requirements that are different, but apparently equal, to Architect for a decision before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. 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 requirements. Refer uncertainties to Architect for a decision before proceeding.

1.4 SUBMITTALS

A. Qualification Data: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

B. Reports: Prepare and submit certified written reports that include the following:

1. Date of issue.
2. Project title and number.
3. Name, address, and telephone number of testing agency.
4. Dates and locations of samples and tests or inspections.

5. Names of individuals making tests and inspections.
6. Description of the Work and test and inspection method.
7. Identification of product and Specification Section.
8. Complete test or inspection data.
9. Test and inspection results and an interpretation of test results.
10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
12. Name and signature of laboratory inspector.
13. Recommendations on retesting and reinspecting.

C. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.5 QUALITY ASSURANCE

A. General: Qualifications paragraphs in this Article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

B. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

C. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

D. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar to those indicated for this Project in material, design, and extent.

F. Specialists: Certain sections of the Specifications require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.

G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 548; and with additional qualifications specified in individual

Sections; and where required by authorities having jurisdiction, that is acceptable to authorities.

1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.

H. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

I. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:

1. Build mockups in location and of size indicated or, if not indicated, as directed by Architect.
2. Notify the Architect seven days in advance of dates and times when mockups will be constructed.
3. Demonstrate the proposed range of aesthetic effects and workmanship.
4. Obtain Architect's approval of mockups before starting work, fabrication, or construction.
5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
6. Demolish and remove mockups when directed, unless otherwise indicated.
7. Mockups, if constructed in a location of the work being inspected, and approved, may become part of the final accepted work.

~~**8. Provide mockups of the following items for review and approval of the architect prior to beginning associated and additional work:**~~

~~a. **Typical Classroom:** One classroom shall be "mocked-up" for installation of all in-wall components such as outlets, switches, thermostats, intercom, data, markerboard and tack board etc… prior to roughing in devices in other classrooms. Marker board / tack board locations and mounting height shall be indicated by use of plywood for approval purposes. Lighting and ac unit locations shall be drawn on the floor with chalk. Door locations shall be framed. Approval of architect and owner is required prior to proceeding with work in other classrooms~~

~~b. **Typical Punch Window Opening**: Indicating studs, insulation, exterior sheathing, vapor barrier, brick ties, brick work, lintel, flashing, window mounting, caulking, sill work, etc. Size to be typical window plus 24" on either side, above and below. Multiple inspections will be required.~~

~~c. **Typical Brick Column:** Indicating construction, footing, coursing, height, mortar, backsplashes, openings, etc.~~

d. ~~**Typical Floor and Wall Ceramic/Porcelain Tile Layout**: Indicating colors, patterns and joints with associated floor to wall transitions and top of tile to wall transitions as well as door frame conditions, floor drain conditions, inside corner conditions, outside corner conditions~~.

~~**9. Decisions made as part of the mock-up inspections shall be incorporated throughout the systems being inspected at no additional cost to the owner as long as they are within the scope of the original work. Contractor to provide notes for approval by the architect after each mock-up inspection.**~~

1.6 QUALITY CONTROL

A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.

1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
2. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor.

B. Tests and inspections not explicitly assigned to Owner are the Contractor's responsibility. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.

1. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services including but not limited to the following:

a. Sub Grade Inspection and Testing

b. Placed and Compacted Soils Inspection and Testing

c. Concrete Foundation and Paving Slump and Compressive Strength Testing

d. Bolted Steel Connection Inspections and Testing

e. Welded Steel Connection Inspections and Testing

~~f. Spray Applied Fireproofing Inspections and Testing~~

~~g. Intumescent Fireproofing Inspections and Testing~~

h. Water Spray Testing of Aluminum Framed Systems

i. Slab Moisture Content Inspection and Testing for Flooring Applications

2. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
4. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Division 1 Section "Submittal Procedures."

1. Where services are indicated as Manufacturer’s Field Services, engage a qualified manufacturer’s representative to perform these quality-control services including but not limited to the following:

a. Roofing Systems

b. Vapor Barrier Systems

c. Kitchen Equipment Systems

d. Flooring Systems

e. Aluminum Storefront and Curtainwall Systems

D. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.

E. Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
6. Do not perform any duties of Contractor.

F. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:

1. Access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
4. Facilities for storage and field curing of test samples.
5. Delivery of samples to testing agencies.
6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
7. Security and protection for samples and for testing and inspecting equipment at Project site.

G. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

1. Schedule times for tests, inspections, obtaining samples, and similar activities.

~~1.7 SPECIAL TESTS AND INSPECTIONS~~

~~A. Special Tests and Inspections: Owner will engage a qualified [**testing agency**] [**special inspector**] to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner, and as follows:~~

~~B. Special Tests and Inspections: Conducted by a qualified [**testing agency**] [**special inspector**] as required by authorities having jurisdiction, as indicated in individual Specification Sections, and as follows:~~

~~1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviewing the completeness and adequacy of those procedures to perform the Work.~~
~~2. Notifying Architect and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.~~
~~3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect with copy to Contractor and to authorities having jurisdiction.~~
~~4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.~~
~~5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.~~
~~6. Retesting and reinspecting corrected work.~~

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

1. Provide materials and comply with installation requirements specified in other Specification Sections. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible.
2. Comply with the Contract Document requirements for Division 1 Section "Cutting and Patching."

B. Protect construction exposed by or for quality-control service activities.

C. Repair and protection are the Contractor’s responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 014000

SECTION 01 50 00 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

B. See Divisions 2 through 16 Sections for specific requirements for temporary heat, ventilation, and humidity control requirements for products in those Sections.

1.2 DEFINITIONS

A. Permanent Enclosure: As determined by Architect, permanent or temporary roofing is complete, insulated, and weathertight; exterior walls are insulated and weathertight; and all openings are closed with permanent construction or substantial temporary closures.

1.3 USE CHARGES

A. General: Unless otherwise specified herein, all utility costs or use charges for temporary facilities shall be included in the Contract Sum. The Contractor shall allow other entities to use temporary services and facilities without cost, including, but not limited to: the Owner's Representatives, Architect, Testing Agencies, and Authorities Having Jurisdiction.

B. **Temporary Water Service: Water from the Owner's existing water system WILL be available for the Contractor's use without metering and without payment of use charges.**

The Contractor shall provide connection to and extension of existing services, as required for construction operations. The Contractor shall make provisions to extend the Owner's existing water service for extended or remote areas of the site.

The Owner reserves the right to restrict or terminate the Contractor's use of Owner's water service at no charge, due to abuse or wanton waste.

In such case, payment for water for construction use will become the responsibility of the Contractor, and no Change to the Contract will be considered.

Where impractical or cost-prohibitive to extend the Owner's existing electrical service, the Contractor shall make other provisions for temporary electrical service, at no additional cost to the Owner.

C. **Temporary Electrical Power Service: Electric power from the Owner's existing electrical system WILL be available for the Contractor's use, without metering and without payment of use charges.**

The Contractor shall provide connection to and extension of existing services, as required for construction operations. The Contractor shall make provisions to extend the Owner's existing electrical service for extended or remote areas of the site.

The Owner reserves the right to restrict or terminate the Contractor's use of Owner's electrical service at no charge, due to abuse or wanton waste.

In such case, payment for electrical service for construction use will become the responsibility of the Contractor, and no Change to the Contract will be considered.

Where impractical or cost-prohibitive to extend the Owner's existing electrical service, the Contractor shall make other provisions for temporary electrical service, at no additional cost to the Owner.

D. SUBMITTALS

Site Plan: Prior to mobilization, provide a Site Plan, indicating proposed locations for temporary fencing, gates or other site access controls, construction area access, location of the job trailer, location of storage containers or trailers, locations of toilets and other temporary facilities, utility hookups, material storage and staging areas, parking areas for construction personnel, and all other pertinent information, for the Owner's approval and comment.

1.4 QUALITY ASSURANCE

A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

1.5 PROJECT CONDITIONS

A. Temporary Use of Permanent Facilities: Installer of each permanent service shall assume responsibility for the operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS

2.1 MATERIALS (AS MAY BE APPLICABLE TO THE PROJECT)

A. Temporary Drives: Cement-Stabilized Soil, Limestone, Hot-Mix Asphalt Paving, or Concrete Pavement, as deemed necessary by the Contractor, or as specified to maintain access to areas as required by the Contract.

B. Chain-Link Fencing: Minimum 2-inch (50-mm), 0.148-inch- (3.76-mm-) thick, galvanized steel, chain-link fabric fencing; minimum 6 feet (1.8 m) high or 8 feet (2.4m) with galvanized steel pipe posts; minimum 2-3/8-inch- (60-mm-) OD line posts and 2-7/8-inch- (73-mm-) OD corner and pull posts, with 1-5/8-inch- (42-mm-) OD top rails.

C. Portable Chain-Link Fencing: Minimum 2-inch (50-mm), 9-gage, galvanized steel, chain-link fabric fencing; minimum 6 feet (1.8 m) high with galvanized steel pipe posts; minimum 2-3/8-inch- (60-mm-) OD line posts and 2-7/8-inch- (73-mm-) OD corner and pull posts, with 1-5/8-inch- (42-mm-) OD top and bottom rails. Provide galvanized steel bases for supporting posts.

D. Wood Enclosure Fence: Plywood, 8 feet (2.4 m) high, framed with four 2-by-4-inch (50-by-100-mm) rails or vertical studs, with preservative-treated wood posts spaced not more than 8 feet (2.4 m) apart, or as required for the specific application.

E. Gypsum Board: Minimum 1/2 inch (12.7 mm) thick by 48 inches (1219 mm) wide by maximum available lengths; regular-type panels with tapered edges. Comply with ASTM C 36/C 36M.

F. Insulation: Where temporary enclosures are required to be insulated, provide unfaced mineral-fiber blanket, manufactured from glass, slag wool, or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, in thicknesses as indicated on the Drawings.

2.2 TEMPORARY FACILITIES

A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.

B. Storage Units: Provide secure, weathertight lockable storage units or containers, appropriate for the storage of materials on site.

C. Fabrication Sheds: Provide temporary sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.

2.3 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

B. Heating Equipment: Unless Owner authorizes use of permanent heating system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.

1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
2. Heating Units: Listed and labeled for type of fuel being consumed, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.

B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

A. General: Install temporary service or connect to existing service.

1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.

B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.

1. Connect temporary sewers to the municipal system or private system, if indicated on the Drawings, as directed by the Owner or authorities having jurisdiction.

C. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction requirements.

D. Water Service: If acceptable to the Owner, use of Owner's existing water service facilities will be permitted, as long as facilities are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.

1. Where installations below an outlet might be damaged by spillage or leakage, provide a drip pan of suitable size to minimize water damage. Drain accumulated water promptly from pans.

E. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.

F. Temporary Heating and Cooling: Provide temporary heating and cooling as required by construction activities for curing or drying of completed installations, or for protecting installed construction from adverse effects of low or high temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.

G. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.

H. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.

1. Temporary electric power service may be installed overhead or underground, unless specifically indicated.
2. Connect temporary service to Owner's existing power source, as directed by Owner.

I. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.

1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.

J. Telephone and Data Services:

1. Provide telephone-based, cable-based, or wireless-based electronic communication services as described below:

a. Dedicated land-based telephone line(s) ~~WILL /~~ WILL NOT be required for telephone(s) in each field office.

b. Dedicated land-based telephone line(s) ~~WILL /~~ WILL NOT be required for facsimile machine(s) in each field office.

c. Dedicated land-based telephone or cable line(s) ~~WILL /~~ WILL NOT be required for computer(s) in each field office.

d. **Provide the superintendent with cellular telephone for use and contact at all times.**

1. In the Contractor's Field Office, post a list of important telephone numbers including police and fire departments, Contractor's home office, Architect's office, Owner's office, Principal subcontractors' field and home offices.

K. Electronic Communication Service: Provide superintendent with electronic mail service, either in the field office, laptop computer, or by portable personal communication device.

3.3 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:

1. Provide incombustible construction for offices, shops, and sheds located within construction area or within 30 feet (9 m) of building lines. Comply with NFPA 241.
2. Maintain support facilities until near Substantial Completion. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.

B. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate for construction operations. Locate temporary roads and paved areas as required for access or as indicated on the Drawings.

1. Provide dust-control treatment that is non-polluting and non-tracking. Reapply treatment as required to minimize dust.

C. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate for construction operations. Locate temporary roads and paved areas in same location as permanent roads and paved areas. Extend temporary roads and paved areas, within construction limits indicated, as necessary for construction operations.

1. Coordinate elevations of temporary roads and paved areas with permanent roads and paved areas.
2. Prepare subgrade and install subbase and base for temporary roads and paved areas to be incorporated into final work according to Division 2 Section "Earthwork."
3. Recondition base after temporary use, including removing contaminated material, regrading, proof rolling, compacting, and testing, as necessary to comply with requirements for Construction.
4. Delay installation of final course of permanent hot-mix asphalt pavement, if applicable, until immediately before Substantial Completion. Repair hot-mix asphalt base-course pavement before installation of final course according to Division 2 Section "Hot-Mix Asphalt Paving."

D. Traffic Controls: Comply with requirements of authorities having jurisdiction.

1. Protect existing site improvements to remain including curbs, pavement, and utilities.
2. Maintain access for fire-fighting equipment and access to fire hydrants.

E. Parking: Provide temporary parking areas, or use designated areas of Owner's existing parking areas for construction personnel, as directed by the Owner.

F. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.

1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties nor endanger permanent Work or temporary facilities.
2. Remove snow and ice as required to minimize accumulations.

G. Project Identification and Temporary Signs: Provide Project identification and other signs as required. Install signs where indicated to inform public and individuals seeking entrance to Project. Unauthorized signs are not permitted.

1. Provide temporary, directional signs for construction personnel and visitors.
2. Maintain and touchup signs so they are legible at all times.

H. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with Division 1 Section "Execution Requirements" for progress cleaning requirements.

I. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.

1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

J. Temporary Elevator Use: Refer to Division 14 Sections for temporary use of new elevators.

K. Existing Elevator Use: Use of Owner's existing elevators, if applicable, will be permitted, as long as elevators are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore elevators to condition existing before initial use, including replacing worn cables, guide shoes, and similar items of limited life.

1. Provide protective coverings, barriers, devices, signs, or other procedures to protect elevator car and entrance doors and frame. If, despite such protection, elevators become damaged, engage elevator Installer to restore damaged work so no evidence remains of correction work. Return items that cannot be refinished in field to the shop, make required repairs and refinish entire unit, or provide new units as required.

L. Temporary Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate.

M. Existing Stair Usage: Use of Owner's existing stairs, if applicable, will be permitted, as long as stairs are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore stairs to condition existing before initial use.

1. Provide protective coverings, barriers, devices, signs, or other procedures to protect stairs and to maintain means of egress. If, despite such protection, stairs become damaged, restore damaged areas so no evidence remains of correction work.

N. Temporary Use of Permanent Stairs: Cover finished, permanent stairs with protective covering of plywood or similar material so finishes will be undamaged at time of acceptance.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

B. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction.

C. Stormwater Control: Comply with requirements of the authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.

D. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.

E. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Obtain extended warranty for Owner. Perform control operations lawfully, using environmentally safe materials.

F. Site Enclosure Fence: Prior to commencement of construction operations, furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.

1. Extent of Fence: Sufficient to accommodate construction operations, unless otherwise indicated on Drawings.
2. Maintain security by limiting number of keys and restricting distribution to authorized personnel.
3. Provide the Owner and/or Architect each with one set of keys.
4. Provide additional fencing and/or barricades at locations of excavation, prior to beginning excavation operations.

G. Security Enclosure and Lockup: Install substantial temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security.

H. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

I. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.

1. Where heating or cooling is needed and permanent enclosure is not complete, insulate temporary enclosures.

J. Temporary Partitions: If applicable, provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by Owner and/or tenants from dust, fumes and noise.

1. Construct dustproof partitions with gypsum wallboard with joints taped on occupied side, and fire-retardant plywood on construction operations side.
2. Construct dustproof partitions with 2 layers of 3-mil (0.07-mm) polyethylene sheet on each side. Cover floor with 2 layers of 3-mil (0.07-mm) polyethylene sheet, extending sheets 18 inches (460 mm) up the sidewalls. Overlap and tape full length of joints. Cover floor with fire-retardant plywood.

    a. Where required, construct vestibule and airlock at each entrance through temporary partition with not less than 48 inches (1219 mm) between doors. Maintain water-dampened foot mats in vestibule.

3. Insulate partitions to provide noise protection to occupied areas.
4. Seal joints and perimeter. Equip partitions with dustproof doors and security locks.
5. Protect air-handling equipment.
6. Weather strip openings.
7. Provide walk-off mats at each entrance through temporary partition.

K. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241.

1. Prohibit smoking in enclosed construction areas.
2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

3.5 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Maintenance: Maintain facilities in good operating condition until removal.

1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage to work completed and/or in place.

C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.

D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are property of the Contractor.
2. The Owner reserves right to take possession of Project identification signs.
3. At Substantial Completion, clean and renovate permanent facilities used during construction period. Comply with final cleaning requirements specified in Division 1 Section "Closeout Procedures."

END OF SECTION 01 50 00

SECTION 01 50 10 - PROJECT SIGN REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes provisions for Signage to be erected at the Project site, including, but not limited to, the following:

1. Construction Project Sign(s)
2. General Safety and/or Informational Signage

1.2 CONSTRUCTION PROJECT SIGN

A. General: The Contractor shall include in the project, Construction Project Sign(s) with the following information, as related to the Project.

1. Quantity Required: **One (1) each**
2. Sign Size: **6'-0" x 8'-0"**
3. Orientation: **Vertical**
4. Color Requirements: **Provide Full Color for Logos and Copy**
5. Color Images: **A project rendering image will be provided for this sign.**
6. Sample: **(2) full scale 12" X 12" colored sample prints will be required during the submittal process for review of image and color quality.**
7. Information to be included on sign:
   a. **Project Name and Logo (if applicable)**
   b. **Owner's Project Number (if applicable)**
   c. **Dates (if applicable)**
   d. **Other pertinent information (as may be applicable)**
   e. **Funding Sources (if applicable)**
   f. **Owner's Name and Logo**
   g. **Architect's Name and Logo**
   h. **Contractor's Name and Logo**

B. Installation: Install sign(s) and maintain in good condition throughout the duration of the Project.

1. Posts: **6" x 6" Treated Pine, Painted White**
2. Overall height: **11'-0"**
3. Footings: **Concrete, diameter = 16", depth = exposed height / 3.**
4. Braces: **2" x 4" or 2" x 6" treaded pine, as is appropriate.**

1.3 SITE SAFETY AND/OR INFORMATIONAL SIGNS

A. General: Provide signs as deemed necessary to provide pertinent information to

employees, visitors, and the general public.

1. The Contractor shall provide and install safety and/or informational signs, as the Contractor deems necessary to inform employees and/or visitors to the Project Site, and the general public in the vicinity of the Project Site, of pertinent safety and/or general information as related to the Project Site.

B. Installation: Install sign(s) and maintain in good condition throughout the duration of the Project.

END OF SECTION 01 50 01

SECTION 01 72 00 – CONSTRUCTION SURVEYING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Construction Surveying.

1.2 QUALITY ASSURANCE

A. The contractor shall retain the services of a Professional Land Surveyor, licensed in the State of Louisiana for the services included in this section.

PART 2 - EXECUTION

2.1 SERVICES

A. A licensed surveyor shall, at a minimum, provide the following services:

1. Provide no less than (2) Temporary Benchmark Elevations on each project site, located so as to remain available for the duration of the project.
2. Provide construction staking of all underground utilities to be protected.
3. Provide construction staking of all slab on grade components verifying location conforms to the requirements of the Construction Documents.
4. Provide construction staking of all existing and new shaft locations to ensure conformance with bid documents.
5. Confirm vertical heights of structural components to ensure that the “finished floor” elevation conforms to the requirements of the Construction Documents.
6. ~~**For each building, or buildings, and associated equipment pads or platforms, and prior to pouring any concrete slabs, field verify and prepare for Project Record and for Permitting Authorities, a “TOP OF FORMWORK” Elevation Certificate.).**~~
7. ~~**For each building, or buildings, and for associated equipment pads or platforms field verify and prepare for Project Record and for Permitting Authorities at Substantial Completion, a final “CERTIFICATE OF ELEVATION” for each building or buildings, per the following requirements:**~~

~~**Provide a FEMA National Flood Insurance Program Elevation Certificate for each building or buildings. The elevation certificate is to be completed and stamped by a Professional Land Surveyor, licensed in the State of Louisiana, in strict accordance with FEMA's National Flood Insurance Program (N.F.I.P.) requirements, and shall include photographs where required.**~~

~~**The Elevation Certificate(s) for each building or buildings shall be prepared in accordance with and under the assumption that it is intended to support a LOMA or LOMR-F request.**~~

END OF SECTION 01 72 00

SECTION 01 77 00 – PROJECT CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:

1. Inspection procedures.
2. Warranties.
3. Final cleaning.

1.2 SUBSTANTIAL COMPLETION

A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete in request.

1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
2. Advise Owner of pending insurance changeover requirements.
3. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
4. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
5. Prepare and submit Project Record Documents, operation and maintenance manuals, Final Completion construction photographs, property surveys, and similar final record information.
6. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.
7. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
8. Complete startup testing of systems.
9. Submit test/adjust/balance records.
10. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
11. Advise Owner of changeover in utilities.
12. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
13. Complete final cleaning requirements, including touchup painting.
14. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

B. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Architect will either proceed with inspection or notify Contractor of

unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for Final Completion.

1.3 FINAL COMPLETION

A. Preliminary Procedures: Before requesting final inspection for determining date of Final Completion, complete the following:

1. Submit a final Application for Payment according to Division 1 Section "Payment Procedures."
2. Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.

B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.4 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Preparation: Submit list. Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.

1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor.
2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.

1.5 WARRANTIES

A. Submittal Time: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated.

B. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.

1. Bind warranties and bonds in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.

C. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. General: Provide final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:

a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
d. Remove tools, construction equipment, machinery, and surplus material from Project site.
e. Remove snow and ice to provide safe access to building.
f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
h. Sweep concrete floors broom clean in unoccupied spaces.
i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.
j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
k. Remove labels that are not permanent.
l. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.

    1) Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.

m. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
n. Replace parts subject to unusual operating conditions.
o. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
p. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
q. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
r. Leave Project clean and ready for occupancy.

C. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful, or

dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.

END OF SECTION 01 77 00

SECTION 01 78 39 - PROJECT RECORD DOCUMENTATION

PART 1 - GENERAL

1.1 PROJECT RECORD DOCUMENTS

A. Maintain on site one set of the following record documents; record actual revisions to the Work, as changes are made:

1. Drawings.
2. Specifications.
3. Addenda.
4. Architects/Engineers written responses to Requests for Information, Architect's Supplemental Instructions, Field Orders', Minor Change Directives, and Construction Change Directives.
5. Change Orders and other modifications to the Contract.
6. Proposal Requests, and other supplemental instructions.
7. Reviewed Shop Drawings, Product Data, and Samples.
8. Manufacturer's instructions for assembly, installation, maintaining, and adjusting of items installed in the Project.

B. Ensure entries are complete and accurate, enabling future reference by Owner. The Architect and Owner's Project Manager will review documents for general conformance, however, the Contractor will be solely responsible for completeness and accuracy of the documentation and other information.

C. Do not use Record Documents for construction purposes. Store Record Documents separate from documents used for construction. Protect Record Documents from deterioration and loss in a secure, weather-tight location in accordance with Section 015000, Temporary Facilities and Controls.

D. Record information concurrent with construction progress, not less than weekly.

E. Provide access to record documents for Owner's and Architect's reference during normal working hours.

F. Give particular attention to information on concealed products and installations that would be difficult to identify or measure and record later.

G. Mark record sets in red erasable colored pencil; use other colors to distinguish between changes for different categories of the Work at the same location.

1. Mark important additional information which was either shown schematically or omitted from original Documents.
2. Note Construction Change Directive numbers, Alternate numbers, Change Order numbers, and similar identifying information.

3. Where feasible, the individual or entity who obtained record data, whether the individuals or entity is the installer, subcontractor, or similar entity, is required to prepare the mark-up on record documents.
4. Accurately record information in an understandable drawing technique.
5. Record data as soon as possible after it has been obtained. In the case concealed installations, record and check the mark-up prior to concealment.
6. Sign or initial and date each mark-up.

1.2 RECORD SPECIFICATIONS

A. Record Specifications: Maintain one complete copy of the Project Manual including addenda and modifications issued. Legibly mark and record at each product section a description of actual products installed and variations in actual Work performed in comparison with products specified. Include the following:

1. Manufacturer's name and product model and number.
2. Product substitutions or alternates utilized.
3. Changes made by addenda and modifications.
4. Related record drawing information and Product Data.
5. Other information necessary to provide a record of selections made and to document coordination with record Product Data submittals and maintenance manuals.

1.3 RECORD DRAWINGS

A. Record Drawings: Maintain one complete blackline copy of the Drawings, Specifications, and Shop Drawings. Mark the set to show the actual installation where the installation varies from the Work as originally shown.

1. Legibly mark each item to record actual construction including, but not limited to the following:

a. Measured depths of foundations in relation to project finish floor datum.
b. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
c. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
d. Field changes of dimension and detail.
e. Details not on original Drawings.
f. Revisions to details shown on the Drawings.
g. Dimensional changes to the Drawings.
h. Actual equipment locations.

i. Duct size and routing.
j. Changes made by Change Order; include change order number.

2. Mark completely and accurately record prints of Drawings, Specifications, and Shop Drawings, whichever is most capable of showing actual physical conditions. Where Shop Drawings are marked to reflect changes in the Work, record a cross-reference at the corresponding location on the Drawings.

3. Prepare a full set of corrected reproducible Drawings and Shop Drawings.

4. Incorporate changes and additional information previously marked on print sets. Erase, redraw, and add details and notations where applicable. Identify and date each Drawing; include the printed designation "PROJECT RECORD DRAWINGS" in a prominent location on each Drawing. Refer instances of uncertainty to the Architect for resolution.

1.4 RECORD PRODUCT DATA

A. Maintain one copy of each Product data submittal for record document purposes. Mark Product Data to indicate the actual product installation. Include significant changes in the product delivered to the site, and changes in manufacturer's instructions and recommendations for installation.

1.5 RECORD PRODUCT SAMPLES

A. Immediately prior to date of Substantial Completion, meet with the Project Manager, and Owner, at the Owner's discretion, at the site to determine which of the Samples maintained during the construction period shall be transmitted to Owner for record purposes.

1. Comply with the Architect's instructions for packaging, identification marking, and delivery to Owner's Sample storage space.
2. Dispose of other Samples in manner specified for disposal of surplus and waste materials.

1.6 MISCELLANEOUS RECORD DOCUMENTS

A. Refer to other Specification Sections for additional miscellaneous record-keeping requirements and submittals in connection with various construction activities.

B. Immediately prior to Substantial Completion, complete miscellaneous records and place in good order, properly identified and bound or filed, ready for use and reference. Categories of requirements resulting in miscellaneous records, include, but are not limited to the following:

1. Ambient and substrate condition tests
2. Inspections and certifications by governing authorities.
3. Fire resistance and flame spread test results.

1.7 CERTIFICATION

A. By submittal of Project Record Documents, the Contractor certifies, that to the best of his knowledge, information, and belief the documents are a true and complete representation of the actual construction of the Work of this Project.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 78 39



SECTION 01 91 13 - GENERAL COMMISSIONING REQUIREMENTS

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.

B. OPR and BoD documentation are included by reference for information only.

1.2 SUMMARY

A. Section includes general requirements that apply to implementation of commissioning without regard to specific systems, assemblies, or components.

B. Related Sections:

1. Division 23 Section "Commissioning of HVAC" - commissioning process activities for HVAC&R systems, assemblies, equipment, and components.

1.3 DEFINITIONS

A. BoD: Basis of Design. A document that records concepts, calculations, decisions, and product selections used to meet the OPR and to satisfy applicable regulatory requirements, standards, and guidelines. The document includes both narrative descriptions and lists of individual items that support the design process.

B. Commissioning Plan: A document that outlines the organization, schedule, allocation of resources, and documentation requirements of the commissioning process.

C. CxA: Commissioning Agent.

D. OPR: Owner's Project Requirements. A document that details the functional requirements of a project and the expectations of how it will be used and operated. These include Project goals, measurable performance criteria, cost considerations, benchmarks, success criteria, and supporting information.

E. Systems, Subsystems, Equipment, and Components: where these terms are used together or separately, they shall mean "as-built" systems, subsystems, equipment, and components.

1.4 DESCRIPTION OF WORK

A. The purpose of the commissioning process is to provide the owner/operator of the facility with assurance that the HVAC System has been installed according to the

contract documents, and operate within the performance guidelines set out in the specifications. The CxA will provide the owner with an unbiased, objective view of the system's installation, operation, and performance. The commissioning process does not take away or reduce the responsibility of the installing contractors to provide a finished product, installed and fully functional in accordance with the contract documents.

B. Commissioning is intended to enhance the quality of system start-up and aid in the orderly completion and transfer of systems for beneficial use by the owner. The CxA will be the leader of the commissioning team, planning and coordinating all commissioning activities in conjunction with the design professionals, construction manager, subcontractors, manufacturers and equipment suppliers.

C. The General Contractor and HVAC Contractor shall be responsible for cooperating, and coordinating their work, with the CxA. They shall also be responsible for carrying out all the physical activities required for installation of components and systems, and operating them during the commissioning process as required in this Section.

1.5 REFERENCES

A. ACG Building Systems Commissioning Guideline

B. ASHE Commissioning Guideline-2010

C. ASHRAE Guideline 0-2019 The Commissioning Process

D. ASHRAE Standard 202-2024 -- The Commissioning Process Requirements for New Buildings and New Systems

1.6 MEMBERS OF THE COMMISSIONING TEAM

A. The commissioning team will be comprised of representatives from each discipline involved in the commissioning process. The core members of the team will be required to attend all meetings.

B. Members appointed by Owner

1. Representatives of the facility user and operation and maintenance personnel. Architect and engineering design professionals.

C. Team Members Appointed by Contractor(s):

1. CxA is the designated person, company, or entity that plans, schedules, and coordinates the commissioning team to implement the commissioning process.
2. The General Contractor will engage the CxA under this contract.
3. Representatives of each contractor, including project superintendent and subcontractors, installers, vendor, suppliers, and specialists deemed appropriate by the CxA. The individuals shall each have authority to act on

behalf of the entity he or she represents, explicitly organized to implement the commissioning process through coordinated actions.

4. The commissioning team will meet on a regular basis as defined by the CxA in the "kick-off" meeting. The frequency of the meetings will be determined by the activity of the construction and the nearness to completion of each specialty.
5. Non-core team members will be required to attend meetings as scheduled by the team in order to provide seamless continuity to the commissioning progress schedule.

1.7 OWNER'S RESPONSIBILITIES

A. Provide the OPR documentation (if applicable) to the CxA and each Contractor for information and use.

B. Assign operation and maintenance personnel and schedule them to participate in commissioning team activities.

C. Provide the BoD documentation (if applicable), prepared by Architect and approved by Owner, to the CxA and each Contractor for use in developing the commissioning plan, systems manual, and operation and maintenance training plan.

1.8 EACH CONTRACTOR'S RESPONSIBILITIES

A. Each Contractor shall assign representatives with expertise and authority to act on its behalf and shall schedule them to participate in and perform commissioning process activities including, but not limited to, the following:

1. Evaluate performance deficiencies identified in test reports and, in collaboration with entity responsible for system and equipment installation, recommend corrective action.
2. Cooperate with the CxA for resolution of issues recorded in the Action Items Log.
3. Attend commissioning team meetings held on a monthly basis.
4. Integrate and coordinate commissioning process activities with construction schedule.
5. Review and accept construction checklists provided by the CxA.
6. Complete paper and electronic construction checklists as Work is completed and provide to the Commissioning Agent on a monthly basis.
7. Review and accept commissioning process test procedures provided by the Commissioning Agent.
8. Complete commissioning process test procedures.

B. Construction Manager

1. Participate in construction coordination.
2. Participate in the commission process and attend all meetings.
3. Develop the project schedule.

4. Work with the CxA to incorporate the commissioning schedule into the project schedule.
5. Ensure that subcontractors perform assigned responsibilities in a timely manner to meet the schedule.
6. Submit to CxA pre-functional test forms that meet the specifications and are typically used for the start-up of major equipment and systems.
7. Participate in maintenance orientation and inspection.
8. Participate in O&M training
9. Certify work is complete and systems are operational.

C. Subcontractors

1. Participate in commissioning team meetings.
2. Cooperate with all commissioning team members and work in a cohesive manner to accomplish the commissioning process objectives.
3. Provide schedules for the O&M data submittals and equipment start-up and testing to the CxA for incorporation into the commissioning plan. Update the schedule on a regular basis throughout the construction phase.
4. Provide information to the CxA for developing the construction phase commissioning plan.
5. Ensure participation of major equipment manufacturing in appropriate start-up, testing, and training activities.
6. Provide sufficient personnel to assist the CxA as required during equipment start-ups, system verification and functional performance testing.

D. CxA's RESPONSIBILITIES

1. Organize and lead the commissioning team.
2. Provide commissioning plan.
3. Convene commissioning team meetings as needed to facilitate commissioning activities.
4. Attends selected project meetings when invited by the design team. The CxA reviews the minutes of the regular project meetings and attends selected project meetings as needed to resolve issues and concerns and coordinate the commissioning process.
5. Review Submittal data and shop drawings related to the commissioning process to ensure conformance to the construction documents. Reviews the documents with the O & M personnel and forwards comments and concerns to the design team and the Owner. The design team reviews these and considers incorporating the items into the design team's formal review process. The project team then discusses and resolves any Cx & O & M personnel comments and concerns that the design team does not incorporated into its formal review.
6. Provide Project-specific construction (start-up) checklists and commissioning process functional test procedures
7. Witness systems, assemblies, equipment, and component startup
8. Evaluate performance deficiencies identified in test reports and, in collaboration with entity responsible for system and equipment installation, recommend corrective action.

9. Prepare and maintain the Actions Item Log
10. Verify the execution of commissioning process activities using random sampling. The sampling rate may vary from 1 to 100 percent. Verification will include, but is not limited to, equipment submittals, construction checklists, training, operating and maintenance data, tests, and test reports to verify compliance with the OPR. When a random sample does not meet the requirement, the CxA will report the failure in the Action Items Log
11. Facilitate implementation of HVAC control system trends
12. Prepare and maintain completed construction checklist log.
13. Compile test data, inspection reports, and certificates; include them in the systems manual and commissioning process report

END OF SECTION 01 91 13

SECTION 024119 - SELECTIVE DEMOLITION

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. Demolition and removal of selected site elements.

1.3 DEFINITIONS

A. Remove: Detach items from existing construction and dispose of them off-site unless indicated to be salvaged or reinstalled.

B. Existing to Remain: Leave existing items that are not to be removed and that are not otherwise indicated to be salvaged or reinstalled.

1.4 MATERIALS OWNERSHIP

A. Unless otherwise indicated, demolition waste becomes property of Contractor.

B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.

1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.5 PREINSTALLATION MEETINGS

A. Predemolition Conference: Conduct conference at Project site.

1. Inspect and discuss condition of construction to be selectively demolished.
2. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
3. Review areas where existing construction is to remain and requires protection.

1.6 INFORMATIONAL SUBMITTALS

A. Proposed Protection Measures: Indicate the measures proposed for protecting individuals and property, for dust control and, for noise control. Indicate proposed locations and construction of barriers.

B. Schedule of Selective Demolition Activities: Indicate the following:

1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's building manager's and other tenants' on-site operations are uninterrupted.
2. Interruption of utility services. Indicate how long utility services will be interrupted.
3. Coordination for shutoff, capping, and continuation of utility services.
4. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.

C. Predemolition Photographs or Video: Show existing conditions of adjoining construction, including finish surfaces, that might be misconstrued as damage caused by demolition operations. Comply with Section 013233 "Photographic Documentation." Submit before Work begins.

1.7 FIELD CONDITIONS

A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.

B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.

1. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.

E. Storage or sale of removed items or materials on-site is not permitted.

F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

1. Maintain fire-protection facilities in service during selective demolition operations.

1.8 COORDINATION

A. Arrange selective demolition schedule so as not to interfere with Owner's operations.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Standards: Comply with ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs or video.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.

3.3 PROTECTION

A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
4. Cover and protect furniture, furnishings, and equipment that have not been removed.
5. Provide for temporary enclosures, dust control, heating, and cooling specified in Section 015000 "Temporary Facilities and Controls." where required.

B. Temporary Shoring: Design, provide, and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of

construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.

1. Strengthen or add new supports when required during progress of selective demolition. C. Remove temporary barricades and protections where hazards no longer exist.

3.4 SELECTIVE DEMOLITION, GENERAL

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
   1. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.
   2. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
   3. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
   4. Maintain fire watch during and for at least 1 hour after flame-cutting operations.
   5. Maintain adequate ventilation when using cutting torches.
   6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
   7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
   8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
   9. Dispose of demolished items and materials promptly.

B. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

C. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

A. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals using power-driven saw, and then remove concrete between saw cuts.

B. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, and then break up and remove.

3.6 DISPOSAL OF DEMOLISHED MATERIALS

A. Remove demolition waste materials from Project site and dispose of them in an EPA-approved construction and demolition waste landfill acceptable to authorities having jurisdiction.

1. Do not allow demolished materials to accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: Do not burn demolished materials.

3.7 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION 024119

SECTION 032000 - CONCRETE REINFORCING



PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Steel reinforcement bars.
2. Welded-wire reinforcement.

B. Related Requirements:

1. Section 033000 “Cast-in-Place Concrete”
2. Section 321313 "Concrete Paving"

1.2 ACTION SUBMITTALS

A. Product Data: For the following:

1. Each type of steel reinforcement.
2. Bar supports.
3. Mechanical splice couplers

B. Shop Drawings: Comply with ACI 315-18 (Manual of Standard Practice for Detailing Reinforced Concrete Structures) and CRSI MSP-1 (Manual of Standard Practice), 29th Edition:

1. Include placing drawings that detail fabrication, bending, and placement.
2. Include bar sizes, lengths, materials, grades, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, location of splices, lengths of lap splices, details of mechanical splice couplers, details of welding splices, tie spacing, hoop spacing, and supports for concrete reinforcement.

C. Construction Joint Layout: Indicate proposed construction joints required to build the structure.

1. Location of construction joints is subject to approval of Engineer.

a. Include locations of contraction joints; spacing not to exceed 15’c./c u.n.o. on drawings.
b. Coordinate with sensitive architectural features as required.

1.3 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.

1. Store reinforcement to avoid contact with earth.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

2.2 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A615, Grade 60, deformed.

B. Plain-Steel Welded-Wire Reinforcement: ASTM A1064, plain, fabricated from as-drawn steel wire into flat sheets.

C. Deformed-Steel Welded-Wire Reinforcement: ASTM A1064, flat sheet.

2.3 REINFORCEMENT ACCESSORIES

A. Joint Dowel Bars: ASTM A615, Grade 60, plain-steel bars, cut true to length with ends square and free of burrs.

B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire reinforcement in place.

1. Manufacture bar supports from steel wire, plastic, or precast concrete in accordance with CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:

a. For concrete surfaces exposed to view, where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire, all-plastic bar supports, or CRSI Class 2 stainless steel bar supports.

C. Steel Tie Wire: ASTM A1064, annealed steel, not less than 0.0508 inch in diameter.

1. Finish: Plain.

2.4 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

PART 3 - EXECUTION

3.1 PREPARATION

A. Protection of In-Place Conditions:

1. Do not cut or puncture vapor retarder.
2. Repair damage and reseal vapor retarder before placing concrete.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that reduce bond to concrete.

3.2 INSTALLATION OF STEEL REINFORCEMENT

A. Comply with CRSI's "Manual of Standard Practice" for placing and supporting reinforcement.

B. Accurately position, support, and secure reinforcement against displacement.

1. Locate and support reinforcement with bar supports to maintain minimum concrete cover.
2. Do not tack weld crossing reinforcing bars.

C. Preserve clearance between bars of not less than 1 inch, not less than one bar diameter, or not less than 1-1/3 times size of large aggregate, whichever is greater.

D. Provide concrete coverage in accordance with ACI 318.

E. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

F. Splices: Lap splices as indicated on Drawings.

1. Bars indicated to be continuous, and all vertical bars to be lapped not less than 48 bar diameters at splices, or 24 inches, whichever is greater.
2. Stagger splices in accordance with ACI 318.

G. Install welded-wire reinforcement in longest practicable lengths.

1. Support welded-wire reinforcement in accordance with CRSI "Manual of Standard Practice."

    a. For reinforcement less than W4.0 or D4.0, continuous support spacing to not exceed 12 inches.

2. Lap edges and ends of adjoining sheets at least one wire spacing plus 2 inches for plain wire and 8 inches for deformed wire.
3. Offset laps of adjoining sheet widths to prevent continuous laps in either direction.
4. Lace overlaps with wire.

3.3 JOINTS

A. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Engineer.

B. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length, to prevent concrete bonding to one side of joint.

3.4 INSTALLATION TOLERANCES

A. Comply with ACI 117 (latest edition).

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.

B. Inspections:

1. Steel-reinforcement placement.

END OF SECTION 032000

SECTION 033000 - CAST-IN-PLACE CONCRETE



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, including concrete materials, mixture design, placement procedures, and finishes.

B. Related Requirements:
1. Section 032000 "Concrete Reinforcing" for steel reinforcing bars and welded-wire reinforcement.
2. Section 072600 “Vapor Retarder”
3. Section 312000 "Earth Moving"

1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with fly ash; materials subject to compliance with requirements.

B. Water/Cement Ratio (w/cm): The ratio by weight of water to cementitious materials.

1.4 ACTION SUBMITTALS

A. Product Data: For each of the following.

1. Portland cement.
2. Fly ash.
3. Aggregates.
4. Admixtures:

a. Include limitations of use, including restrictions on cementitious materials, supplementary cementitious materials, air entrainment, aggregates, temperature at time of concrete placement, relative humidity at time of concrete placement, curing conditions, and use of other admixtures.
5. Vapor retarders.
6. Curing materials.
7. Joint Fillers
8. Repair Materials

B. Design Mixtures: For each concrete mixture, include the following:

1. Mixture identification.
2. Minimum 28-day compressive strength.
3. Durability exposure class.
4. Maximum w/cm.
5. Slump limit.
6. Air content.
7. Nominal maximum aggregate size.
8. Intended placement method.
9. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

C. Shop Drawings:

1. Construction Joint Layout: If not shown on Drawings, indicate proposed construction joints required to construct the structure. Location of construction joints is subject to approval of the Architect.
2. Reinforcement: Submit shop drawings for fabrication, bending, and placement of concrete reinforcement. Comply with CRSI “Manual of Standard Practice” showing bar schedules, stirrup spacing, diagrams of bent bars, and arrangement of concrete reinforcement. Include special reinforcement required at openings through concrete structures.

D. Concrete Schedule: For each location of each Class of concrete indicated in "Concrete Mixtures" Article, including the following:

1. Concrete Class designation.
2. Location within Project.
3. Exposure Class designation.
4. Formed Surface Finish designation and final finish.
5. Final finish for floors.
6. Curing process.
7. Floor treatment if any.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For the following:

1. Installer: Include copies of applicable ACI certificates.
2. Ready-mixed concrete manufacturer.
3. Testing agency: Include copies of applicable ACI certificates.

B. Material Certificates: For each of the following, signed by manufacturers:

1. Cementitious materials.
2. Admixtures.
3. Curing compounds.
4. Bonding agents.
5. Vapor retarders.

6. Semirigid joint filler.
7. Joint-filler strips.
8. Repair materials.

C. Material Test Reports: For the following, from a qualified testing agency:

1. Portland cement.
2. Fly ash.
3. Aggregates.
4. Admixtures:

D. Preconstruction Test Reports: For each mix design.

E. Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Ready-Mixed Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94 requirements for production facilities and equipment.

B. Laboratory Testing Agency Qualifications: A testing agency qualified in accordance with ASTM C1077 and ASTM E329 for testing indicated and employing an ACI-certified Concrete Quality Control Technical Manager.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Comply with ASTM C94 and ACI 301.

1.8 FIELD CONDITIONS

A. Cold-Weather Placement: Comply with ACI 301 and ACI 306.1 and as follows.

1. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
2. Concrete is not to be placed is temperature is below or expected to fall below 40 deg F. Place concrete only when temperature is 40 deg F or higher and rising.
3. Do not use frozen materials or materials containing ice or snow.
4. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

B. Hot-Weather Placement: Comply with ACI 301 and ACI 305.1, and as follows:

1. Maintain concrete temperature at time of discharge to not exceed 95 deg F.
2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

A. ACI Publications: Comply with ACI 301 unless modified by requirements in the Contract Documents.

2.2 CONCRETE MATERIALS

A. Source Limitations:

1. Obtain all concrete mixtures from a single ready-mixed concrete manufacturer for entire Project.
2. Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant.
3. Obtain aggregate from single source.
4. Obtain each type of admixture from single source from single manufacturer.

B. Cementitious Materials:

1. Portland Cement: ASTM C150, Type I/II, IL gray.
2. Fly Ash: ASTM C618, Class F.

C. Normal-Weight Aggregates: ASTM C33, Class 1N coarse aggregate or better, graded. Provide aggregates from a single source.

1. Maximum Coarse-Aggregate Size: 1 inch nominal.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

D. Air-Entraining Admixture: ASTM C260.

E. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C494, Type A.
2. Retarding Admixture: ASTM C494, Type B.
3. Water-Reducing and -Retarding Admixture: ASTM C494, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C494, Type F.
5. High-Range, Water-Reducing and -Retarding Admixture: ASTM C494, Type G.
6. Plasticizing and Retarding Admixture: ASTM C1017, Type II.

F. Water and Water Used to Make Ice: ASTM C94, potable.

2.3 VAPOR RETARDERS

A. Sheet Vapor Retarder, Class A: ASTM E1745, Class A; not less than 15 mils thick. Include manufacturer's recommended adhesive or pressure-sensitive tape. Comply with requirements of Section 072600 “Vapor Retarder.”

2.4 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

1. Manufacturers: Subject to compliance with requirements, providers include, but are not limited to, the following:

a. BASF Corporation.
b. Dayton Superior.
c. Euclid Chemical Company (The); an RPM company.

B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.

C. Moisture-Retaining Cover: ASTM C171, polyethylene film burlap-polyethylene sheet.

1. Color:

a. Ambient Temperature Below 50 deg F: Black.
b. Ambient Temperature between 50 deg F and 85 deg F: Any color.
c. Ambient Temperature Above 85 deg F: White.

D. Water: Potable or complying with ASTM C1602.

E. Clear, Waterborne, Membrane-Forming, Dissipating Curing Compound: ASTM C309, Type 1, Class B.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following, certified by curing compound manufacturer to not interfere with bonding of floor covering:

a. Dayton Superior.
b. Euclid Chemical Company (The); an RPM company.
c. W.R. Meadows, Inc.

2.5 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D1751, asphalt-saturated cellulosic fiber.

B. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Type A shore durometer hardness of 80 in accordance with ASTM D2240.

C. Bonding Agent: ASTM C1059, Type II, nonredispersible, acrylic emulsion or styrene butadiene.

D. Epoxy Bonding Adhesive: ASTM C881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade and class to suit requirements, and as follows:

1. Types I and II, non-load bearing and Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

2.6 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, in accordance with ACI 301.

1. Use a qualified testing agency for preparing and reporting proposed mixture designs, based on laboratory trial mixtures.

B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:

1. Fly Ash: 15 percent by mass. The use of fly ash is an option, not a requirement.

C. Admixtures: Use admixtures in accordance with manufacturer's written instructions.

1. Use water-reducing, high-range water-reducing, or plasticizing 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.

2.7 CONCRETE MIXTURES

A. Normal-weight concrete.

1. Exposure Class: ACI 318 [F0] [S0] [W0] [C0].
2. Minimum Compressive Strength: 3000 psi (building slabs) and 4000 psi (grade beams) unless otherwise indicated at 28 days.
3. Maximum w/cm:
   a. 0.57 (non-air entrained 4000 psi concrete)
   b. 0.48 (air-entrained 4000 psi concrete)
   c. 0.68 (non-air entrained 3000 psi concrete)
   d. 0.59 (air-entrained 3000 psi concrete)
4. Slump Limit: 4 inches, plus or minus 1 inch; 8 inches, plus or minus 1 inch for concrete with verified slump of 3 inches, plus or minus 1 inch before adding high-range water-reducing admixture or plasticizing admixture at Project site.
5. Air Content:
   a. No entrained air for interior steel trowel finished slabs
   b. 5.0 percent, plus or minus 1.5 percent at point of delivery for all other locations

6. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.

7. “Performance” type mixes with variances in the (above) parameters of 3 and 4 (only) submitted with satisfactory testing and performance documentation will be considered.

2.8 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete in accordance with ASTM C94 (90 minutes), and furnish batch ticket information.

1. When air temperature is between 85 and 90 degrees F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 degrees F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions:

1. Before placing concrete, verify that installation of concrete forms, accessories, and reinforcement, and embedded items is complete and that required inspections have been performed.
2. Do not proceed until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Provide reasonable auxiliary services to accommodate field testing and inspections, acceptable to testing agency, including the following:

1. Daily access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Secure space for storage, initial curing, and field curing of test samples, including source of water and continuous electrical power at Project site during site curing period for test samples.
4. Security and protection for test samples and for testing and inspection equipment at Project site.

3.3 INSTALLATION OF EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining Work that is attached to or supported by cast-in-place concrete.

1. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
2. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of ANSI/AISC 303.

3.4 INSTALLATION OF VAPOR RETARDER

A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder in accordance with ASTM E1643 and manufacturer's written instructions. Comply with requirements of Section 072600 “Vapor Retarder.”

3.5 JOINTS

A. Construct joints true to line, with faces perpendicular to surface plane of concrete.

B. Construction Joints: Coordinate with floor slab pattern and concrete placement sequence.

1. Install so strength and appearance of concrete are not impaired, at locations indicated on Drawings or as approved by Architect.

2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.
3. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

C. Control Joints in Slabs-on-Ground: Form weakened-plane control joints, sectioning concrete into areas as indicated. Construct control joints for a depth equal to at least one-fourth of concrete thickness as follows:

1. Grooved Joints: Form control joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of control joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
2. Sawed Joints: Form control joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random cracks. Timing of cutting shall be performed so as to not damage concrete but also prior to cracking of concrete. Any damage to the concrete resulting from cutting (or not cutting) of joints at appropriate times shall be repaired by the Contractor with no modifications to the contract amount or time.

D. Isolation Joints in Slabs-on-Ground: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated on Drawings.
2. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface, where joint sealants, specified in Section 079200 "Joint Sealants," are indicated.
3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

E. Doweled Joints:

1. Install dowel bars and support assemblies at joints where indicated on Drawings.

2. Lubricate or asphalt coat one-half of dowel bar length to prevent concrete bonding to one side of joint.

3.6 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, embedded items, and vapor retarder is complete and that required inspections are completed.

1. Immediately prior to concrete placement, inspect vapor retarder for damage and deficient installation, and repair defective areas.
2. Provide continuous inspection of vapor retarder during concrete placement and make necessary repairs to damaged areas as Work progresses.

B. Notify Architect and testing and inspection agencies 24 hours prior to commencement of concrete placement.

C. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect in writing, but not to exceed the amount indicated on the concrete delivery ticket.

1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness.

1. If a section cannot be placed continuously, provide construction joints as indicated.
2. Deposit concrete to avoid segregation.
3. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.
4. Consolidate placed concrete with mechanical vibrating equipment in accordance with ACI 301.

    a. Do not use vibrators to transport concrete inside forms.
    b. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches-into preceding layer.
    c. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity.
    d. 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.

E. 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. Do not place concrete floors and slabs in a checkerboard sequence.
2. Consolidate concrete during placement operations, so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
3. Maintain reinforcement in position on chairs during concrete placement.
4. Screed slab surfaces with a straightedge and strike off to correct elevations.

5. Level concrete, cut high areas, and fill low areas.
6. Slope surfaces uniformly to drains where required.
7. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface.
8. Do not further disturb slab surfaces before starting finishing operations.

3.7 FINISHING FORMED SURFACES

A. As-Cast Surface Finishes:

1. ACI 301 Surface Finish SF-1.0: As-cast concrete texture imparted by form-facing material.

    a. Patch voids larger than 1-1/2 inches wide or 1/2 inch deep.
    b. Remove projections larger than 1 inch.
    c. Tie holes do not require patching.
    d. Surface Tolerance: ACI 117 Class D.
    e. Apply to concrete surfaces not exposed to public view.

2. ACI 301 Surface Finish SF-2.0: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams.

    a. Patch voids larger than 3/4 inch wide or 1/2 inch deep.
    b. Remove projections larger than 1/4 inch.
    c. Patch tie holes.
    d. Surface Tolerance: ACI 117 Class B.
    e. Locations: Apply to concrete surfaces exposed to public view, to receive a rubbed finish, or to be covered with a coating or covering material applied directly to concrete.

B. Related Unformed Surfaces:

1. At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a color and texture matching adjacent formed surfaces.
2. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.8 FINISHING FLOORS AND SLABS

A. Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Scratch Finish:

1. While still plastic, texture concrete surface that has been screeded and bull-floated or darbied.
2. Use stiff brushes, brooms, or rakes to produce a profile depth of 1/4 inch in one direction.

3. Apply scratch finish to surfaces to receive concrete floor toppings and to receive mortar setting beds for bonded cementitious floor finishes.

C. Float Finish:

1. When bleedwater sheen has disappeared and concrete surface has stiffened sufficiently to permit operation of specific float apparatus, consolidate concrete surface with power-driven floats or by hand floating if area is small or inaccessible to power-driven floats.
2. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture and complies with ACI 117 tolerances for conventional concrete.
3. Apply float finish to surfaces to receive trowel finish and to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing, or sand-bed terrazzo.

D. Trowel Finish:

1. After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel.
2. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance.
3. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
4. Do not add water to concrete surface.
5. Do not apply hard-troweled finish to concrete, which has a total air content greater than 3 percent.
6. Apply a hard trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
7. Finish surfaces to the following tolerances, in accordance with ASTM E1155, for a randomly trafficked floor surface:

    a. Slabs on Ground:

        1) Finish and measure surface so gap at any point between concrete surface and an unleveled, freestanding, 10-ft. long straightedge resting on two high spots and placed anywhere on the surface does not exceed 1/4 inch and 1/16 inch in 2 feet.

    b. Suspended Slabs:

        1) Finish and measure surface so gap at any point between concrete surface and an unleveled, freestanding, 10-ft. long straightedge resting on two high spots and placed anywhere on the surface does not exceed 1/4 inch and 1/16 inch.

E. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces indicated on Drawings. While concrete is still plastic, slightly scarify surface with a fine broom perpendicular to main traffic route.

1. Coordinate required final finish with Architect before application.
2. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.

F. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and locations indicated on Drawings.

1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route.
2. Coordinate required final finish with Architect before application.

3.9 INSTALLATION OF MISCELLANEOUS CONCRETE ITEMS

A. Filling In:

1. Fill in holes and openings left in concrete structures after Work of other trades is in place unless otherwise indicated.
2. Mix, place, and cure concrete, as specified, to blend with in-place construction.
3. Provide other miscellaneous concrete filling indicated or required to complete the Work.

3.10 CONCRETE CURING

A. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

1. Comply with ACI 301 and ACI 306.1 for cold weather protection during curing.
2. Comply with ACI 301 and ACI 305.1 for hot-weather protection during curing.
3. Maintain moisture loss no more than 0.2 lb/sq. ft. x h before and during finishing operations.

B. Curing Formed Surfaces: Comply with ACI 308.1 as follows:

1. Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces.
2. Cure concrete containing color pigments in accordance with color pigment manufacturer's instructions.
3. If forms remain during curing period, moist cure after loosening forms.
4. If removing forms before end of curing period, continue curing for remainder of curing period, as follows:

    a. Continuous Fogging: Maintain standing water on concrete surface until final setting of concrete.
    b. Continuous Sprinkling: Maintain concrete surface continuously wet.
    c. Absorptive Cover: Pre-dampen absorptive material before application; apply additional water to absorptive material to maintain concrete surface continuously wet.
    d. Water-Retention Sheeting Materials: Cover exposed concrete surfaces with sheeting material, taping, or lapping seams.
    e. Membrane-Forming Curing Compound: Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's written instructions.

        1) Recoat areas subject to heavy rainfall within three hours after initial application.
        2) Maintain continuity of coating and repair damage during curing period.

C. Curing Unformed Surfaces: Comply with ACI 308.1 as follows:

1. Begin curing immediately after finishing concrete.
2. Interior Concrete Floors:

a. Floors to Receive Floor Coverings Specified in Other Sections: Contractor has option of the following:

1) Absorptive Cover: As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.

a) Lap edges and ends of absorptive cover not less than 12-inches.
b) Maintain absorptive cover water saturated, and in place, for duration of curing period, but not less than seven days.

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.

a) Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
b) Cure for not less than seven days.

3) Ponding or Continuous Sprinkling of Water: Maintain concrete surfaces continuously wet for not less than seven days, utilizing one, or a combination of, the following:

a) Water.
b) Continuous water-fog spray.

b. Floors to Receive Polished Finish: Contractor has option of the following:

1) Absorptive Cover: As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.

a) Lap edges and ends of absorptive cover not less than 12 inches.
b) Maintain absorptive cover water saturated, and in place, for duration of curing period, but not less than seven days.

2) Ponding or Continuous Sprinkling of Water: Maintain concrete surfaces continuously wet for not less than seven days, utilizing one, or a combination of, the following:

a) Water.
b) Continuous water-fog spray.

c. Floors to Receive Curing Compound:

1) Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's written instructions.
2) Recoat areas subjected to heavy rainfall within three hours after initial application.
3) Maintain continuity of coating, and repair damage during curing period.
4) Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer, unless manufacturer certifies curing compound does not interfere with bonding of floor covering used on Project.

d. Floors to Receive Curing and Sealing Compound:

1) Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller in accordance with manufacturer's written instructions.
2) Recoat areas subjected to heavy rainfall within three hours after initial application.
3) Repeat process 24 hours later, and apply a second coat. Maintain continuity of coating, and repair damage during curing period.

3.11 TOLERANCES

A. Conform to ACI 117.

3.12 JOINT FILLING

A. Prepare, clean, and install joint filler in accordance with manufacturer's written instructions.

1. Defer joint filling until concrete has aged at least 1 month.
2. 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 joints clean and dry.

C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints.

D. Overfill joint, and trim joint filler flush with top of joint after hardening.

3.13 CONCRETE SURFACE REPAIRS

A. Defective Concrete:

1. Repair and patch defective areas when approved by Architect.
2. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

B. Patching Mortar: Mix dry-pack patching mortar, consisting of 1 part portland cement to 2-1/2 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 to solid concrete.

    a. Limit cut depth to 3/4 inch.
    b. Make edges of cuts perpendicular to concrete surface.
    c. Clean, dampen with water, and brush-coat holes and voids with bonding agent.
    d. Fill and compact with patching mortar before bonding agent has dried.
    e. 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 matches surrounding color.

    a. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching.
    b. Compact mortar in place and strike off slightly higher than surrounding surface.

3. Repair defects on concealed formed surfaces that will affect concrete's durability and structural performance as determined by Architect.

D. Repairing Unformed Surfaces:

1. Test unformed surfaces, such as floors and slabs, for finish, and verify surface tolerances specified for each surface.

    a. Correct low and high areas.
    b. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

2. Repair finished surfaces containing surface defects, including 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.
3. After concrete has cured at least 14 days, correct high areas by grinding.
4. Correct localized low areas during, or immediately after, completing surface-finishing operations by cutting out low areas and replacing with patching mortar.

    a. Finish repaired areas to blend into adjacent concrete.

5. Correct other low areas scheduled to receive floor coverings with a repair underlayment.

    a. Prepare, mix, and apply repair underlayment and primer in accordance with manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
    b. Feather edges to match adjacent floor elevations.

6. Correct other low areas scheduled to remain exposed with repair topping.

a. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations.
b. Prepare, mix, and apply repair topping and primer in accordance with manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.

7. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete.

a. Remove defective areas with clean, square cuts, and expose steel reinforcement with at least a 3/4-inch clearance all around.
b. Dampen concrete surfaces in contact with patching concrete and apply bonding agent.
c. Mix patching concrete of same materials and mixture as original concrete, except without coarse aggregate.
d. Place, compact, and finish to blend with adjacent finished concrete.
e. Cure in same manner as adjacent concrete.

8. Repair random cracks and single holes 1 inch or less in diameter with patching mortar.

a. Groove top of cracks and cut out holes to sound concrete, and clean off dust, dirt, and loose particles.
b. Dampen cleaned concrete surfaces and apply bonding agent.
c. Place patching mortar before bonding agent has dried.
d. Compact patching mortar and finish to match adjacent concrete.
e. Keep patched area continuously moist for at least 72 hours.

E. Perform structural repairs of concrete, subject to 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.

3.14 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.

1. Testing agency shall be responsible for providing curing container for composite samples on Site and verifying that field-cured composite samples are cured in accordance with ASTM C31.
2. Testing agency shall immediately report to Architect, Contractor, and concrete manufacturer any failure of Work to comply with Contract Documents.
3. Testing agency shall report results of tests and inspections, in writing, to Owner, Architect, Contractor, and concrete manufacturer within 48 hours of inspections and tests.

a. Test reports shall include reporting requirements of ASTM C31, ASTM C39, and ACI 301, including the following as applicable to each test and inspection:

1) Project name.

2) Name of testing agency.
3) Names and certification numbers of field and laboratory technicians performing inspections and testing.
4) Name of concrete manufacturer.
5) Date and time of inspection, sampling, and field testing.
6) Date and time of concrete placement.
7) Location in Work of concrete represented by samples.
8) Date and time sample was obtained.
9) Truck and batch ticket numbers.
10) Design compressive strength at 28 days.
11) Concrete mixture designation, proportions, and materials.
12) Field test results.
13) Information on storage and curing of samples before testing, including curing method and maximum and minimum temperatures during initial curing period.
14) Type of fracture and compressive break strengths at seven days and 28 days.

B. Batch Tickets: For each load delivered, submit three copies of batch delivery ticket to testing agency, indicating quantity, mix identification, admixtures, design strength, aggregate size, design air content, design slump at time of batching, and amount of water that can be added at Project site.

C. Inspections:
1. Notify Architect a minimum of twenty-four (24) hours prior to scheduling concrete pours to allow for a pre-pour inspection. Defective work will be rejected.

D. Concrete Tests: Testing of composite samples of fresh concrete obtained in accordance with ASTM C 172 shall be performed in accordance with 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 provides 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 C143:

a. 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.
b. Perform additional tests when concrete consistency appears to change.

3. Air Content: ASTM C231 pressure method, for normal-weight concrete.

a. 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 C1064:

a. One test hourly when air temperature is 40 deg F and below or 80 deg F and above, and one test for each composite sample.

5. Compression Test Specimens: ASTM C31:

   a. Cast and laboratory cure three sets of two standard cylinder specimens for each composite sample.

6. Compressive-Strength Tests: ASTM C39.

   a. Test one set of two laboratory-cured specimens at seven days and one set of two specimens at 28 days. Retain one set of two specimens in reserve for later testing if required.
   b. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.

7. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
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 if specified compressive strength is 5000 psi, or no compressive strength test value is less than 10 percent of specified compressive strength if specified compressive strength is greater than 5000 psi .
9. 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.
10. Additional Tests:

    a. 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.
    b. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42 or by other methods as directed by Architect.

       1) Acceptance criteria for concrete strength shall be in accordance with ACI 301, section 1.6.6.3.

11. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
12. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

3.15 PROTECTION

A. Protect concrete surfaces as follows:

   1. Protect from petroleum stains.

2. Diaper hydraulic equipment used over concrete surfaces.
3. Prohibit vehicles from interior concrete slabs.
4. Prohibit use of pipe-cutting machinery over concrete surfaces.
5. Prohibit placement of steel items on concrete surfaces.
6. Prohibit use of acids or acidic detergents over concrete surfaces.
7. Protect liquid floor treatment from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by liquid floor treatments installer.
8. Protect concrete surfaces scheduled to receive surface hardener or polished concrete finish using Floor Slab Protective Covering.

END OF SECTION 033000

SECTION 042000 – UNIT MASONRY

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 unit masonry assemblies consisting of the following:

1. Concrete masonry units (CMUs).
2. Decorative concrete masonry units.
3. Pre-faced concrete masonry units.
4. Face brick.
5. Building (common) brick.
6. Mortar and grout.
7. Reinforcing steel.
8. Masonry joint reinforcement.
9. Ties and anchors.
10. Embedded flashing.
11. Miscellaneous masonry accessories.
12. Masonry-cell insulation.
13. Cavity-wall insulation.

B. Related Sections include the following:

1. Division 04 Section "Glass Unit Masonry" for glass block.
2. Division 07 Section "Bituminous Dampproofing" for dampproofing applied to cavity face of backup wythes of cavity walls.
3. Division 07 Section "Water Repellents" for water repellents applied to unit masonry assemblies.
4. Division 07 Section "Sheet Metal Flashing and Trim" for sheet metal flashing.
5. Division 07 Section "Penetration Firestopping" for firestopping at openings in masonry walls.
6. Division 07 Section "Fire-Resistive Joint Systems" for fire-resistive joint systems at heads of masonry walls.
7. Division 07 Section "Joint Sealants" for sealing control and expansion joints in unit masonry.

C. Products furnished, but not installed, under this Section include the following:

1. Dovetail slots for masonry anchors, installed under Division 03 Section "Cast-in-Place Concrete."
2. Anchor sections of adjustable masonry anchors for connecting to structural frame, installed under Division 05 Section "Structural Steel Framing."

1.3 DEFINITIONS

A. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.4 PERFORMANCE REQUIREMENTS

A. Provide structural unit masonry that develops indicated net-area compressive strengths (f'_m) at 28 days.

1.5 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Material Certificates: Include statements of material properties indicating compliance with requirements including compliance with standards and type designations within standards. Provide for each type and size of the following:

1. Masonry units.
    a. Include material test reports substantiating compliance with requirements.
    b. For bricks, include size-variation data verifying that actual range of sizes falls within specified tolerances.
    c. For masonry units used in structural masonry, include data and calculations establishing average net-area compressive strength of units.
2. Grout mixes. Include description of type and proportions of ingredients.

1.6 QUALITY ASSURANCE

A. Testing Agency Qualifications: An independent agency qualified according to ASTM C 1093 for testing indicated, as documented according to ASTM E 548.

B. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, through one source from a single manufacturer for each product required.

C. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from a single manufacturer for each cementitious component and from one source or producer for each aggregate.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store masonry units 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. If units become wet, do not install until they are dry.

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. Deliver preblended, dry mortar mix in moisture-resistant containers designed for lifting and emptying into dispensing silo. Store preblended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in a metal dispensing silo with weatherproof cover.

E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.8 PROJECT CONDITIONS

A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.

B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least 3 days after building masonry walls or columns.

C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.

1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
2. Protect sills, ledges, and projections from mortar droppings.
3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.

D. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.
2. Products: Subject to compliance with requirements, provide one of the products specified.
3. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.
4. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 MASONRY UNITS, GENERAL

A. **Defective Units: Disregard any allowances in referenced masonry unit standards allowing a certain percentage of units to exceed tolerances, or to contain chips, cracks, or other defects exceeding limits stated in the referenced standard. Such defects shall not be considered as acceptable for use in the work.**

B. **The Contractor shall cull any units where such defects including, but not limited to, chips, cracks, voids in unit faces, or dimensions that vary from specified dimensions by more than stated tolerances, will be exposed in the completed Work or will impair the quality of completed masonry.**

C. **The Contractor shall be responsible for removing and replacing any units with defects that are laid and exposed in the finished work, at no additional cost to the Owner.**

2.3 CONCRETE MASONRY UNITS (CMUs)

A. Shapes: Provide shapes indicated and as follows:

1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.

B. Concrete Masonry Units: ASTM C 90.

1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 2150 psi.
2. Weight Classification: **Normal weight, unless otherwise indicated.**
3. Size (Width): Manufactured to dimensions 3/8 inch less than nominal dimensions.
4. Exposed Faces: Provide color and texture matching the range represented by Architect's sample.

2.4 MASONRY LINTELS

A. General: Provide masonry lintels, complying with requirements below.

B. Masonry Lintels: Prefabricated or built-in-place masonry lintels made from bond beam concrete masonry units with reinforcing bars placed as indicated and filled with coarse grout. Cure precast lintels before handling and installing. Temporarily support built-in-place lintels until cured.

2.5 BRICK

A. **Refer to Specification Section 048100 "Exterior Masonry Veneer"**

B. General: Provide shapes indicated and as follows:

1. For ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces, provide units without cores or frogs and with exposed surfaces finished.
2. Provide special shapes for applications where stretcher units cannot accommodate special conditions, including those at corners, movement joints, bond beams, sashes, and lintels.
3. Provide special shapes for applications requiring brick of size, form, color, and texture on exposed surfaces that cannot be produced by sawing.
4. Provide special shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view.

C. Face Brick: ASTM C 216, Grade MW or SW, Type as selected by Architect.

1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 4400 psi.
2. Initial Rate of Absorption: Less than 30 g/30 sq. in. per minute when tested per ASTM C 67.
3. Surface Coating: Brick with colors or textures produced by application of coatings shall withstand 50 cycles of freezing and thawing per ASTM C 67 with no observable difference in the applied finish when viewed from 10 feet.
4. Size (Actual Dimensions): as selected by Architect.
5. Application: Use where brick is exposed, unless otherwise indicated.
6. Color and Texture: As selected by Architect.

D. Building (Common) Brick: ASTM C 62, Grade MW or SW.

1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 4400 psi.
2. Size: Match size of face brick or as selected by Architect.
3. Application: Use where brick is indicated for concealed locations.

2.6 MORTAR AND GROUT MATERIALS

A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.

B. Hydrated Lime: ASTM C 207 Type S.

C. Portland Cement-Lime Mix: Packaged blend of portland cement complying with ASTM C 150, Type I or Type III, and hydrated lime complying with ASTM C 207, Type S.

D. Masonry Cement: ASTM C 91.

E. Mortar Cement: ASTM C 1329.

1. **At all interior and exterior walls, utilize Type "S" mortar.**

F. Aggregate for Mortar: ASTM C 144.

1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
2. For joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.
3. White-Mortar Aggregates: Natural white sand.
4. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.

G. Aggregate for Grout: ASTM C 404.

H. Epoxy Pointing Mortar: ASTM C 395, epoxy-resin-based material formulated for use as pointing mortar for structural-clay tile facing units (and approved for such use by manufacturer of units); in color indicated or, if not otherwise indicated, as selected by Architect from manufacturer's colors.

I. Refractory Mortar Mix: Ground fireclay or non-water-soluble, calcium aluminate, medium-duty refractory mortar that passes ASTM C 199 test; or an equivalent product acceptable to authorities having jurisdiction.

J. Water: Potable.

2.7 REINFORCEMENT

A. Uncoated Steel Reinforcing Bars: ASTM A 615/A 615M or ASTM A 996/A 996M, Grade 60.

B. Masonry Joint Reinforcement, General: ASTM A 951.

1. **Interior Walls: Hot-dip galvanized, carbon steel.**
2. **Exterior Walls: Hot-dip galvanized, carbon steel.**
3. **Wire Size for Side Rods: W2.8 or 0.188-inch diameter.**
4. **Wire Size for Cross Rods: W2.8 or 0.188-inch diameter.**
5. **Wire Size for Veneer Ties: W2.8 or 0.188-inch diameter.**
6. **Spacing of Cross Rods, Tabs, and Cross Ties: Not more than 16 inches o.c.**
7. **Provide in lengths of not less than 10 feet.**
8. **Provide prefabricated corner and tee units.**

C. **Masonry Joint Reinforcement for Single-Wythe Masonry: Ladder type, with single pair of side rods.**

D. **Masonry Joint Reinforcement for Veneers Anchored with Seismic Masonry-Veneer Anchors: Single 0.188-inch diameter, hot-dip galvanized, carbon steel continuous wire.**

2.8 TIES AND ANCHORS

A. **Materials: Provide ties and anchors specified in subsequent paragraphs that are made from materials that comply with the subparagraphs below, unless otherwise indicated.**

1. **Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82; with ASTM A 153/A 153M, Class B-2 coating.**
2. **Galvanized Steel Sheet: ASTM A 653/A 653M, Commercial Steel, G60 zinc coating.**
3. **Steel Sheet, galvanized after Fabrication: ASTM A 1008/A 1008M, Commercial Steel, hot-dip galvanized after fabrication to comply with ASTM A 153/A 153M.**

B. **Corrugated Metal Ties: Metal strips not less than 7/8 inch wide with corrugations having a wavelength of 0.3 to 0.5 inch and an amplitude of 0.06 to 0.10 inch made from steel sheet, galvanized after fabrication not less than 0.067 inch thick.**

C. **Wire Ties, General: Unless otherwise indicated, size wire ties to extend at least halfway through veneer but with at least 5/8-inch cover on outside face. Outer ends of wires are bent 90 degrees and extend 2 inches parallel to face of veneer.**

D. **Adjustable Veneer Masonry Anchors: Provide 2-piece, hot-dipped galvanized adjustable anchors at brick veneer locations over metal studs. Provide anchor plate**

with flat base. Provide triangle anchors of sufficient length to be within 1-1/4", but not less than 5/8" from the face of the brick veneer.

E. **Fasteners: Screws at Exterior Masonry Veneer Anchors shall be hot-dipped galvanized.**

2.9 MISCELLANEOUS ANCHORS

A. Unit Type Inserts in Concrete: Cast-iron or malleable-iron wedge-type inserts.

B. Anchor Bolts: Headed or L-shaped steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers; hot-dip galvanized to comply with ASTM A 153/A 153M, Class C; of dimensions indicated.

C. Post-installed Anchors: Provide chemical anchors, with capability to sustain, without failure, a load equal to six times the load imposed when installed in solid or grouted unit masonry and equal to four times the load imposed when installed in concrete, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.

1. Corrosion Protection: Carbon-steel components zinc plated to comply with ASTM B 633, Class Fe/Zn 5 (5 microns) for Class SC 1 service condition (mild).

2.10 MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler: Pre-molded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene urethane or PVC.

B. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D 2000, Designation M2AA-805 or PVC, complying with ASTM D 2287, Type PVC-65406 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.

1. Provide and install pre-formed rubber cross-type masonry control joint, specifically designed to key into a pre-formed channel in a CMU sash-type block.
2. Control joints shall be sized relative to the nominal CMU width into which it is to be installed. The actual width of the control joint, when installed in the corresponding nominal CMU width wall, shall result in a 3/8" wide X 1/2" deep recess at each face of the wall, for application of joint sealants, as specified.

C. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).

D. Weep/Vent Products: refer to Architectural drawings and information.

E. Cavity Drainage Material: refer to Architectural drawings and information.

F. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells with loops for holding reinforcing bars in center of cells. Units are formed from 0.142-inch steel wire, hot-dip galvanized after fabrication. Provide units with either two loops or four loops as needed for number of bars indicated.

1. Products:

a. Dayton Superior Corporation, Dur-O-Wal Division; D/A 810, D/A 812 or D/A 817.
b. Heckmann Building Products Inc.; No. 376 Rebar Positioner.
c. Hohmann & Barnard, Inc.; #RB or #RB-Twin Rebar Positioner.
d. Wire-Bond; O-Ring or Double O-Ring Rebar Positioner.

~~2.11 MASONRY CELL FOAM INSULATION~~

~~A. Foam Fill Insulation: Spray foam insulation, specifically designed for masonry core fill applications.~~

~~B. Provide products by one of the following:~~

~~1. **Core Fill 500 by Tailored Chemical Products, Inc.**~~
~~2. Prior-Approved products, submitted for review, and determined by the Architect to be equal or superior to that specified, and listed as Prior Approved, in an Addendum.~~

2.12 MASONRY CLEANERS

A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.

1. Manufacturers:

a. Diedrich Technologies, Inc.
b. EaCo Chem, Inc.
c. ProSoCo, Inc.

2.13 MORTAR AND GROUT MIXES

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated.

1. Do not use calcium chloride in mortar or grout.
2. Limit cementitious materials in mortar to portland cement, and lime.
3. Limit cementitious materials in mortar for exterior and reinforced masonry to portland cement and lime.
4. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.

B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.

C. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification. Provide the following types of mortar for applications stated unless another type is indicated or needed to provide required compressive strength of masonry.

D. Mortar for Unit Masonry: Comply with ASTM C 270, Property Specification. Provide the following types of mortar for applications stated unless another type is indicated or needed to provide required compressive strength of masonry.

1. For masonry below grade or in contact with earth, use **Type S Mortar**.
2. For reinforced masonry, use **Type S Mortar**.
3. For exterior, above-grade, load-bearing and non-load-bearing walls and parapet walls; for interior load-bearing walls; for interior non-load-bearing partitions; and for other applications where another type is not indicated, use **Type S Mortar**.
4. For interior non-load-bearing partitions, use **Type S Mortar**.

E. Grout for Unit Masonry: Comply with ASTM C 476.

1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with Table 1.15.1 in ACI 530.1/ASCE 6/TMS 602 for dimensions of grout spaces and pour height.
2. Provide grout with a slump of 8 to 11 inches as measured according to ASTM C 143/C 143M.

2.14 SOURCE QUALITY CONTROL

A. Owner has option to engage a qualified independent testing agency to perform source quality-control testing indicated below:

1. Payment for these services will be made by Owner.
2. Retesting of materials failing to comply with specified requirements shall be done at Contractor's expense.

B. Clay Masonry Unit Test: For each type of unit furnished, per ASTM C 67.

C. Concrete Masonry Unit Test: For each type of unit furnished, per ASTM C 140.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.

1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.
2. Verify that foundations are within tolerances specified.
3. Verify that reinforcing dowels are properly placed.

B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping connections.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Thickness: Build cavity and composite walls and other masonry construction to full thickness shown. Build single-wythe walls to actual widths of masonry units, using units of widths indicated.

B. Build chases and recesses to accommodate items specified in this and other Sections.

C. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to opening.

D. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

E. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.

1. Mix units from several pallets or cubes as they are placed.

F. Matching Existing Masonry: Match coursing, bonding, color, and texture of existing masonry.

G. Wetting of Brick: Wet brick before laying if initial rate of absorption exceeds 30 g/30 sq. in. per minute when tested per ASTM C 67. Allow units to absorb water so they are damp but not wet at time of laying.

H. Comply with construction tolerances in ACI 530.1/ASCE 6/TMS 602 and with the following:

1. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
2. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet, or 1/2 inch maximum.
3. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
4. For exposed bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch. Do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.
5. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch. Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch.
6. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch except due to warpage of masonry units within tolerances specified for warpage of units.
7. For exposed bed joints and head joints of stacked bond, do not vary from a straight line by more than 1/16 inch from one masonry unit to the next.

3.3 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

B. **Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in bond pattern indicated on Drawings; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.**

ALL CONCRETE MASONRY UNITS SHALL BE LAID IN RUNNING BOND PATTERN, UNLESS SPECIFICALLY NOTED OTHERWISE.

C. Stopping and Resuming Work: Stop work by racking back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.

D. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

E. Fill space between steel frames and masonry solidly with mortar, unless otherwise indicated.

F. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below and rod mortar or grout into core.

G. Fill cores in hollow concrete masonry units with grout 24 inches under bearing plates, beams, lintels, posts, and similar items, unless otherwise indicated.

H. Build non-load-bearing interior partitions full height of story to underside of solid floor or roof structure above, unless otherwise indicated.

1. Install compressible filler in joint between top of partition and underside of structure above.
2. Fasten partition top anchors to structure above and build into top of partition. Grout cells of CMUs solidly around plastic tubes of anchors and push tubes down into grout to provide 1/2-inch clearance between end of anchor rod and end of tube. Space anchors 48 inches o.c., unless otherwise indicated.
3. Wedge non-load-bearing partitions against structure above with small pieces of tile, slate, or metal. Fill joint with mortar after dead-load deflection of structure above approaches final position.
4. At fire-rated partitions, treat joint between top of partition and underside of structure above to comply with Division 07 Section "Fire-Resistive Joint Systems."

3.4 MORTAR BEDDING AND JOINTING

A. Lay hollow concrete masonry units as follows:

1. With face shells fully bedded in mortar and with head joints of depth equal to bed joints.
2. With webs fully bedded in mortar in all courses of piers, columns, and pilasters.
3. With webs fully bedded in mortar in grouted masonry, including starting course on footings.
4. With entire units, including areas under cells, fully bedded in mortar at starting course on footings where cells are not grouted.

B. Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.

C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness, unless otherwise indicated.

1. For glazed masonry units, use a nonmetallic jointer 3/4 inch (19 mm) or more in width.

D. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint), unless otherwise indicated.

E. **In order to ensure compliance with the requirements of U.L. Design Test Data, IBC and NFPA 101 Life Safety Code Requirements, LASFM requirements for Rated and Smoke Partitions, and requirements for exterior coatings and waterproofing systems:**

ALL CONCRETE MASONRY UNITS SHALL BE LAID IN RUNNING BOND PATTERN, UNLESS SPECIFICALLY NOTED OTHERWISE.

ALL JOINTS AT ALL LOCATIONS SHALL BE STRUCK. THIS INCLUDES ALL EXTERIOR AND INTERIOR WALLS, WHETHER EXPOSED TO VIEW, OR CONCEALED, ABOVE CEILINGS, INSIDE ELEVATOR SHAFTS, CHASES, ETC., WITHOUT EXCEPTION.

3.5 EXPANSION, CONTRACTION, AND CONTROL JOINTS IN MASONRY WALLS

A. **Expansion, contraction, and control joints in NON-RATED masonry walls**

1. Provide and install pre-formed rubber cross-type masonry control joint, specifically designed to key into a pre-formed channel in a CMU sash-type block.
2. Control joints shall be sized relative to the nominal CMU width into which it is to be installed. The actual width of the control joint, when installed in the corresponding nominal CMU width wall, shall result in a 3/8" wide X 1/2" deep recess at each face of the wall, for application of joint sealants, as specified.
3. At NON-RATED masonry walls, install gun-grade polyurethane joint sealants specifically designed for vertical applications in unit masonry walls, in accordance with the manufacturer's installation instructions.
4. Tool joint sealants to result in finished appearance, similar to joints in the adjacent CMU wall(s).

B. **Expansion, contraction, and control joints in RATED masonry walls**

1. Provide and install pre-formed rubber cross-type masonry control joint, specifically designed to key into a pre-formed channel in a CMU sash-type block.
2. Control joints shall be sized relative to the nominal CMU width into which it is to be installed. The actual width of the control joint, when installed in the corresponding nominal CMU width wall, shall result in a 3/8" wide X 1/2" deep recess at each face of the wall, for application of joint sealants, as specified.
3. At RATED masonry walls, install gun-grade Firestopping Sealants specifically designed to prevent the passage of fire, smoke, and hot gasses, when applied in a vertical application in unit masonry walls.
4. Install Firestopping Sealants in strict accordance with the manufacturer's installation instructions.
5. Tool joint sealants to result in finished appearance, similar to joints in the adjacent CMU wall(s), unless otherwise specifically required by the Firestopping Sealant manufacturer.

6. Refer to Specification Section 078410 “Firestopping Systems”, Section 078998 “Rated Assemblies & Smoke Partitions”, and Section 078999 “Rated Construction Test Assemblies” for additional requirements for joints in Rated Walls.
7. Refer to the Firestopping Sealant manufacturer’s product data and installation instructions for specific requirements for joints in Rated Walls.

~~3.6 MASONRY CELL INSULATION~~

~~A. Allow CMU mortar to cure a minimum of 28 days, or longer, if recommended or required by the masonry foam fill manufacturer.~~

~~B. Install masonry foam fill insulation in strict accordance with the manufacturer’s recommendations.~~

3.7 MASONRY JOINT REINFORCEMENT

A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches.

1. Space reinforcement not more than 16 inches o.c.
2. Space reinforcement not more than 8 inches o.c. in foundation walls and parapet walls.
3. Provide reinforcement not more than 8 inches above and below wall openings and extending 12 inches beyond openings.

a. Reinforcement above is in addition to continuous reinforcement.

B. Interrupt joint reinforcement at control and expansion joints, unless otherwise indicated.

C. Provide continuity at wall intersections by using prefabricated T-shaped units.

D. Provide continuity at corners by using prefabricated L-shaped units.

E. Cut and bend reinforcing units as directed by manufacturer for continuity at[corners,] returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

3.8 CONTROL AND EXPANSION JOINTS

A. General: Install control and expansion joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.

B. Form control joints in concrete masonry using one of the following methods:

1. Fit bond-breaker strips into hollow contour in ends of concrete masonry units on one side of control joint. Fill resultant core with grout and rake out joints in exposed faces for application of sealant.
2. Install preformed control-joint gaskets designed to fit standard sash block.
3. Install interlocking units designed for control joints. Install bond-breaker strips at joint. Keep head joints free and clear of mortar or rake out joint for application of sealant.
4. Install temporary foam-plastic filler in head joints and remove filler when unit masonry is complete for application of sealant.

C. Form expansion joints in brick made from clay or shale as follows:

1. Build flanges of metal expansion strips into masonry. Lap each joint 4 inches in direction of water flow. Seal joints below grade and at junctures with horizontal expansion joints if any.
2. Build flanges of factory-fabricated, expansion-joint units into masonry.
3. Build in compressible joint fillers where indicated.
4. Form open joint full depth of brick wythe and of width indicated, but not less than 3/8 inch for installation of sealant and backer rod specified in Division 07 Section "Joint Sealants."

D. Provide horizontal, pressure-relieving joints by either leaving an air space or inserting a compressible filler of width required for installing sealant and backer rod specified in Division 07 Section "Joint Sealants," but not less than 3/8 inch.

3.9 LINTELS

A. Install steel lintels where indicated.

B. Provide masonry lintels where shown and where openings of more than 12 inches for brick-size units and 24 inches for block-size units are shown without structural steel or other supporting lintels.

C. Provide minimum bearing of 8 inches at each jamb, unless otherwise indicated.

3.10 FLASHING, WEEP HOLES, CAVITY DRAINAGE, AND VENTS

A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated.

B. Install flashing as follows, unless otherwise indicated:

1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with

mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.

2. At lintels and shelf angles, extend flashing a minimum of 6 inches into masonry at each end. At heads and sills, extend flashing 6 inches at ends and turn up not less than 2 inches to form end dams.
3. Install metal flashing termination beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch back from outside face of wall and adhere flexible flashing to top of metal flashing termination.
4. Cut flexible flashing off flush with face of wall after masonry wall construction is completed.

C. Install single-wythe CMU flashing system in bed joints of CMU walls where indicated to comply with manufacturer's written instructions. Install CMU cell pans with upturned edges located below face shells and webs of CMUs above and with weep spouts aligned with face of wall. Install CMU web covers so that they cover upturned edges of CMU cell pans at CMU webs and extend from face shell to face shell.

D. Install reglets and nailers for flashing and other related construction where they are shown to be built into masonry.

E. Install weep holes in head joints in exterior wythes of first course of masonry immediately above embedded flashing and as follows:

1. Use specified weep/vent products or open head joints to form weep holes.
2. Space weep holes 24 inches o.c., unless otherwise indicated.
3. Cover cavity side of weep holes with plastic insect screening at cavities insulated with loose-fill insulation.

F. Place pea gravel in cavities as soon as practical to a height equal to height of first course above top of flashing, but not less than 2 inches, to maintain drainage.

1. Fill cavities full height by placing pea gravel in cavities as masonry is laid so that at any point masonry does not extend more than 24 inches above top of pea gravel.

G. Place cavity drainage material in cavities to comply with configuration requirements for cavity drainage material in Part 2 "Miscellaneous Masonry Accessories" Article.

H. Install vents in head joints in exterior wythes at spacing indicated. Use specified weep/vent products or open head joints to form vents.

1. Close cavities off vertically and horizontally with blocking in manner indicated. Install through-wall flashing and weep holes above horizontal blocking.

3.11 REINFORCED UNIT MASONRY INSTALLATION

A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.

1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other temporary loads that may be placed on them during construction.

B. Placing Reinforcement: Comply with requirements in ACI 530.1/ASCE 6/TMS 602.

C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.

1. Comply with requirements in ACI 530.1/ASCE 6/TMS 602 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
2. Limit height of vertical grout pours to not more than 60 inches.

3.12 FIELD QUALITY CONTROL

A. Inspectors: Owner has option to engage qualified independent inspectors to perform inspections and prepare reports. Allow inspectors access to scaffolding and work areas, as needed to perform inspections.

1. Place grout only after inspectors have verified compliance of grout spaces and grades, sizes, and locations of reinforcement.

B. Testing Agency: Owner has option to engage a qualified independent testing and inspecting agency to perform field tests and inspections indicated below and prepare test reports:

1. Payment for these services will be made by Owner.
2. Retesting of materials failing to comply with specified requirements shall be done at Contractor's expense.

C. Testing Frequency: One set of tests for each 5000 sq. ft. of wall area or portion thereof.

D. Clay Masonry Unit Test: For each type of unit provided, per ASTM C 67.

E. Concrete Masonry Unit Test: For each type of unit provided, per ASTM C 140.

F. Mortar Test (Property Specification): For each mix provided, per ASTM C 780. Test mortar for mortar air content and compressive strength.

G. Grout Test (Compressive Strength): For each mix provided, per ASTM C 1019.

3.13 REPAIRING, POINTING, AND CLEANING

A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.

B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.

C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:

1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
3. Protect adjacent stone and non-masonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
5. Clean brick by bucket-and-brush hand-cleaning method described in BIA Technical Notes 20.
6. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.
7. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable to type of stain on exposed surfaces.
8. Clean stone trim to comply with stone supplier's written instructions.
9. Clean limestone units to comply with recommendations in ILI's "Indiana Limestone Handbook."

3.14 MASONRY WASTE DISPOSAL

A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.

B. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soil-contaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed.

C. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION 042000

SECTION 04 21 26 - GLAZED STRUCTURAL CLAY TILE MASONRY

1.0 GENERAL

1.1 SUMMARY

A. System Description: Work described in this section covers requirements for Structural Glazed Tile Unit Masonry and its installation and maintenance.

B. Products installed but not furnished in this section:
1. Section 04 05 13: Masonry Mortaring
2. Section 04 05 23: Masonry Accessories

1.2 REFERENCES

A. Applicable standards of the following as referenced:
1. American Society for Testing and Materials (ASTM)
2. Brick Industry Association (BIA)
3. Underwriters Laboratories, Inc. (UL)
4. Ceramic Glazed Masonry Institute (CGMI)

1.3 DEFINITIONS

A. Terms
1. Structural Glazed Tile: SGT, extruded and manufactured clay masonry unit with a ceramic glazed face that is a structural unit which can be loadbearing masonry.
2. Glazed Face: Exposed ceramic glazed face(s) on SGT.
3. Bed Joint: Horizontal mortar joint between two SGT.
4. Head Joint: Vertical mortar joint between two SGT.

1.4 SUBMITALS:

A. Strap Samples: Submit three samples to indicate the approximate range of color and texture to be expected in the completed wall for each color or texture.

1.5 ~~QUALITY ASSURANCE:~~

~~A. Sample Field Panel: Construct a wall panel 4' (1.2m) wide and 4' (1.2m) high for SGT work. Locate as directed by Architect.~~

~~B. Panel to indicate quality representation of:~~
~~1. SGT color and texture range.~~
~~2. Bonding pattern.~~
~~3. Mortar color.~~
~~4. Joint tooling.~~
~~5. Reinforcement/Ties.~~
~~6. Workmanship.~~

~~C. Sample Field Panel should be erected at least 14 days prior to shipment of the SGT to the jobsite. If necessary, additional panels will be erected until Architect approval is received.~~

~~D. Approved Sample Panel shall act as the standard of comparison and quality to be expected throughout the work.~~

~~E. Approved Sample Panel should be maintained through job completion and not destroyed until instructed by the Architect.~~

~~F. Erect separate Sample Panels for each color and texture, mortar color or combinations specified or as indicated on drawings.~~

1.6 DELIVERY, STORAGE AND HANDLING:

A. Deliver SGT to jobsite as packaged by manufacturer. Offload SGT packages using equipment that will not damage SGT. No SGT is allowed to be in direct contact with the ground. Do not double stack cubes of SGT.

B. Cover SGT with non-staining waterproof membrane covering. Keep units dry. Allow air circulation around stacked units. Installation of wet or stained SGT is prohibited.

C. Keep SGT units in the individual cardboard packaging provided by the manufacturer until the unit is ready to be laid in the wall. Never use brick tongs or “pitch” the SGT to upper levels of scaffolding.

1.7 PROJECT CONDITIONS:

A. Environmental requirements. Use normal procedures when temperatures are between 100°F to 40°F (37.8°C to 4.4 C) (see current reference BIA Technical Note 1):
1. See Brick Industry Association Technical Note 1, Table 1 “Requirements for Masonry Construction in Hot and Cold Weather” for temperatures outside this range unless specific written approval from Architect. (Reference: BIA Technical Notes for Guide Specifications for Brick Masonry.)

B. Take all precautions necessary to protect units from damage.

C. Handle and store in protective cartons or trays until actual installation in the wall.

D. Damaged units will not be accepted in the wall.

2.0 PRODUCTS:

2.1 STRUCTURAL GLAZED TILE:

A. Type: Match existing size.

B. Color: is not important as all block will be painted. “White” or “Gray” is preferred.

C. Pattern: Match Existing running bond.

D. Characteristics:
1. Size: Nominal Face stretcher dimensions standard 6T Series (Horizontal or Vertical Cell) 5-1/3" height x 12" length. Provide depth as required to match existing wall being repaired.
2. Nominal Bed Depths: 4", 6" or 8" thickness. As required to match existing.
3. Shapes: Furnished as shown on the plans in accordance with manufacturers current standard production. All external corners, sills and jambs shall be bullnose (or square), unless otherwise noted. Lintels and internal corners shall be square (or bullnose), unless otherwise noted. The base course is straight (or coved [recessed or nonrecessed], as required) as shown on the drawings.
4. Color(s) to be selected by Architect from manufacturer's **full range** of color selections.
5. Approved manufacturer:
   a. Elgin Butler Company, Elgin, Texas, (512) 285-3356.
   b. Or approved equal.

2.2 ACCESSORIES:

A. Mortar: As specified in mortar section.

B. Joint Reinforcement: for stack bonding pattern on a bearing wall, or as required, use continuous horizontal joint reinforcement in lengths of 10 to 12' (3 to 4 m). Use #9 gauge wire or 3/16" (5 mm) diameter wire. Ladder-type (or Tab-type) horizontal joint reinforcement recommended. Masonry joint reinforcing as specified in Masonry Accessories section.

C. Wall Ties for multi-wythe wall construction: Installed as per BIA recommendations use corrosion resistant metal ties, minimum of one 3/16" (5mm) diameter steel wall tie in every 4-1/2 ft2 (m2); for vertical-cell hollow masonry units the tie shall be rectangular or U-shaped, or for horizontal-cell, solid masonry units shall be rectangular or Z-shaped (Reference BIA Tech Note 21C). Maximum distance of 16" (406mm) vertically and 36" (913mm) horizontally.

D. Lateral support, as required.

3.0 EXECUTION:

3.1 PREPARATION :

A. Protection of work:
1. Protect the surfaces of the installed SGT. Cover freshly laid weather exposed masonry at the end of each day or the start of each shut down period, with non-staining waterproof material in such a manner which will ensure that the covering will overhang the masonry not less than 2' (50mm) on each side of the masonry. Anchor on each side of wall. Finished walls to be covered with #15 felt paper and erect wooden barriers to protect walls at areas that are subject to large amounts of

construction traffic or material movement. Protect glazed face from exposure to welding burns, stains, etc.

3.2 INSTALLATION

A. Workmanship:
1. Lay only dry masonry units.
2. Lay masonry plumb, level and true to line.
3. Lay units in bonding pattern, as specified.
4. Cut units with masonry saw using a wet diamond blade. Do not use units less than 4" in length.

B. Build in work of other trades indicated to be built-in with SGT as work progresses.

C. Mortar Joints:
1. Lay joints of each first course in full width bed of mortar.
2. Horizontally cored units:
a. Bed Joint: Full
b. Head Joint: Face shell thickness.
3. Vertically cored units:
a. Bed Joint: Face shell thickness.
b. Head Joint: Full
4. Remove and replace mortar with fresh mortar where adjustment must be made after mortar has started to set.
5. Keep bed and head joints uniform in width, except for minor variations required to maintain bond and locate returns.
6. Both bed and head mortar joints standard thickness of 3/8" (10mm) except for 6T Series use 5/16" (8mm), +/- 1/16" (1.6mm) or to course out with the existing material.

D. Joint Treatment:
1. Tool or strike mortar joints on exposed face when they are "thumb print" hard.
2. Tool all SGT joints concave using a non-metallic tool 1-1/4" (31mm) in diameter or larger unless otherwise noted.
3. Sanitary Epoxy Mortar, where required:
a. Rake mortar joints 1/4" (6mm) to 3/8" (10mm) deep. Mix and install vertical wall, non-sag sanitary epoxy grout in strict accordance with manufacturer's directions.

E. Removal of Existing Structural Glazed Tile:
1. Cut out existing material where indicated on the drawings. Do not leave pieces of tile in the wall smaller than 4" (101mm) in length. Use care in cutting out units at the mortar joints as to not chip the existing tile. Chips larger than a 3/8" (10mm) square will require replacement of the units. Smaller chips may be repaired. Contact the manufacturer for instructions.

3.3 APPLICATION :

A. Acceptable Tolerances:

1. Walls must be straight in plane.
2. Maximum variation from plumb: 1/4" (6mm) in 10' 0" (3.05m); not exceeding 3/8" (10mm) in 20' 0" (6.1m).
3. Maximum variation from level: 1/4" (6mm) in 20' 0" (6.1m); not exceeding 1/2" (13mm) in 40' 0" (12.2m) or more.
4. Maximum variation in linear building line from location indicated: 1/4" (6mm) in 20' 0" (6.1m).

3.4 CLEANING:

A. It is intended that with careful adherence to this specification that extensive final cleaning will not be necessary. During construction, wipe glazed surface clean after tooling of joints or within 30 minutes after laying, with course rag. Keep wall clean as work progresses to avoid more difficult cleanup later. Use no metal scrapers, abrasive powders or unauthorized cleaning agents. Use wooden paddles or scrapers to clean away mortar residue or lumps. Wash with clean water. A mild detergent may be used. Rinse with clean water. Wipe with clean cloths, sponges or similar item.

B. In event of unexpected contaminations of SGT walls, perform any cleaning with other than a non-metallic scraper, stiff nylon or natural bristled brush or wooden paddle only after approval by Architect and necessary tests to insure against any wall damage.

END OF SECTION 04 21 26

SECTION 04 72 00 – ARCHITECTURAL CAST STONE

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Provide cast stone panels, moldings, and ornamental work, mortar, grout, reinforcement, anchorages, and accessories shown, specified, or required to complete Work

1. Manufacturer shall furnish Cast Stone covered by this CONTRACT.
2. Installing contractor shall unload, store, furnish all anchors, set, patch, clean and seal the cast stone as required.
3. Manufacturer shall produce specific sections of cast stone for mock-up purposes. Accepted materials may become a part of the completed project.

B. Contractor performing Work of this Section shall be responsible for performing unit masonry work specified in Section 04 20 00.

1.2. RELATED SECTIONS

A. Section 04 81 00 – Exterior Masonry Veneer

1.3 REFERENCE STANDARDS

A. American Concrete Institute (ACI)

1. 318, Building Code Requirements for Reinforced Concrete.

B. ASTM International (ASTM)

1. A82, Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
2. A615/A 615M, Standard Specification for Deformed and Plain Billet-Steel Bars for Reinforced Concrete.
3. C33, Standard Specification for Concrete Aggregates.
4. C150, Standard Specification for Portland Cement.
5. C173, Standard Test Method for Air Content of Freshly Mixed Concrete by the Volume Method.
6. C231, Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
7. C260, Standard Specification for Air-Entrained Admixtures for Concrete.
8. C270, Standard Specification for Mortar for Unit Masonry.
9. C494, Standard Specification for Chemical Admixtures for Concrete.
10. C618, Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete.
11. C979, Standard Specification for Coloring Pigments for Integrally Pigmented Concrete.
12. C989, Standard Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete.
13. C1194, Standard Test Method for Compressive Strength of Architectural Cast Stone.
14. C1195, Standard Test Method for Absorption of Architectural Cast Stone.

15. C1364, Standard Specification for Architectural Cast Stone.
16. D2244, Standard Test Method for Calculation of Color Differences from Instrumentally Measured Color Coordinates.

C. Cast Stone Institute

1. Technical Manual (Current Edition)

1.4 DEFINITIONS

A. Cast Stone: a refined architectural concrete building unit manufactured to simulate natural cut stone, used in unit masonry applications.

1. Dry Cast Concrete Products: manufactured from zero slump concrete.

a. Vibrant Dry Tamp (VDT) casting method: Vibratory ramming of earth moist, zero-slump concrete against a rigid mold until it is densely compacted.

2. Wet Cast Concrete Products: manufactured from measurable slump concrete.

a. Wet casting method: Manufactured from measurable slump concrete and vibrated into a mold until it becomes densely consolidated.

1.5. SUBMITTALS

A. Samples: Submit minimum 6 inch long pieces of the cast stone that are representative of the general range of finish and color proposed to be furnished for the project.

B. Test results: Submit manufacturers test results of cast stone previously made by the manufacturer.

C. Shop Drawings: Submit manufacturers shop drawings including profiles, cross-sections, reinforcement, exposed faces, arrangement of joints, anchoring methods, anchors (if required), annotation of stone types and their location.

D. Engineering calculations: Calculations shall bear the seal of a Registered Professional Engineer.

E. Certification: Manufacturers affidavit that materials used in Project contains no asbestos.

1.6. QUALITY ASSURANCE

A. Manufacturer Qualifications:

1. Manufacturer shall have sufficient plant facilities to produce the shapes, quantities and size of Cast Stone required in accordance with the project schedule.

2. Manufacturer shall submit a written list of projects similar in scope and at least three (3) years of age, along with owner, architect and contractor references.

B. Single Source Responsibility:

1. Cast Stone Units: Obtain cast stone units of uniform texture and color, or a uniform blend within the accepted ranges for those characteristics, from one (1) manufacturer for each different product required for each continuous surface or visually related surfaces.

2. For Mortar and Grout Materials: Brands of cementitious materials and admixtures, and the source of supply of sand and aggregates shall remain the same throughout the Work where exposed to view and where not scheduled to receive a subsequently applied finish, i.e. painting, etc., unless directed otherwise in writing.
3. Contractor's Responsibility: Contractor performing Work of this Section shall be responsible for performing unit masonry work specified in Section 04200.

C. Standards: Comply with the requirements of the Cast Stone Institute Technical Manual and the project CONTRACT. Where a conflict may occur, the CONTRACT documents shall prevail.

D. Supplementary Design Details and Engineering: The general design is presumed adequate to permit compliance with the specified performance, except the contractor is responsible to determine, furnish and install all additional blocking and bracing not shown on the drawings but required to resist wind loads and other building code requirements. Provide engineering calculations to supplement the general design bearing the seal of a Registered Professional Engineer.

E. Mock-up: Provide full size unit(s) for use in construction of sample wall. The accepted mock-up shall become the standard for appearance and workmanship for the project. The accepted mock-up may be incorporated into the finished work.

1.7 PRE-INSTALLATION CONFERENCE

A. Refer to Section 01 31 13 – Project Coordination

1.8 DELIVERY AND STORAGE

A. Mark production units with the identification marks as shown on the shop drawings.

B. Package units and protect them from staining or damage during shipping and storage.

C. Stack cast stones on non-staining wood skids clear of the ground. Protect with non- staining plastic membrane or waterproof paper.

1.9 PROJECT CONDITIONS AND WARRANTY

A. Refer to Section 04 20 00, Unit Masonry.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Manufacturers listed below or named within the CONTRACT whose product meets or exceeds the CONTRACT are approved for use on the Project. Other manufacturers must have a minimum of five (5) years experience manufacturing products meeting or exceeding the CONTRACT and comply with Division 1 regarding substitutions in order to be considered.

1. AHI, Alvin, TX; (800) 873-5794, Ext. 12
2. Dallas Cast Stone Co., Inc., Dallas, TX; (214) 428-6269
3. Precision Development, Inc., Houston, TX; (713) 667-1310

4. Stone Castle Industries, Houston, TX; (713) 440-6224
5. Any member in good standing of the Cast Stone Institute (770) 972-3011
6. Or Approved Equal

2.2 ARCHITECTURAL CAST STONE

A. Physical properties: Provide the following:

1. Compressive Strength: ASTM C1194: 6,500 psi minimum for products at 28 days.
2. Absorption: ASTM C1195: 6 percent maximum by the cold water method or 10 percent maximum by the boiling method for products at 28 days.
3. Air Content: ASTM C173 or C231, for wet cast product shall be 4-8 percent for units exposed to freeze-thaw environments. Air entrainment is not required for VDT products.

C. Job site testing: One (1) sample from production units may be selected at the field for each 500 cubic feet delivered to the job site.

1. Three (3) field cut cube specimens from each of these samples shall average minimum compressive strength of not less than 85 percent single specimen testing less than 75 percent of design strength as ACI 318.
2 Three (3) field cut cube specimens from each of these samples shall average maximum cold-water absorption of 6 percent.
3. Field specimens shall be tested in accordance with ASTM C1194 and C1195.

D. Provide sizes and shapes as indicated on the drawings.

2.3 RAW MATERIALS

A. Portland cement: Type I or Type III, white, ASTM C150.

B. Coarse aggregates: Granite, quartz or limestone, ASTM C33, except for gradation, and are optional for the VDT casting method.

C. Fine aggregates: Manufactured or natural sands, ASTM C33, except for gradation.

D. Colors: Inorganic iron oxide pigments, ASTM C979 except that carbon black pigments shall not be used.

E. Admixtures, comply with the following:

1. ASTM C260 for air-entraining admixtures.
2. ASTM C494 for water reducing, retarding or accelerating admixtures.
3. ASTM C618 mineral admixtures of dark and variable colors shall not be used in surfaces intended to be exposed to view.
4. ASTM C989 granulated blast furnace slag may be used to improve physical properties. Tests are required to verify these features.

F. Water: Clean, potable

G. Reinforcing bars:

1. ASTM A615/A 615M, Galvanized or epoxy coated when cover is less than 1-1/2 inches

2. Welded Wire Fabric: ASTM A82 where applicable for wet cast units

H. All anchors, dowels and other anchoring devices and shims shall be stainless steel Type 302 or 304.

I. Cleaner: Sure Clean No. 600 manufactured by ProSoCo Products, Inc.; or other approved by manufacturer to suit application.

J. Masonry Sealer: Breather type (non-filming forming) sealer. Advance Chemical Technology's Sil-Act 22 or General Electric Silicon PWR 255; or other approved by manufacturer to suit application.

K. Joint Mortar: Type N, ASTM C270.

L. Other Materials: Provide all other materials, not specifically described, but required for a complete and proper installation.

2.4 COLOR AND FINISH

A. All surfaces intended to be exposed to view shall have a fine-grained texture similar to natural stone, with no air voids in excess of 1/32 inch and the density of such voids shall be less than three (3) occurrences per any 1 square inch and not obvious under direct daylight illumination at a 5 foot distance.

B. Units shall exhibit a texture approximately equal to the approved sample when viewed under direct daylight illumination at a 10 foot distance.

1. ASTM D 2244 permissible variation in color between units of comparable age subjected to similar weathering exposure.

a. Total color difference: not greater than six (6) units.

b. Total hue difference: not greater than two (2) units.

C. Minor chips shall not be obvious under direct daylight illumination from a 20 foot distance.

D. Remove cement film, if required, from exposed surfaces prior to packaging for shipment.

2.5 MATERIAL REINFORCING

A. Manufacturer shall reinforce the units as required for safe handling and structural stress.

B. Minimum reinforcing shall be 0.25 percent of the cross section area.

C. Panels, soffits and similar stones greater than 24 inches in one direction shall be reinforced in that direction. Units less than 24 inches in both their length and width dimension shall be non-reinforced unless otherwise specified.

D. Welded wire fabric reinforcing shall not be used in dry cast products.

2.6 MISCELLANEOUS STEEL SUB-FRAMING AND SUPPORTS

A. Provide miscellaneous steel sub-framing for cast stone pieces. The drawings indicate cast stone profiles which are to be maintained, and may indicate sub-framing, however, the quantity, location, and sizes of steel sub-framing may vary depending on the maximum size of cast stone unit that the cast stone supplier is capable of providing or that the mason is ca-

pable of installing. The quantity, location, and sizes of sub-framing required can only be ascertained by close coordination between the cast stone suppler, the brick mason, and the supplier of miscellaneous metals. Failure to determine, and include in the proposal, the steel required for support of the cast stone shall not be considered for additional compensation, and costs related thereto shall be the responsibility of the General Contractor.

2.7 MATERIAL CURING

A. Cure units in a warm curing chamber approximately 100 degrees F at 100 percent relative humidity for approximately 12 hours, or cure in a 100 percent moist environment at a minimum 70 degrees F for 16 hours after casting. Additional yard curing at 95 percent relative humidity shall be 350 degree-days (i.e. 7 days at 50 degrees F or 5 days at 70 degrees F) prior to shipping. Form cured units shall be protected from moisture evaporation with curing blankets or curing compounds after casting.

B. Acid etch exposed surfaces, if necessary, to remove cement film prior to packaging and shipment.

2.8 MANUFACTURING TOLERANCES

A. Cross section dimensions shall not deviate by more than ±1/8 inch from approved dimensions.

B. Length of units shall not deviate by more than length/ 360 or ±1/8 inch, whichever is greater, not to exceed ±1/4 inch.

1. Maximum length of any unit shall not exceed 15 times the average thickness of such unit unless otherwise agreed by the manufacturer.

C. Warp, bow or twist of units shall not exceed length/ 360 or ±1/8 inch, whichever is greater.

D. Location of dowel holes, anchor slots, flashing grooves, false joints and similar features: On formed sides of unit, 1/8 inch, on unformed sides of unit, 3/8 inch maximum deviation.

2.9 PRODUCTION QUALITY CONTROL

A. Testing:

1. Test compressive strength and absorption from specimens selected at random from plant production.

2. Samples shall be taken and tested from every 500 cubic feet of product produced.

3. Perform tests in accordance ASTM C1194 and C1195.

4. New and existing mix designs shall be tested for strength and absorption compliance prior to producing units.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Installing contractor shall check Cast Stone materials for fit and finish prior to installation. Do not set unacceptable units.

3.2 SETTING TOLERANCES

A. Comply with Cast Stone Institute Technical Manual.
B. Set stones 1/8 inch or less, within the plane of adjacent units.
C. Joints, plus - 1/16 inch, minus - 1/8 inch

3.3. MORTAR MIXING

A. Thoroughly mix mortar ingredients in quantities needed in accordance with Section 04 20 00.
B. Do not use anti-freeze compounds to lower the freezing point of mortar.

3.4 JOINTING

A. Joint size:

1. At stone/brick joints 3/8 inch
2. At stone/stone joints in vertical position 1/4 inch
3. Stone/stone joints exposed on top 3/8 inch

B. Joint materials:

1. Use a full bed of mortar at all bed joints.
2. Flush vertical joints full with mortar.
3. Leave joints with exposed tops or under relieving angles open for sealant.
4. Leave head joints in copings and projecting components open for sealant.

C. Location of joints:

1. As shown on drawings and confirmed on shop drawings
2. At control and expansion joints unless otherwise shown.

3.5 SETTING

A. Drench units with clean water prior to setting.

B. Fill dowel holes and anchor slots completely with mortar or non-shrink grout.

C. Set units in full bed of mortar, unless otherwise detailed.

D. Rake mortar joints 3/4 inch for pointing.

E. Remove excess mortar from unit faces immediately after setting. F. Tuck point unit joints to a slight concave profile.

3.6 JOINT SEALANT

A. Comply with requirements of Section 07 92 00, Building Sealants.

B. Prime ends of units, insert properly sized backing rod and install required sealant.

3.7 REPAIR AND CLEANING

A. Repair chips with touchup materials furnished by manufacturer.

B. Saturate units to be cleaned prior to applying approved masonry cleaner.

C. Consult with manufacturer for appropriate cleaners.

D. Masonry Surfaces Clean and Untreated: Examine newly laid masonry closely to ensure that its finished surface contains no releasing agents (form oil). If it does contain form oil, etch surface with muriatic acid, rinse thoroughly and/or score with a wire brush.

E. Masonry Surfaces: Remove paint, coatings, sealers and dirt by sandblasting; rinse with clear water.

3.8 INSPECTION AND ACCEPTANCE

A. Inspect finished installation according to Cast Stone Institute Technical Bulletin #36.

B. Do not field apply water repellant until repair, cleaning, inspection and acceptance is completed.

3.9 SEALER

A. Apply breather type (non film forming) masonry sealer to completed surfaces in accordance with manufacturer's instructions. Sealer required on all exposed surfaces.

END OF SECTION 04 72 00

SECTION 04 81 00 – EXTERIOR MASONRY VENEER

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes unit masonry assemblies consisting of the following:

1. Face Brick Veneer

1.2 SUBMITTALS

A. Samples for each type and color of Face Brick Veneer.
~~B. Samples for each type and color of Decorative CMU Veneer.~~

1.3 QUALITY ASSURANCE

A. Sample Panels: Build sample panels to verify selections made under sample submittals and to demonstrate aesthetic effects – 4'x4' sample panel.

1.4 PROJECT CONDITIONS

A. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

B. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

1.5 COLORS, TEXTURES, AND PATTERNS

A. Face Brick Veneer (Color 1)

1. Allowances: Not Applicable.
2. Brick Color(s): Basis of Design ACME "French Vanilla Medium 412". Verify color in field. The intent is to match existing. Provide physical samples for Architect's review prior to ordering.
3. Size: MODULAR (Provide Solid Bricks where required.)
4. Mortar Type(s): Type-S, Standard Gray Mortar.
5. Locations: As indicated on the Drawings.

1.6 BRICK

A. General: Provide shapes indicated and as follows:

1. For ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces, provide units without cores or frogs and with exposed surfaces finished.
2. Provide special shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view.

1.7 MORTAR AND GROUT MATERIALS

A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction.

B. Aggregate for Mortar: ASTM C 144.

C. Water: Potable.

D. Use Type “S” Mortar at Exterior Locations.

1.8 REINFORCEMENT

1. Wire Size for Veneer Ties: W2.8 diameter.
2. Spacing of Ties: Not more than 16 inches o.c.

1.9 TIES AND ANCHORS

A. Materials:

1. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82; with ASTM A 153/A 153M, Class B-2 coating.

B. Wire Ties, General: Unless otherwise indicated, size wire ties to extend at least halfway through veneer but with at least 5/8-inchcover on outside face. Outer ends of wires are bent 90 degrees and extend 2 inches parallel to face of veneer.

C. Adjustable Masonry-Veneer Anchors

1. General: Provide anchors that allow vertical adjustment but resist tension and compression forces perpendicular to plane of wall, for attachment over sheathing to wood or metal studs, and as follows:

a. Structural Performance Characteristics: Capable of withstanding a 100-lbf load in both tension and compression without deforming or developing play in excess of 0.05 inch.

2. Screw-Attached, Masonry-Veneer Anchors: Units consisting of a wire tie and a flat metal anchor section, hot-dipped galvanized, with hot-dipped galvanized screws, appropriate for wood or metal studs, as is appropriate for the framing and sheathing systems indicated.

a. Anchor Section: Rib-stiffened, sheet metal plate with screw holes top and bottom, and slotted holes for inserting wire tie.
b. Fabricate sheet metal anchor sections from 0.067-inch thick, steel sheet, galvanized after fabrication.
c. Wire Ties: Triangular-, rectangular-, or T-shaped wire ties fabricated from 0.188 inch diameter, hot-dip galvanized steel wire, length as appropriate to reach the mid-point of the masonry veneer.

1.10 EMBEDDED FLASHING MATERIALS

A. Metal Flashing: Provide metal flashing, where flashing is exposed or partly exposed and where indicated, complying with Division 7 Section "Sheet Metal Flashing and Trim."

1. Metal Drip Edges: Fabricate from stainless steel, or copper, or as otherwise indicated on the drawings.

a. Provide one-piece flashings through wall, extending at least 4 inches above and/or behind the moisture barrier or water-shedding membrane and out to exterior face of wall. At exterior face of wall, hem metal back on itself 3/8 inch and turn down at a 30 degree angle to form a drip, or as otherwise indicated on the Drawings.

2. Metal Flashing Terminations: Fabricate from stainless steel, copper, or as otherwise indicated on the drawings. Extend at least 3 inches into wall and out to exterior face of wall. At exterior face of wall, bend metal back on itself for 3/4 inch and down into joint 3/8 inch to form a stop for retaining sealant backer rod.

B. Flexible Flashing: For flashing not exposed to the exterior, use one of the following, unless otherwise indicated:

1. Stainless Steel: 0.0187 inch (0.5 mm) (26 gauge.)

a. Provide Copper-Laminated Flashing in rolls of sufficient width to allow the flashing to extend in a single piece from the edge of the brick ledge to a minimum of 8 inches above the slab line.

C. Solder and Sealants for Sheet Metal Flashings: As specified in Division 7 Section "Sheet Metal Flashing and Trim."

D. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer.

1.11 MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler: Pre-molded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; formulated from neoprene.

B. Pre-formed Weep Joints: Pre-formed PVC weep joints, designed to be installed in head joints at the base course at the slab line, above lintels, at brick-relieving shelf angles, and other similar conditions.

C. Cavity Drainage Material: Free-draining mesh, made from polymer strands that will not degrade within the wall cavity.

1. Provide one of the following configurations:

a. Strips, full-depth of cavity and 12 inches high, with dovetail shaped notches 7 inches deep.

1.12 MASONRY CLEANERS

A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains from new masonry without damaging masonry. Use product approved for intended use by cleaner manufacturer and manufacturer of masonry units for the type and color of units being cleaned.

1.13 MORTAR AND GROUT MIXES

A. General: Do not use admixtures, unless otherwise indicated.

1. Do not use calcium chloride in mortar or grout.
2. Limit cementitious materials in mortar for exterior masonry to Portland cement and lime.
3. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.

B. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification.

PART 2 - EXECUTION

2.1 MOCK-UP

A. Mason to provide one full height section of one story brick work per drawing 2 / A4.2 and at a corner for evaluation by the architect prior to proceeding with the remainder of the work. The work in place, if accepted, can remain part of the finished product.

B. Mason shall assist the General Contractor in providing one full mock-up of an exterior window including all flashing and masonry conditions.

2.2 INSTALLATION, GENERAL

A. Use full-size units without cutting if possible. If cutting is required, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying

unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

B. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.

C. Wetting of Brick: Wet brick before laying if initial rate of absorption exceeds 30 g/30 sq. in. per minute when tested per ASTM C 67. Allow units to absorb water so they are damp but not wet at time of laying.

D. Comply with tolerances in ACI 530.1/ASCE 6/TMS 602 and with the following:

1. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet , 1/4 inch in 20 feet , or 1/2 inch maximum.
2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.

2.3 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.

2.4 ANCHORING MASONRY VENEERS

A. Anchor masonry veneers to wall framing with masonry-veneer anchors to comply with the following requirements:

1. Fasten anchors through sheathing to wall framing with metal fasteners of type indicated. Use two fasteners.
2. Embed in masonry joints. Provide not less than 2 inches of air space between back of masonry veneer and face of sheathing.
3. Locate anchor sections to allow maximum vertical differential movement of ties up and down.
4. Space anchors as indicated, but not more than 16 inches o.c. vertically and 32 inches o.c. horizontally with not less than 1 anchor for each.
5. Install additional anchors within 12 inches of openings and at intervals, not exceeding 36 inches, around perimeter.

2.5 FLASHING, WEEP HOLES, CAVITY DRAINAGE, AND VENTS

A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated.

B. Install flashing as follows, unless otherwise indicated:

1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing as recommended by flashing manufacturer.
2. At lintels and shelf angles, extend flashing a minimum of 6 inches into masonry at each end. At heads and sills, extend flashing 6 inches at ends and turn up not less than 2 inches to form end dams.
3. Install metal drip edges beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch back from outside face of wall and adhere flexible flashing to top of metal drip edge.
4. Install metal flashing termination beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch back from outside face of wall and adhere flexible flashing to top of metal flashing termination.

C. Install pre-formed weeps in head joints in exterior wythes of first course of masonry immediately above embedded flashing and as follows:

1. Space weep holes 24 inches o.c., unless otherwise indicated.

D. Place cavity drainage material in cavities to comply with configuration requirements for cavity drainage material in Part 2 "Miscellaneous Masonry Accessories" Article.

E. Install vents in head joints in exterior wythes at spacing indicated.

1. Close cavities off vertically and horizontally with blocking in manner indicated. Install through-wall flashing and weep holes above horizontal blocking.

2.6 CLEANING

A. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

B. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:

1. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes.
2. Protect adjacent surfaces from contact with cleaner.
3. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
4. Clean brick by bucket-and-brush hand-cleaning method described in BIA Technical Notes 20.

5. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.
6. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable to type of stain on exposed surfaces.

END OF SECTION 04 81 00

SECTION 048150 - GLASS UNIT MASONRY ASSEMBLIES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Exterior glass unit masonry assemblies.
2. ~~Interior glass unit masonry assemblies.~~

1.2 SUBMITTALS

A. Product Data: For each product indicated.

B. Samples: Manufacturer’s actual glass-block units for each form, pattern, and color indicated.

PART 2 - PRODUCTS

2.1 GLASS BLOCK

A. Hollow Glass Block:

1. 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:
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Seves
    b. Mulia, Inc.
    c. La Rochere
    d. GBA Architectural Products
    e. Innovative Building Products

3. Glass Color: Colorless (Match Existing.)
4. Pattern: Light-diffusive fluted design (Match Existing.)
5. Edge-Coating Color: As selected from manufacturer's full range. (Match Existing.)
6. Unit Sizes: 8”x8”x4” - Manufacturer's standard sizes corresponding to existing sizes.
7. Thick-Faced Units: Units with faces at least 3/4 inch thick.

2.2 MORTAR MATERIALS

A. Portland Cement: ASTM C 150, Type I or Type II.

B. Hydrated Lime: ASTM C 207, Type S.

C. Masonry Cement: ASTM C 91.

D. Aggregate: ASTM C 144.
   1. Colored Aggregates: Natural colored sand or ground marble, granite, or other durable stone, as required to match existing.

E. Water: Potable.

2.3 GLASS UNIT MASONRY ACCESSORIES

A. Panel Reinforcement: Ladder-type units complying with [ASTM A 951] [UBC Standard 21-10] in straight lengths of not less than 10 feet, and as follows:

   1. Interior Walls: Mill galvanized, carbon-steel wire.
   2. Exterior Walls: Hot-dip galvanized, carbon-steel wire.
   3. Wire Size: W1.7 or 0.148-inch diameter.
   4. Spacing of Side Rods: 2 inches o.c.

B. Panel Anchors: Glass-block manufacturer's standard perforated steel strips, 0.0359 inches by 1-3/4 inches wide by 24 inches long, hot-dip galvanized after fabrication to comply with ASTM A 153/A 153M.

C. Asphalt Emulsion: Cold-applied asphalt emulsion complying with ASTM D 1187 or ASTM D 1227.

D. Sealants and related materials, including primers, cylindrical sealant backing, and bond-breaker tape, are specified in Division 7 Section "Joint Sealants."

   1. Grid Systems: Neutral-curing silicone sealant recommended by glass-block grid system manufacturer.

E. Mineral-Fiber Expansion Strips: Mineral-fiber strips, complying with requirements of fire-rated assembly listing and glass-block manufacturer.

F. Plastic-Foam Expansion Strips: Polyethylene foam complying with requirements of glass-block manufacturer; 3/8 inch thick.

G. Expansion Anchors: Stainless-steel anchor bolt and sleeve assembly complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2.

2.4 MORTAR MIXES

A. Mortar for Glass Unit Masonry Assemblies: Comply with [ASTM C 270] [BIA M1] [UBC Standard 21-15], Proportion Specification for Type S mortar, unless otherwise indicated.
   1. Exterior Panels: Use water-repellent admixture according to admixture manufacturer's written instructions.

PART 3 - EXECUTION

3.1 GLASS UNIT MASONRY ASSEMBLY CONSTRUCTION

A. Apply a heavy coat of asphalt emulsion to sill and adhere expansion strips to jambs and heads with asphalt emulsion. Allow asphalt emulsion to dry before placing mortar. Trim expansion strips to width required to fit glass block and to full lengths of heads and jambs.

B. Set glass block with completely filled bed and head joints, with no furrowing, accurately spaced and coordinated with other construction. Maintain [1/4-inch] [3/8-inch] exposed joint widths, unless otherwise indicated.

C. Install panel reinforcement in horizontal joints continuously from end to end of panels.

   1. Vertical Spacing of Panel Reinforcement for Exterior Panels: [Every other course but not more than 16 inches o.c., starting with first course above sill] [As indicated on Drawings].
   2. Do not bridge expansion joints with panel reinforcement.
   3. Place panel reinforcement in joints immediately above and below all openings within glass unit masonry assemblies.
   4. Lap panel reinforcement not less than 6 inches if more than 1 length is necessary.

D. Install panel anchors at locations indicated and in same horizontal joints where panel reinforcement occurs. Extend panel anchors at least 12 inches into joints, and bend within expansion joints at edges of panels and across the head. Attach panel anchors as indicated.

E. Use plastic spacers in mortar joints to produce uniform joint widths and to prevent mortar from being squeezed out of joints.

F. Keep expansion joints free of mortar.

G. Rake out joints indicated to be pointed to a uniform depth sufficient to accommodate pointing material, but not less than joint width.

H. Fill raked joints and voids with pointing mortar. Place and compact pointing mortar in layers not more than 3/8 inch thick. Compact each layer thoroughly and allow to become thumbprint hard before applying next layer.

I. Pointing of joints with sealant, including installation of primer and bond-breaker tape or cylindrical sealant backing, is specified in Division 7 Section "Joint Sealants."

J. Tool exposed joints slightly concave when mortar is thumbprint hard.

3.2 CLEANING

A. Perform final cleaning of glass unit masonry assemblies when surface is not exposed to direct sunlight. Start at top of panel using generous amounts of clean water. Remove water with clean, dry, soft cloths; change cloths frequently to eliminate dried mortar particles and aggregate.

END OF SECTION 048150

SECTION 053100 - STEEL DECKING



PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Noncomposite form deck.

B. Related Requirements:

1. Section 033000 "Cast-in-Place Concrete"
2. Section 055000 "Metal Fabrications"

1.2 ACTION SUBMITTALS

A. Product Data:
1. Noncomposite form deck.

B. Shop Drawings:

1. Include layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction.

1.3 INFORMATIONAL SUBMITTALS

A. Welding certificates.

B. Product Certificates: For each type of steel deck.

C. Test and Evaluation Reports:

1. Product Test Reports: For tests performed by a qualified testing agency, indicating that each of the following complies with requirements:

a. Power-actuated mechanical fasteners.

2. Research Reports: For steel deck, from ICC-ES showing compliance with the building code.

D. Field Quality-Control Submittals:

1. Field quality-control reports.

E. Qualification Statements: For welding personnel and testing agency.

1.4 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel in accordance with SDI QA/QC and the following welding codes:

1. AWS D1.1/D1.1M.
2. AWS D1.3/D1.3M.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.

B. Store products in accordance with SDI MOC3. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. AISI Specifications: Comply with calculated structural characteristics of steel deck in accordance with AISI S100.

2.2 NONCOMPOSITE FORM DECK

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. CSM Metal Deck.
2. New Millennium Building Systems, LLC.
3. Vulcraft Group; Division of Nucor Corp.

B. Fabrication of Noncomposite Form Deck: Fabricate ribbed-steel sheet noncomposite deck panels used as a form to comply with SDI NC, with the minimum section properties indicated, and with the following:

1. Galvanized-Steel Sheet: ASTM A653/A653M, Structural Steel (SS), Grade 80, G90 zinc coating.

2. Profile Depth: 15/16 inch.
3. Design Uncoated-Steel Thickness: 0.0179 inch. (26 gauge)
4. Span Condition: Double span.
5. Side Laps: Overlapped or interlocking seam at Contractor's option.

2.3 ACCESSORIES

A. Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.

B. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws (#12-14 Tek screws).

C. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 minimum diameter.

D. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber.

E. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi, not less than 0.0359-inch design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.

F. Pour Stops and Girder Fillers: Steel sheet, minimum yield strength of 33,000 psi, of same material and finish as deck, and of thickness and profile indicated or otherwise as recommended by SDI standards for overhang and slab depth if not indicated.

G. Column Closures, End Closures, Z-Closures, and Cover Plates: Steel sheet, of same material, finish, and thickness as deck unless otherwise indicated.

H. Flat Sump Plates: Single-piece steel sheet, 0.0747 inch thick, of same material and finish as deck. For drains, cut holes in the field.

I. Galvanizing Repair Paint: ASTM A780.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine supporting frame and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Install deck panels and accessories in accordance with SDI C, SDI NC, and SDI RD, as applicable; manufacturer's written instructions; and requirements in this Section.

B. Install temporary shoring before placing deck panels if required to meet deflection limitations.

C. Locate deck bundles to prevent overloading of supporting members.

D. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.

E. Place deck panels flat and square and fasten to supporting frame without warp or deflection.

F. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.

G. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.

H. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.

I. Mechanical fasteners may be used in lieu of welding to fasten deck. Locate mechanical fasteners and install in accordance with deck manufacturer's written instructions. Submit product to Engineer for review prior to bid submission.

3.3 INSTALLATION OF FLOOR DECK

A. Fasten floor-deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated and as follows:

1. Weld Diameter: 5/8 inch, nominal.
2. Weld Spacing:
   a. Space and locate welds as indicated on drawings.
3. Weld Washers: Do not use weld washers without specific direction from Engineer.

B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding the lesser of one-half of the span or 36 inches, and as follows:

1. Mechanically fasten with self-drilling, No. 10 diameter or larger, carbon-steel screws.
2. Mechanically clinch or button punch.

C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches, with end joints as follows:

1. End Joints: Lapped.

D. Pour Stops and Girder Fillers: Weld steel sheet pour stops and girder fillers to supporting structure in accordance with SDI recommendations unless otherwise indicated.

E. Floor-Deck Closures: Weld steel sheet column closures, cell closures, and Z-closures to deck, in accordance with SDI recommendations, to provide tight-fitting closures at open ends of ribs and sides of deck.

3.4 REPAIR

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint in accordance with ASTM A780 and manufacturer's written instructions.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

B. Tests and Inspections:

1. Special inspections and qualification of welding special inspectors for cold-formed steel floor and roof deck in accordance with quality-assurance inspection requirements of SDI QA/QC.

    a. Field welds will be subject to inspection.

2. Steel decking will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

END OF SECTION 053100

SECTION 05 52 10 – STEEL RAILINGS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Steel railings.

1.2 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide railings capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

   1. Handrails:

      a. Uniform load of 50 lbf/ ft. applied in any direction.
      b. Concentrated load of 200 lbf applied in any direction.
      c. Uniform and concentrated loads need not be assumed to act concurrently.

   2. Top Rails of Guards:

      a. Uniform load of 50 lbf/ ft. applied horizontally and concurrently with 100 lbf/ ft. applied vertically downward.
      b. Concentrated load of 200 lbf applied in any direction.
      c. Uniform and concentrated loads need not be assumed to act concurrently.

   3. Infill of Guards:

      a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft.
      b. Uniform load of 25 lbf/sq. ft. applied horizontally.
      c. Infill load and other loads need not be assumed to act concurrently.

1.3 SUBMITTALS

A. Product Data: For the following:

   1. Manufacturer's cut sheets of railing components.
   2. Grout, anchoring cement, and paint products.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain each type of railing through one source from a single manufacturer.

B. Welding: Qualify procedures and personnel according to the following:

1. AWS D1.1, "Structural Welding Code--Steel."

1.5 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with railings by field measurements before fabrication and indicate measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.

B. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails, unless otherwise indicated.

2.2 STEEL AND IRON

A. Pipe: ASTM A 53/A 53M, Type F or Type S, Grade A, Standard Weight (Schedule 40), unless another grade and weight are required by structural loads.

1. Provide galvanized finish for exterior installations and where indicated.

B. Plates, Shapes, and Bars: ASTM A 36/A 36M.

2.3 FASTENERS

A. General: Provide the following:
1. Steel Railings: Plated steel fasteners complying with ASTM B 633, Class Fe/Zn 25 for electrodeposited zinc coating.

B. Fasteners for Anchoring Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction indicated and capable of withstanding design loads.

2.4 MISCELLANEOUS MATERIALS

A. Shop Primers: Provide primers that comply with Division 9 painting sections.

B. Shop Primer for Galvanized Steel: Zinc-dust, zinc-oxide primer formulated for priming zinc-coated steel and for compatibility with finish paint systems indicated, and complying with division 9 painting sections.

C. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.

D. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

2.5 FABRICATION

A. General: Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.

B. Assemble railings in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.

C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

D. Form work true to line and level with accurate angles and surfaces.

E. Fabricate connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

F. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.

G. Connections: Fabricate railings with welded connections, unless otherwise indicated.

H. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove flux immediately.
4. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.

I. Form changes in direction as follows:
   1. As detailed and by radius bends of radius indicated . Provide sample in mock-up to architect.

J. Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.

K. Close exposed ends of railing members with prefabricated end fittings.

L. Provide wall returns at ends of wall-mounted handrails, unless otherwise indicated. Close ends of returns unless clearance between end of rail and wall is 1/4 inch or less.

M. Toe Boards: Where indicated, provide toe boards at railings around openings and at edge of open-sided floors and platforms. Fabricate to dimensions and details indicated.

2.6 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

D. Provide exposed fasteners with finish matching appearance, including color and texture, of railings.

2.7 STEEL AND IRON FINISHES

A. Galvanized Railings:

   1. Hot-dip galvanize exterior steel and iron railings, including hardware, after fabrication.

B. Fill vent and drain holes that will be exposed in the finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.

C. For galvanized railings, provide hot-dip galvanized fittings, brackets, fasteners, sleeves, and other ferrous components.

D. For nongalvanized steel railings, provide nongalvanized ferrous-metal fittings, brackets, fasteners, and sleeves, except galvanize anchors to be embedded in exterior concrete or masonry.

E. Preparation for Shop Priming: After galvanizing, thoroughly clean railings of grease, dirt, oil, flux, and other foreign matter, and treat with metallic-phosphate process.

F. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with minimum requirements for SSPC surface preparation specifications and environmental exposure conditions of installed railings.

G. Apply shop primer to prepared surfaces of railings, unless otherwise indicated. Comply with requirements in SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine plaster and gypsum board assemblies, where reinforced to receive anchors, to verify that locations of concealed reinforcements have been clearly marked for Installer. Locate reinforcements and mark locations if not already done.

3.2 INSTALLATION, GENERAL

A. Fit exposed connections together to form tight, hairline joints.

B. Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.

1. Do not weld, cut, or abrade surfaces of railing components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
2. Set posts plumb within a tolerance of 1/16 inch in 3 feet .
3. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet .

C. Adjust railings before anchoring to ensure matching alignment at abutting joints.

D. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

3.3 RAILING CONNECTIONS

A. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in Part 2 "Fabrication" Article whether welding is performed in the shop or in the field.

3.4 ANCHORING POSTS

A. Form or core-drill holes not less than 5 inches deep and 3/4 inch larger than OD of post for installing posts in concrete. Clean holes of loose material, insert posts, and fill annular space between post and concrete with nonshrink, nonmetallic grout, mixed and placed to comply with anchoring material manufacturer's written instructions.

B. Anchor posts to metal surfaces with welded flanges or type as required by conditions, connected to posts and to metal supporting members as follows:
   1. For steel pipe railings, weld flanges to post and bolt to metal supporting surfaces.

3.5 ANCHORING RAILING ENDS

A. Anchor railing ends to concrete and masonry with round flanges connected to railing ends and anchored to wall construction with anchors and bolts.

3.6 ATTACHING HANDRAILS TO WALLS

A. Attach handrails to wall with wall brackets. Provide brackets with 2-1/4” - inch clearance from inside face of handrail and finished wall surface.

   1. Use type of bracket with flange tapped for concealed anchorage to threaded hanger bolt.
   2. Use type of bracket with predrilled hole for exposed bolt anchorage.

B. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.

C. Secure wall brackets to building construction as follows:

   1. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.
   2. For hollow masonry anchorage, use toggle bolts.
   3. For wood stud partitions, use hanger or lag bolts set into wood backing between studs. Coordinate with carpentry work to locate backing members.
   4. For steel-framed gypsum board partitions, use hanger or lag bolts set into fire-retardant-treated wood backing between studs. Coordinate with stud installation to locate backing members.

3.7 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

3.8 PROTECTION

A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.

B. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit, or provide new units.

END OF SECTION 05 52 10

SECTION 064020 - INTERIOR ARCHITECTURAL WOODWORK & COUNTER TOPS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes interior woodwork including for the following applications:

1. Standing and running trim.
2. Solid Wood Cabinets and millwork items.
3. Quartz Surfacing.

B. Interior architectural woodwork includes wood furring, blocking, shims, and hanging strips, unless concealed within other construction before woodwork installation.

1.2 SUBMITTALS

A. Samples: Provide actual samples indicating the manufacturer’s full range of product and/or color selections for the following:

1. Trim profiles for selection.
2. Cabinet hardware and accessories.
3. Quartz samples for selection

B. Shop Drawings: Include location of each item, plans and elevations, large-scale details, attachment devices, and other components.

1.3 QUALITY ASSURANCE

A. Quality Standard: Unless otherwise indicated, comply with AWI's "Architectural Woodwork Quality Standards" for grades of interior architectural woodwork, construction, finishes, and other requirements.

B. Manufacturing Facility Qualifications: Quartz surfacing materials produced in an ISO 9001 certified facility.

C. Quartz Fabricator Qualifications: Minimum of five years documented experience in fabricating quartz surfacing countertops similar in scope and complexity to this Project, using water-cooled cutting tools. Currently certified by the manufacturer as an acceptable fabricator.

D. Quartz Installer Qualifications: Minimum of five years documented installation experience for projects similar in scope and complexity to this Project, and currently certified by the manufacturer as an acceptable installer. [Installer shall be the fabricator].

1.4 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at levels planned for building occupants during the remainder of the construction period.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Wood for Opaque Finish:

1. Species: Poplar or other closed-grain hardwood.

B. Hardwood Plywood and Face Veneers: HPVA HP-1.

1. Species: Poplar or other closed-grain hardwood.

C. Wood Crown Moulding:

1. Paint Grade: 2” Cove Moulding

a. Locate Crown Moulding at the perimeter of all rooms, unless specifically noted otherwise.

b. Miter or cope all corner joints for a tight fit.

D. Quartz Surfacing: Up to 93 percent quartz aggregate combined with polyester resin binders and proprietary pigments that are fabricated into slabs using vacuum vibrocompaction technology.

1. Acceptable Manufacturers:

a. Wilsonart

b. Cambria

c. Daltile

2. Physical Characteristics:

a. Flexural Strength: Greater than 4,500 psi; ASTM D 790.

b. Flexural Strain: Less than 0.375 percent; ASTM D 790.

c. Flexural Modulus: Greater than 3.75 MPsi; ASTM D 790.

d. Stain Resistance (24 Hour): No effect to moderate effect; NEMA LD-3.

e. Abrasion Resistance: Greater than 100 in.-lbs.; ASTM C 501.

f. Density: Greater than 2.1 g/cm3 ; ASTM C 97.

g. Compressive Strength (One Axis - Dry): Greater than 20,000 psi; ASTM C 170.

h. Moisture Absorption: Maximum 0.022 percent; ASTM C 97.

i. Finish: Polished finish with glossometer reading greater than 45.

j. Color: As selected from manufacturer's full range.

k. Edge Detail: As selected from manufacturer's standard offerings.

2.2 WOOD CABINETS FOR OPAQUE FINISH:

1. AWI Type of Cabinet Construction: Face frame cabinets with overlay doors.
2. Reveal Dimension: 1/2 inch.
3. Species for Exposed Lumber Surfaces: Any closed-grain hardwood.
4. Semi-exposed Surfaces Other Than Drawer Bodies: Match materials indicated for exposed surfaces.

    a. Drawer Sides and Backs: Solid-hardwood lumber or hardwood plywood.
    b. Drawer Bottoms: Hardwood plywood.

5. Shelves are to be minimum ¾" plywood, species to match cabinet body, with minimum ¾" x 1-1/2" solid hardwood edging.
6. Door Style: Raised panel

    a. Edge, stile and rail, and panel profiles to be selected from manufacturers full range of options.

7. Drawer fronts are to be ¾" solid hardwood, species to match cabinet body, with edge detail as selected by Architect.

2.3 CABINET HARDWARE AND ACCESSORIES

A. General: Provide cabinet hardware and accessory materials for a complete installation of architectural woodwork.

B. Frameless Concealed Hinges (European Type): 105º swing, mortised into stile and rail doors.
    1. Overlay dimension as required for the cabinet location and layout.

C. Pulls: Provide 4" x 1/4" diameter wire pulls at all cabinet doors and drawers. Color to be selected by Architect, based on cabinet color.

D. Catches: Magnetic.

E. Adjustable Shelf Standards and Supports:
1. Unless specifically noted otherwise, all shelves will be adjustable.
2. Drill holes uniformly spaced at 1" at cabinet body sides to accommodate
3. Provide steel offset shelf pins with ¼" shank. Color to be selected by Architect to match cabinet color.

F. Drawer Slides: Side-mounted, full extension, self-closing, zinc-plated steel drawer slides with steel ball bearings.
1. Box Drawer Slides: 100 lbf.
2. File Drawer Slides: 200 lbf.
3. Pencil Drawer Slides: 45 lbf.

G. Exposed Hardware Finishes: Complying with BHMA A156.18
1. Provide finishes as specified above in Part 2.2.C.

2.4 INTERIOR STANDING AND RUNNING TRIM FOR OPAQUE FINISH

A. Quality Standard: Comply with AWI Section 300.

B. Grade: Premium.

C. Wood Species: Poplar or similar closed-grain hardwood.

PART 3 - EXECUTION

3.1 FABRICATION

A. General: Complete fabrication to maximum extent possible before shipment to Project site. Where necessary for fitting at site, provide allowance for scribing, trimming, and fitting.

1. Interior Woodwork Grade: Premium, complying with the referenced quality standard.
2. Shop cut openings to maximum extent possible. Sand edges of cutouts to remove splinters and burrs.
3. Seal edges of openings in countertops with a coat of varnish.
4. For trim items wider than available lumber, use veneered construction. Do not glue for width (except at raised door panels).
5. Back-out or groove backs of flat trim members and kerf backs of other wide, flat members, except for members with ends exposed in finished work.
6. Assemble casings in plant except where limitations of access to place of installation require field assembly.
7. Cabinet bases are to be built of 2x dimensional lumber (no plywood or particle board).

8. Toe-kicks are to be clad to match cabinet body and provided with matching base shoe.

3.2 INSTALLATION

A. Condition woodwork for a minimum of 72 hours to average prevailing humidity conditions in installation areas and examine and complete work as required, including removal of packing and back-priming before installation.

B. Quality Standard: Install woodwork to comply with AWI Section 1700 for the same grade specified in this Section for type of woodwork involved.

C. Quality Standard: Install woodwork to comply with WIC Section 26 for the same grade specified in this Section for type of woodwork involved.

D. Install woodwork level, plumb, true, and straight to a tolerance of 1/8 inch in 96 inches. Shim as required with concealed shims.

E. Scribe and cut woodwork to fit adjoining work, and refinish cut surfaces and repair damaged finish at cuts.

F. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing as required for complete installation. Use fine finishing nails for exposed fastening, countersunk and filled flush with woodwork and matching final finish if transparent finish is indicated.

G. Standing and Running Trim: Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to greatest extent possible. Fill gaps, if any, between top of base and wall with plastic wood filler, sand smooth, and finish same as wood base, if finished. All end joints, splice joints, and inside/outside miter joints are to be glued and nailed.

H. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation.

1. Fasten wall cabinets through back, near top and bottom, at ends and not more than 16 inches o.c. There shall be no exposed fasteners upon completion.

I. Countertops: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop. Caulk space between backsplash and wall with sealant specified in Division 7 Section "Joint Sealants."

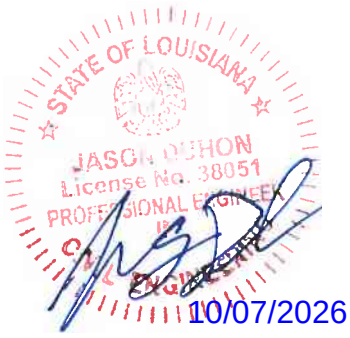
J. Provide and install ¾” CDX plywood deck, continuous below all stone tops and cultured marble/cultured granite tops.

K. Caulking:

1. Caulk all joints at countertop-to-wall, countertop-to-backsplash/endsplash, and backsplash/endsplash-to-wall with color-matched caulking, at both wet and dry countertop locations.
2. Caulk joints at painted or laminate-clad cabinets to wall with color-matched caulking.
3. Joints at stain-grade cabinets to wall are to be scribed, sanded, and tightly fitted to match the profile of the wall. Joints larger than 1/32" will be considered unacceptable.

END OF SECTION 064020

SECTION 072600 – UNDER-SLAB VAPOR BARRIER



PART 1 - GENERAL

1.1 SUMMARY

A. Products supplied under this section:

1. Vapor barrier and installation accessories for installation under concrete slabs.

B. Related Requirements:

1. Section 033000 Cast-in-Place Concrete

1.2 REFERENCES

A. ASTM International:

1. ASTM E1745-17 Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs.
2. ASTM E1643-18a Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.

B. Technical Reference - American Concrete Institute (ACI):

1. ACI 302.2R-06 Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials.
2. ACI 302.1R-15 Guide to Concrete Floor and Slab Construction.

1.3 SUBMITTALS

A. Quality Control/Assurance:

1. Summary of test results per paragraph 9.3 of ASTM E1745.
2. Manufacturer’s samples and literature.
3. Manufacturer’s installation instructions for placement, seaming, penetration prevention and repair, and perimeter seal per ASTM E1643.
   a. Annotate submittal indicting specific details to be used.
   b. Submittal to consider all conditions (typical and unique) on the project.
4. All mandatory ASTM E1745 testing must be performed on a single production roll per ASTM E1745 Section 8.1.

B. Scheduling Consultant Qualifications: An experienced specialist in CPM scheduling and reporting, with capability of producing CPM reports and diagrams within 24 hours of Architect's request.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Vapor barrier shall have all of the following qualities:

1. Maintain permeance of less than 0.01 Perms [grains/(ft2 · hr · inHg)] as tested in accordance with mandatory conditioning tests per ASTM E1745 Section 7.1 (7.1.1-7.1.5).
2. Other performance criteria:
   a. Strength: ASTM E1745 Class A.
   b. Thickness: 15 mils minimum
   c. Provide third party documentation that all testing was performed on a single production roll per ASTM E1745 Section 8.1

B. Vapor barrier products:

1. Stego Wrap Vapor Barrier (15-mil) by Stego Industries LLC., (877) 464-7834 www.stegoindustries.com.
2. Perminator 15 Mil Underslab Vapor Barrier by WR Meadows
3. No substitutions.

2.2 ACCESSORIES

A. Seams:

1. Stego Tape by Stego Industries, LLC

B. Sealing Penetrations of Vapor Barrier:

1. Stego Mastic by Stego Industries, LLC
2. Stego Tape by Stego Industries, LLC

C. Perimeter / Edge Seal:

1. Stego Crete Claw by Stego Industries, LLC
2. Stego Term Bar by Stego Industries, LLC
3. StegoTack Tape (double-sided sealant tape) by Stego Industries, LLC

PART 3 - EXECUTION

3.1 PREPARATION

A. Ensure that the subsoil is approved by Engineer.

1. Level and compact base material.

3.2 INSTALLATION

A. Install vapor barrier in accordance with ASTM E1643.

1. Install vapor barrier in accordance with manufacturer's instructions using typical details. Consult with manufacturer for any unique conditions not addressed with manufacturer’s standard details and directions.
2. Unroll vapor barrier with the longest dimension parallel with the direction of the concrete placement and face laps away from the expected direction of the placement whenever possible.
3. Extend vapor barrier to the perimeter of the slab.

    a. Seal vapor barrier to the entire slab perimeter using Stego Crete Claw, per manufacturer's instructions.
4. Overlap joints 6 inches and seal with manufacturer’s seam tape.
5. Apply seam tape/Crete Claw to a clean and dry vapor barrier.
6. Seal all penetrations (including pipes) per manufacturer’s instructions.
7. For interior forming applications, avoid the use of non-permanent stakes driven through vapor barrier. Use Beast Form Stake and Beast Foot as a vapor barrier-safe forming system. Ensure Beast Foot’s peel-and-stick adhesive base is fully adhered to the vapor barrier.
8. If non-permanent stakes must be driven through vapor retarder, repair as recommended by vapor retarder manufacturer.
9. Use reinforcing bar supports with base sections that eliminate or minimize the potential for puncture of the vapor barrier.
10. Repair damaged areas with vapor barrier material of similar (or better) permeance, puncture and tensile.
11. For vapor barrier-safe concrete screeding applications, install Beast Screed (vapor barrier-safe screed system) per manufacturer’s instructions prior to placing concrete.

END OF SECTION 072600

SECTION 07 90 00 – BUILDING JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Exterior and Interior expansion, contraction, and construction joints within buildings.
   2. Exterior and Interior joints in where dissimilar materials meet.
   3. Exterior joints around storefront, windows & openings.
   4. Interior paintable caulking for closing gaps, cracks, joints, etc.

B. For joints in Rated Walls, Floors, or Ceilings refer to Specification Section 078410 “Firestopping Systems”.

1.2 QUALITY ASSURANCE

A. Obtain each type of sealant through a single source manufacturer.

B. Installer Qualifications: Experienced installer specializing in installing joint sealants similar in material, design and extent of those indicated for this project for at least two (2) years.

1.3 SUBMITTALS

A. Submit product data for each type of sealant specified or proposed for use on this project.

B. Submit manufacturer’s full range of color options, including special order colors.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project Site in original, unopened containers with labels indicating product manufacturer, designation, expiration date, etc.

B. Store and handle materials as recommended by manufacturer. Store materials out of weather exposure and in protected interior space. Protect from freezing.

1.5 PROJECT CONDITIONS

A. Do not install joint sealants or proceed with ongoing installation under any of the following conditions:
   1. When ambient temperature is below 40 deg F or outside of range recommended by manufacturer.
   2. When raining, or under wet conditions.

B. Inspect all joints for satisfactory width and configuration, do not proceed with installation until any discrepancies are remedied. Proceeding with installation signifies acceptance of existing conditions.

PART 2 - PRODUCTS

2.1 JOINT SEALANTS

A. Expansion joints in masonry construction and at joints of dissimilar construction: One-part where required for differential movement up to 25% is expected or two-part polyurethane where required for differential movement up to 50 % is expected.

B. At non-porous materials where dissimilar materials meet: Single component Silicone.

C. Products: Subject to compliance with requirements, provide one of the following:

1. Single Component Polyurethane:
    a. Sonneborn NP-1
    b. Pecora Dynatrol I XL
2. Two Component Polyurethane:
    a. Sonneborn NP-2
    b. Pecora Dynatrol II
3. Single Component Silicone:
    a. Sonneborn Omniseal
    b. Pecora 311 NS
4. Acrylic Latex: (Painting caulk to fill gaps)
    a. Sonneborn Sonolac
    b. Pecora AC 20 +

D. Color of sealant materials to be selected by Architect from available full-line manufacturer's color chart.

2.2 JOINT-SEALANT BACKER MATERIALS

A. Provide joint backer materials which are non-staining, and compatible with joint sealants, primers, and other materials used in installation.

B. Round backer rod of diameter and density required to control sealant depths: ASTM D 5249, Type 1.

2.3 PRIMERS

A. Compatible with sealant materials and as recommended by manufacturer. Clear in color.

B. Perform on-site field tests to determine suitability of product prior to installation.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine all joints for compliance with design drawings and Manufacturer recommendations.

B. Examine on-site with installer present and proceed with installation only when any discrepancies have been remedied.

3.2 PREPARATION

A. Surface clean all joints, removing debris, foreign matter, dirt, etc.

B. Fill voids with backer rod to required depth for sealant material.

C. Prime joint substrates where indicated or where recommended in writing by joint sealant manufacturer based upon actual preconstruction field tests.

3.3 INSTALLATION OF JOINT SEALANTS

A. Comply with manufacturer's written installation instructions regarding mixing and application unless more stringent instructions apply.

B. Comply with recommendations of ASTM C 1193 for use of joint sealants as applicable to materials, applications and conditions indicated.

C. Install backer material to support sealants during application and curing and at position to produce cross-sectional shapes and depths of installed sealants relative to joint widths that will allow optimum sealant movement capability.

1. Do not leave gaps between ends of backer materials.
2. Do not stretch, twist, puncture or tear backer materials.
3. Remove wet backer materials and replace with dry material prior to installation of joint sealant.

D. Install sealant materials in accordance with written manufacturer's instructions and comply with the following:

1. Place sealants so they directly contact and fill fully joint substrates.
2. Completely fill recesses provided for each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

E. Immediately after sealant application and before skinning or curing begins, tool sealant joints to form smooth, uniform beads and conform with the following:

1. Remove excess sealants from surfaces adjacent to joint.

2. Use tooling agents and methods approved in writing manufacturer.

3.4 CLEANING

A. Clean off all excess sealants, sealant smears, etc. adjacent to joints as work progresses by methods and cleaning agents approved by sealant manufacturer.

3.5 PROTECTION

A. Protect all joint sealants during and after curing and prevent contamination with debris, dirt, etc. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated sections and replace with new. Repair areas to be indistinguishable from original work.

END OF SECTION 07 90 00

SECTION 08 11 10 - STANDARD STEEL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes standard hollow-metal steel doors and frames.

1.2 SUBMITTALS

A. Product Data: Include construction details, material descriptions, core descriptions, label compliance, and finishes for each type of steel door and frame specified.

B. Shop Drawings: Provide a schedule of standard steel doors and frames using same reference numbers for details and openings as those indicated on the Drawings.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Deliver doors and frames palletized, wrapped, and/or crated to provide protection during transit and Project-site storage. Do not use non vented plastic.

B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

PART 2 - PRODUCTS

2.1 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:

1. Ceco Door Products; an ASSA ABLOY Group Company.
2. Republic Builders Products Company.
3. Steelcraft; an Ingersoll-Rand Company.
4. Amweld
5. Curries
6. Mesker Door
7. Prior Approved manufacturers, which are submitted in accordance with the requirements of the Contract Documents, deemed to be equal, and approved prior to the issuance of the final Addendum.

2.2 MATERIALS

A. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum A40 zinc-iron-alloy (galvannealed) coating designation. Factory prepare all surfaces to receive paint.

B. Supports and Anchors: After fabricating, galvanize units to be built into exterior walls according to ASTM A 153/A 153M, Class B.

C. Inserts, Bolts, and Fasteners: Provide items to be built into exterior walls, hot-dip galvanized according to ASTM A 153/A 153M.

D. Powder-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching standard steel door frames of type indicated.

E. Glazing: Comply with requirements in Division 8 Section "Glazing."

2.3 STANDARD STEEL DOORS

A. General: Provide doors of design indicated, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces. Comply with ANSI A250.8.

B. Exterior Doors: Face sheets fabricated from **0.053-inch thick (16 gauge) galvanized**, metallic-coated steel sheet. Provide doors complying with requirements indicated below by referencing ANSI A250.8 for level and model and ANSI A250.4 for physical-endurance level:

1. **Level 3 and Physical Performance Level A (Extra Heavy Duty), Model 2 (Seamless)**.
2. Core Construction: Manufacturer's standard **polyurethane core, foam-filled after door fabrication**, that produces doors complying with ANSI A250.8.
3. Vertical Edges for Single-Acting Doors: Square edge.
4. Top and Bottom Edges: Closed with flush or inverted 0.042-inch thick end closures or channels of same material as face sheets.

C. Interior Doors between Conditioned and Un-conditioned spaces: Face sheets fabricated from **0.046-inch thick (18 gauge) galvanized**, metallic-coated steel sheet. Provide doors complying with requirements indicated below by referencing ANSI A250.8 for level and model and ANSI A250.4 for physical-endurance level:

1. **Level 3 and Physical Performance Level (Heavy Duty), Model 2 (Seamless)**.
2. Core Construction: Manufacturer's standard **polyurethane core, foam-filled after door fabrication**, that produces doors complying with ANSI A250.8.
3. Vertical Edges for Single-Acting Doors: Square edge.
4. Top and Bottom Edges: Closed with flush or inverted 0.042-inch thick end closures or channels of same material as face sheets.

D. Interior Doors: Face sheets fabricated from **0.046-inch thick (18 gauge)**, metallic-coated steel sheet. Provide doors complying with requirements indicated below by referencing ANSI A250.8 for level and model and ANSI A250.4 for physical-endurance level:

1. Core Construction: Manufacturer's standard kraft-paper honeycomb core that produces doors complying with ANSI A250.8.
2. Vertical Edges for Single-Acting Doors: Square edge.
3. Top and Bottom Edges: Closed with flush or inverted 0.042-inch thick end closures or channels of same material as face sheets.

2.4 STANDARD STEEL FRAMES

A. General: Comply with ANSI A250.8 and with details indicated for type and profile.

B. Exterior Frames: Fabricated from metallic-coated steel sheet.

1. Fabricate frames with mitered and welded face corners with seamless face joints.
2. Frames for Level 3 Exterior Steel Doors: 0.067-inch thick (14 gauge) galvanized, metallic-coated steel sheet.
3. At CMU walls with exterior veneer masonry or other exterior finish, provide frame sized to allow a standard 8" (7-5/8") CMU block to be set inside the frame, and extend to cover the void between the CMU and the exterior finish.
4. At 8" CMU walls without exterior veneer, provide 8-3/4" frame (7-3/4" throat) to accept and wrap a standard 8" (7-5/8") CMU block wall at jambs and head.
5. At exterior stud walls, provide frame size to allow a standard 8" stud, interior and exterior sheathings, to be set inside the frame.
6. At interior studs, provide frame size to allow a standard stud of size indicated on drawings and 5/8" gypsum board, both sides, to be set inside the frame.

C. Interior Frames: Fabricated from metallic-coated steel sheet.

1. Fabricate frames with mitered and welded face corners with seamless face joints.
2. Frames for Interior Steel Doors or Wood Doors: 0.053-inch thick (16 gauge), galvanized, metallic-coated steel sheet.
3. Provide 8-3/4" frame (7-3/4" throat) to accept and wrap around a standard 8" (7-5/8") CMU block wall at jambs and head.

D. Supports and Anchors: Fabricated from electrolytic zinc-coated or metallic-coated steel sheet.

E. Jamb Anchors: Masonry, stud-wall, compression, or post-installed expansion type, as required by the application; not less than 0.042 inch thick.

F. Floor Anchors: Formed from same material as frames, but in no case less than 0.042 inch thick.

2.5 STOPS AND MOLDINGS

A. Loose Stops for Glazed Lites in Frames: Minimum 0.032 inch thick, fabricated from same material as frames in which they are installed.

2.6 HOLLOW METAL DOOR AND WINDOW GLAZING

A. Provide manufacturer's heavy-duty factory-assembled view lite kits in the sizes indicated.

B. Glazing, where indicated, shall be ¼" clear safety glass, wire-reinforced safety glass, or rated glazing, where openings are located in rated walls.

2.7 FABRICATION

A. General: Fabricate standard steel doors and frames to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify on the shop drawings any work that cannot be permanently factory assembled before shipment.

B. Standard Steel Doors:

1. Exterior Doors: Provide weep-hole openings in bottom of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.
2. Glazed Lites: Factory cut openings in doors.

C. Standard Steel Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.

1. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and prime as required to make joints smooth, flush, and invisible.
2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners, unless otherwise indicated.
3. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
4. Jamb Anchors: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c.
5. Door Silencers: Except on weather-stripped doors, drill stops to receive door silencers as follows. Provide plastic plugs to keep holes clear during construction.

D. Hardware Preparation: Factory prepare standard steel doors and frames to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping, according to the Door Hardware Schedule and templates furnished as specified in Division 8 Section "Door Hardware."

1. Comply with applicable requirements in ANSI A250.6 and ANSI/DHI A115 Series specifications for door and frame preparation for hardware. Locate hardware as indicated on Shop Drawings or, if not indicated, according to ANSI A250.8.

E. Stops and Moldings: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with mitered hairline joints.

1. Provide fixed stops and moldings welded on secure side of door or frame.
2. Provide loose stops and moldings on inside of doors and frames.

2.8 FINISHES

A. Steel Finish for Exterior Doors and Frames: Galvanized and factory primed for field-painted finish.

1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI A250.10 acceptance criteria.

B. Steel Finish for Interior Doors and Frames located between Conditioned and Un-conditioned spaces: Galvanized and factory primed for field-painted finish.

1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI A250.10 acceptance criteria.

C. Steel Finish for Interior Doors and Frames: Factory prepped and primed for field-painted finish.

1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI A250.10 acceptance criteria.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Remove welded-in shipping spreaders installed at factory.

B. Provide doors and frames of sizes, thicknesses, and designs indicated. Install standard steel doors and frames plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.

C. Standard Steel Frames: Install standard steel frames for doors and other openings, of size and profile indicated. Comply with SDI 105.

1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.

2. Install frames using standard jamb anchor types and spacing, as recommended by the manufacturer, appropriate for anchoring frames to the adjacent wall materials.

3. Seal perimeter of each door frame with a polyurethane elastomeric sealant, prior to painting.

4. Coordinate installation of frames with framing, vapor barrier systems, masonry, cladding, wall flashing, and other components, as indicated on the drawings.

D. Standard Steel Frames at Metal Building: Install standard steel frames for doors and other openings, of size and profile indicated. Comply with SDI 105.

1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent weld is made.
2. Where hollow metal door frames are to be installed into metal building framed openings, frames shall be welded to framing with a minimum 1-1/2" long fillet weld at 16" o.c. at interior and exterior. Clean and prime welds, prior to painting or caulking.
3. Seal perimeter of each door frame with a polyurethane elastomeric sealant used for metal wall panels, prior to painting.
4. Coordinate installation of frames with framing, vapor barrier systems, masonry, cladding, wall flashing, and other components, as indicated on the drawings.

E. Standard Steel Doors: Fit hollow-metal doors accurately in frames. Shim as necessary.

F. Glazing: Comply with installation requirements in Division 8 Section "Glazing" and with standard steel door and frame manufacturer's written instructions.

G. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including standard steel doors or frames that are warped, bowed, or otherwise unacceptable.

H. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying primer.

PART 4 - CLOSEOUT

4.1 CLOSEOUT DOCUMENTATION

A. Provide Closeout Documentation as

1. Provide copies of REVISED Door and Frame Schedules incorporating all field changes, change orders, added openings, etc.
2. Provide copies of the Manufacturer's Warranty information for all Door Hardware items incorporated into the project.

END OF SECTION 08 11 10

SECTION 083320 - COILING COUNTER DOORS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Coiling Counter Doors, manually operated.

1.2 SUBMITTALS

A. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Details of construction and fabrication.
   4. Installation methods.

B. Shop Drawings: Include detailed plans, elevations, and details of framing members, required clearances, anchors, and accessories. Include relationship with adjacent construction.

C. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.

1.3 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in performing Work of this section with a minimum of five years experience in the fabrication and installation of security closures.

B. Installer Qualifications: Company specializing in performing Work of this section with minimum three years and approved by manufacturer.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Protect materials from exposure to moisture. Do not deliver until after wet work is complete and dry.

C. Store materials in a dry, warm, ventilated weathertight location.

1.5 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.6 COORDINATION

A. Coordinate Work with other operations and installation of adjacent finish materials to avoid damage to installed materials.

1.7 WARRANTY

A. Warranty: Manufacturer's limited door warranty for 2 years for all parts and components and finishes.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Overhead Door Corporation (655) (Basis of Design)
B. Cookson (ESC10)
C. Approved Equal

2.2 COILING COUNTER DOORS

A. Anodized Aluminum Counter Doors: Overhead Door Corporation 655 Series (BASIS OF DESIGN)
    1. Wall Mounting Condition:
        a. Between jamb with integral frame. (Countertop will act as sill.)
    2. Curtain: Interlocking slats, Type F-158 fabricated of anodized aluminum. Endlocks attached to alternate slats to maintain curtain alignment and prevent lateral slat movement.
    3. Finish:
        a. Anodized Finish:
            1) Slats and hood clear anodized aluminum.
    4. Bottom Bar: Extruded aluminum tubular shape with astragal.
    5. Guides: Extruded aluminum.
    6. Counterbalance: Helical torsion spring type housed in a steel tube or pipe barrel.
    7. Hood: Provided with intermediate support brackets as required and fabricated of:
        a. Aluminum.
    8. Operation:
        a. Manual push up.
    9. Locking:
        a. Two point dead locks with mortise cylinder/s.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify opening sizes, tolerances and conditions are acceptable.

B. Examine conditions of substrates, supports, and other conditions under which this work is to be performed.

C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Use anchorage devices to securely fasten assembly to wall construction and building framing without distortion or stress.

C. Securely and rigidly brace components suspended from structure. Secure guides to structural members only.

D. Fit and align assembly including hardware; level and plumb, to provide smooth operation.

E. Coordinate installation of electrical service with Section 16150. Complete wiring from disconnect to unit components.

F. Coordinate installation of sealants and backing materials at frame perimeter as specified in Section 07900.

G. Install perimeter trim and closures.

3.4 ADJUSTING

A. Test for proper operation and adjust as necessary to provide proper operation without binding or distortion.

B. Adjust hardware and operating assemblies for smooth and noiseless operation.

3.5 CLEANING

A. Clean curtain and components using non-abrasive materials and methods recommended by manufacturer.

B. Remove labels and visible markings.

C. Touch-up, repair or replace damaged products before Substantial Completion.

3.6 PROTECTION

A. Protect installed products until completion of project.

END OF SECTION

SECTION 084110 - ALUMINUM FRAMING, ENTRANCES, & DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. **Exterior aluminum-framed curtainwall systems.**
2. **Exterior glass and glazing.**

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Include plans, elevations, sections, details, hardware, and attachments to other work, operational clearances and installation details.

C. Samples: For each exposed finish; physical samples of finish colors.

D. Moch-up: Provide mockup of each head jamb and sill condition for each exterior wall finish and including interior finish termination for approval by architect prior to installation.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: Acceptable to manufacturer and capable of preparation of data for aluminum-framed systems including Shop Drawings based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.

B. Installer Qualifications: An installer which has had successful experience with installation of the same or similar units required for the project and other projects of similar size and scope.

C. Manufacturer Qualifications: A manufacturer capable of providing aluminum framed storefront system and curtainwall system that meets or exceeds performance requirements indicated and of documenting this performance by inclusion of test reports, and calculations.

D. Source Limitations: Obtain aluminum-framed storefront and curtain wall systems through one source from a single manufacturer.

1.4 PERFORMANCE REQUIREMENTS

A. Storefront & Curtainwall System Performance Requirements:

1. Wind loads: Provide impact rated exterior storefront and curtainwall systems; including anchorage, capable of withstanding wind load design speed of **141 mph**. The design speed is based on the **ASCE 7-16** Building Code.

2. Air Leakage: The test specimen shall be tested in accordance with ASTM E 283. Air Leakage rate shall not exceed 0.06 cfm/ft^2 at a static air pressure differential of 1.6 psf (75 Pa) without interior seal. CSA A440 Fixed Rating.

3. Water Resistance: The test specimen shall be tested in accordance with ASTM E 331. There shall be no leakage at a minimum static air pressure differential of 1.6 psf (500 Pa) as defined in AAMA 501. CSA A440 B5 Rating.

4. Uniform Load: A static air design load of 30 psf (1437Pa) shall be applied in the positive and negative direction in accordance with ASTM E 330. There shall be no deflection in excess of L/175 of the span of any framing member. At a structural test load equal to 1.5 times the specified design load, no glass breakage or permanent set in the framing members in excess of 0.2% of their clear spans shall occur. CSA A440 C2 Rating.

5. Condensation Resistance (CRF): When tested to AAMA Specification 1503, the condensation resistance factor shall not be less than:

   a. 41 $_{frame}$ and 63 $_{glass}$ (low-e).

6. Condensation Resistance (I): When tested to CSA A-440.2, the condensation index shall not be less than:

   a. 63 $_{frame}$ and 68 $_{glass}$ (low-e).

7. Sound Transmission Class (STC) and Outdoor-Indoor Transmission Class (OITC): When tested to AAMA Specification 1801 and in accordance with ASTM E1425 and ASTM E90, the STC and OITC Rating shall not be less than:

   a. 37 (STC) and 31 (OITC)

8. Windborne-Debris-Impact Resistance Performance: Shall be tested in accordance with ASTM E 1886, information in ASTM E 1996 and TAS 201/203.

   a. Large-Missile Impact: For aluminum-framed systems located within 30 feet (9.1m) of grade.

1.5 WARRANTY

A. Special Assembly Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of aluminum-framed systems that do not comply with requirements or that deteriorate within specified warranty period.

   1. Warranty Period: 5 years from date of Substantial Completion.

B. Special Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components on which finishes fail within specified warranty period. Warranty does not include normal weathering.

1. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. **Curtainwall Product**: The design for aluminum framed curtainwall systems is based on Kawneer 1600. Subject to compliance with requirements, provide the named product or a comparable product by one of the following:

1. Kawneer "1600" – 6" deep. (BASIS OF DESIGN)
2. U.S. Aluminum
3. YKK
4. Tubelite
5. Approved Equal

B. **Exterior Glazing**: Subject to compliance with requirements, provide products by one of the manufacturers specified. Reference 2.4 Glazing Systems for glass sizes. (Reference Section 088000 for Interior Glazing Systems.)

1. Vitro
2. AGC
3. Cardinal
4. Guardian
5. Approved Equal

2.2 MATERIALS

A. Painted Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated. Architect to select painted finish color from Manufacturer's standard and custom choices.

B. Aluminum Extrusions: Alloy and temper recommended by aluminum storefront manufacturer for strength, corrosion resistance, and application of required finish and not less than 0.070" (1.8 mm) wall thickness at any location for the main frame and complying with ASTM B 221: 6063-T6 allow and temper.

C. Fasteners: Aluminum, nonmagnetic stainless steel or other materials to be non-corrosive and compatible with aluminum members, trim hardware, anchors and other components.

D. Anchors, Clips, and Accessories: Aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressure.

E. Reinforcing Members: Aluminum, nonmagnetic stainless steel, or nickel/chrome-plated steel complying with ASTM B 456 for Type SC 3 severe service conditions, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressure.

2.3 FRAMING SYSTEMS

A. Thermal Barrier: Thermal break, where indicated or standard, shall have a nominal ¼" (6.4 mm) separation consisting of a two-part chemically curing, high-density polyurethane, which is mechanically and adhesively joined to aluminum storefront sections.

B. Framing Members: Manufacturer's standard extruded-aluminum framing members of thickness required and reinforced as required to support imposed loads.

C. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with non-staining, nonferrous shims for aligning system components.

D. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, non-staining, nonbleeding fasteners and accessories compatible with adjacent materials.

E. Flashing: Manufacturer's standard corrosion-resistant, non-staining, nonbleeding flashing compatible with adjacent materials. Form exposed flashing from sheet aluminum finished to match framing and of sufficient thickness to maintain a flat appearance without visible deflection.

F. Framing System Gaskets and Sealants: Manufacturer's standard recommended by manufacturer for joint type.

2.4 GLAZING SYSTEMS

A. **Exterior Fixed Glazing (Impact Rated)**: 1 5/16" inch thick, impact rated (for large and small missile impacts), insulated, Low-E, Solarban 90, Gray glass.

B. Glazing Gaskets: Manufacturer's standard compression types, replaceable, molded or extruded, that maintain uniform pressure and watertight seal.

C. Spacers and Setting Blocks: Manufacturer's standard elastomeric types.

D. Bond-Breaker Tape: Manufacturer's standard TFR-fluorocarbon or polyethylene material to which sealants will not develop adhesion.

2.5 FABRICATION

A. Form aluminum shapes before finishing.

B. Weld in concealed locations to the greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

C. Framing Members, General: Fabricate components that, when assembled, have the following characteristics:

1. Profiles that are sharp, straight, and free of defects or deformations.
2. Accurately fitted joints with ends coped or mitered.

3. Means to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.
4. Physical and thermal isolation of glazing from framing members.
5. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
6. Provisions for field replacement of glazing from interior for vision glass and exterior for spandrel glazing or panels.
7. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.

2.6 ALUMINUM FINISHES

A. **Clear Anodized Aluminum**

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:

1. Fit joints to produce hairline joints free of burrs and distortion.
2. Rigidly secure nonmovement joints.
3. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration.
4. Seal joints watertight, unless otherwise indicated.
5. Install aluminum-framed storefront system level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction.

B. Metal Protection:

1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape or installing nonconductive spacers as recommended by manufacturer for this purpose.
2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

C. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.

D. Set continuous sill members and flashing in full sealant bed to produce weathertight installation.

E. Install components plumb and true in alignment with established lines and grades, without warp or rack.

3.2 FIELD QUALITY CONTROL

A. Water Spray Test: Before installation of interior finishes has begun, a minimum area of 75 feet by 1 story of aluminum-framed systems designated by Architect shall be tested according to AAMA 501.2 and shall not evidence water penetration.

B. Manufacturer's Field Services: Upon Owner's written request, provide periodic site visit by manufacturer's field service representative.

END OF SECTION 08 41 10

SECTION 09 26 00 - GYPSUM BOARD ASSEMBLIES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
1. Interior gypsum wallboard.
2. ~~Exterior gypsum wallboard.~~
3. ~~Rated gypsum wall assemblies.~~
4. ~~Rated gypsum ceiling assemblies~~.
5. Tile backing panels.
6. Non-load-bearing steel framing.
7. Sound Attenuation Blankets
8. Aluminum Trim Accessories

1.2 SUBMITTALS

A. Product Data: For each product indicated.

1.3 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: For gypsum board assemblies with fire-resistance ratings, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.

1.4 FIRE RATED ASSEMBLIES

A. Refer to Specification Section 078998 “Rated Assemblies & Smoke Partitions” for requirements for these types of assemblies.

B. Refer to Specification Section 078999 “Rated Construction Test Assemblies” for copies of the U.L. Assemblies utilized in this project, and the specific requirements associated with these systems.

C. Comply with the specific requirements of each U.L. Construction Test Assembly, as if included in the Drawings and Details.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Non-Load Bearing Metal Framing Products:

1. Clark Dietrich
2. Cemco
3. JN Linrose
4. Approved Equal.

B. Gypsum Board Panel Products.

1. US Gypsum
2. Georgia Pacific
3. National Gypsum Company
4. Approved Equal.

C. Aluminum Trim Accessories and Expansion Joints:

1. Fry Reglet
2. Schluter
3. Approved Equal.

D. Unfaced Sound Attenuation Batts & Blankets:

1. Owens Corning
2. Knauf.
3. Johns Manville

2.2 NON-LOAD BEARING STEEL FRAMING

A. Steel Framing, General: Comply with ASTM C 754 for conditions indicated.

1. Interior wall, ceiling, and miscellaneous stud framing, and furring:
   a. Steel stud sizes indicated on plans.
   b. Twenty (20) gauge minimum. Required gauge to be modified per wall height and "Steel Stud Manufacturers Association".
   c. Twenty-four (24) gauge studs allowed at "infill" locations, (beams, etc.)

~~2. Rated Interior ceiling framing:~~

~~a. 1-1/2" hat channels: 20 gauge at Rated Roof/Ceiling Assembly~~
~~b. C-H Stud sized for span: 18 gauge at Rated Ceilings in Stairwells and Elevator Shaft~~

~~3. Area Separation Fire Wall:~~

~~a. H studs per UL Assembly.~~

~~4. Exterior Studs:~~

~~a. Steel stud sizes indicated on plans.~~
~~b. Sixteen (16) gauge, typ.~~
~~c. 8" studs typ.~~

2.3 GYPSUM PANEL PRODUCTS

A. Panel Size, General: Provide in maximum lengths and widths available that will minimize joints in each area and correspond with support system indicated.

B. Gypsum Wallboard: ASTM C 36.

1. Gypsum Wall Panels in types and thicknesses indicated herein, or as indicated on the Drawings and details, with long edges tapered.

    a. 5/8" Gypsum Board
    b. 5/8" Mold & Moisture Resistant Gypsum Board
    ~~c. 5/8" Type X, Fire Rated Gypsum Board~~
    ~~d. 5/8" Type X, Fire Rated + Mold & Moisture Resistant Gypsum Board~~

2. Gypsum Liner Panels: ASTM C442, C1396 in thickness indicated.

    a. 1" Type X Core Board, specifically for use with C-H and H stud framing system at rated wall and ceiling assemblies.

3 Gypsum Exterior Wallboard: ASTM C 1396

    b. 5/8" thick, 4' wide square edge product with type X core, wax treated, water resistant and water repellant on both faces.

C. Tile Backing Panels:

1. Cementitious Backer Units: ANSI A118.9, in thickness indicated.

    a. 5/8" at all walls scheduled to receive ceramic or porcelain tile.

2.4 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047.

1. Cornerbead: Use at outside corners.
2. Expansion (Control) Joint: Use at intervals indicated on drawings, or as recommended by Gypsum Board manufacturer.

B. Aluminum Trim: Extruded accessories of profiles and dimensions indicated.

1. Basis of Design Manufacturer:

    a. Basis of Design Manufacturer: "Schluter" or other manufacturers offering similar products represented in drawings and prior approved.

2. Basis of Design Products:

    a. Basis of Design Product: Schluter
        - Model "Quadec" wall tile.
        - Model "Quadec" at wall tile corners.

2.5 SOUND ATTENUATION BLANKETS:

A. Interior Partition Batting: Install 2-1/2, 3-1/2", 6-1/4" or 8" fiberglass acoustical batt insulation to match wall thickness at interior walls. ASTM C 665, Type I. Acoustic batt insulation shall be part of a documented wall construction attaining a 36 STC at minimum and shall be part of a rated wall construction where required.

B. Sound Attenuation Batting to be installed at all interior partitions.

1. Thickness: Match stud size.

2. Mounting: E-405
3. Flame Spread: 10
4. Smoke Development: 10

2.6 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475.

B. Joint Tape:

1. Interior Gypsum Wallboard: Paper.
2. Tile Backing Panels: As recommended by panel manufacturer.

C. Joint Compound for Interior Gypsum Wallboard: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.

1. Prefilling: At open joints and damaged surface areas, use setting-type taping compound.
2. Embedding and First Coat: For embedding tape and first coat on joints, flanges of trim accessories, and fasteners, use setting-type taping compound.
3. Fill Coat: For second coat, use setting-type, sandable topping compound.
4. Finish Coat: For third coat, use setting-type, sandable topping compound.
5. Skim Coat: For final coat of Level 5 finish, use setting-type, sandable topping compound.

D. Joint Compound for Tile Backing Panels:

1. Cementitious Backer Units: As recommended by manufacturer.

2.7 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.

B. Acoustical Sealant for Exposed and Concealed Joints: Nonsag, paintable, nonstaining, latex sealant complying with ASTM C 834 that effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

C. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.

1. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.

PART 3 - EXECUTION

3.1 NON-LOAD-BEARING STEEL FRAMING INSTALLATION

A. General: Comply with ASTM C 754, and ASTM C 840 requirements that apply to framing installation.

B. Comply with Steel Stud Manufaturer's Institute Product Technical Guide.

C. Suspended Ceiling and Soffit Framing:

1. Suspend ceiling hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or ceiling suspension system. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.

2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with the location of hangers required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.

3. Attach hangers to structural members. Do not support ceilings from or attach hangers to permanent metal forms, steel deck tabs, steel roof decks, ducts, pipes, or conduit.

4. Screw furring to wood framing.

5. Wire-tie or clip furring channels to supports**,** as required to comply with requirements for assemblies indicated.

6. Grid Suspension System: Attach perimeter wall track or angle where grid suspension system meets vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.

D. Partition and Soffit Framing:

1. Where studs are installed directly against exterior walls, install isolation strip between studs and wall.

2. Extend partition framing full height to structural supports or substrates above suspended ceilings at 4'-0" intervals, otherwise terminate at 6" above ceiling height. Continue framing over frames for doors and openings and frame around ducts penetrating partitions above ceiling to provide support for gypsum board.

3. Frame door openings to comply with GA-600 and with gypsum board manufacturer's applicable written recommendations, unless otherwise indicated. Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.

   a. Install two studs at each jamb, unless otherwise indicated.
   b. Extend jamb studs through suspended ceilings and attach to underside of floor or roof structure above.

4. Frame openings other than door openings the same as required for door openings, unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.

3.2 PANEL PRODUCT INSTALLATION

A. Gypsum Board: Comply with ASTM C 840 and GA-216.

1. Space screws a maximum of 12 inches o.c. for vertical applications.
2. Space fasteners in panels that are tile substrates a maximum of 8 inches o.c.
3. On ceilings, apply gypsum panels before wall/partition board application to the greatest extent possible and at right angles to framing, unless otherwise indicated.
4. On partitions/walls, apply gypsum panels vertically (parallel to framing), unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
    a. Stagger abutting end joints not less than one framing member in alternate courses of board.
    b. At stairwells and other high walls, install panels horizontally, unless otherwise indicated or required by fire-resistance-rated assembly.
5. Single-Layer Fastening Methods: Apply gypsum panels to supports with steel drill screws.
6. Multilayer Fastening Methods: Fasten base layers and face layers separately to supports with screws.
7. Laminating to Substrate: Comply with gypsum board manufacturer's written recommendations and temporarily brace or fasten gypsum panels until fastening adhesive has set.

B. Tile Backing Panels:

1. Water-Resistant Gypsum Backing Board: Install with 1/4-inch gap where panels abut other construction or penetrations.
2. Glass-Mat, Water-Resistant Backing Panel: Install with 1/4-inch gap where panels abut other construction or penetrations.
3. Cementitious Backer Unit Application: ANSI A108.11.

3.3 FINISHING

A. Installing Trim Accessories: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

B. Finishing Gypsum Board Panels: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration.

1. Prefill open joints and damaged surface areas.
2. Apply joint tape over gypsum board joints, except those with trim having flanges not intended for tape.

3. Glass-Mat Gypsum Sheathing Board: Finish according to manufacturer's written instructions for use as exposed soffit board.
4. Glass-Mat, Water-Resistant Backing Panels: Finish according to manufacturer's written instructions.

C. Cementitious Backer Units: Finish according to manufacturer's written instructions.

D. Gypsum Board Finish Levels: Finish panels to levels indicated below, according to ASTM C 840, for locations indicated:

1. **Level 4**: Embed tape and apply separate first, fill, and finish coats of joint compound to tape, fasteners, and trim flanges, and apply skim coat of joint compound over entire surface.

END OF SECTION 09 26 00

SECTION 09 31 00 - CERAMIC AND PORCELAIN TILE

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Porcelain floor tile.
2. Porcelain wall tile.
3. Waterproofing and Crack Prevention membrane at tile floors and walls.
4. Cementitious backer units installed as part of floor tile installations.
5. Grouting Materials and Additives.

1.2 RELATED SECTIONS

A. Section 09 30 50 Tile Setting Materials and Accessories

1.3 SUBMITTALS

A. Product Data: For each product indicated.

B. Samples:

1. Each type, composition, color, and finish of tile.
2. Stone thresholds.

C. Mock-ups of each material transition condition, trim condition, edge / corner condition, etc.

1.4 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed, for each type, composition, color, pattern, and size indicated.

PART 2 - PRODUCTS

2.1 TILE PRODUCTS

A. Manufacturers:

1. DalTile
2. Approved Equal

B. ANSI Ceramic Tile Standard: Provide Standard grade tile that complies with ANSI A137.1, "Specifications for Ceramic Tile," for types, compositions, and other characteristics indicated.

C. Porcelain Wall Tile (where indicated on drawings):
1. **DalTile Colorbody Porcelain "Industrial Park" – 2 colors**
2. **Surface: Slip-resistant natural finish.**
3. **Module Size: 12" x 12"**
4. **Nominal Thickness: ¼"**
5. **Grout Joint: 1/8" or as recommended by manufacturer.**
6. **Trim Units: Schluter**
7. **Pattern: As indicated on drawings**
8. **Grout: Premium Sanded Polymer Grout, Color: To Be Determined**
9. **Installation: per manufacturer's recommendations**
10. **Aluminum Trim at top of tile wainscot and outside tile corners:**
    a. **Schluter Model "Quadec" wall tile, or approved equal.**
    b. Schluter Model "Quadec" at wall tile corners, or approved equal.

D. Porcelain Floor Tile (where indicated on drawings):
1. **DalTile Colorbody Porcelain "Industrial Park" – 2 colors**
2. **Surface: Slip-resistant natural finish.**
3. **Module Size: 12" x 12"**
4. **Nominal Thickness: ¼"**
5. **Grout Joint: 1/8" or as recommended by manufacturer.**
6. **Pattern: As indicated on drawings**
7. **Grout: Premium Sanded Polymer Grout, Color: To Be Determined**
8. **Installation: per manufacturer's recommendations**

2.2 ACCESSORY MATERIALS

A. Extruded Aluminum Transition Strip: Provide Extruded Aluminum transition trim in polished chrome finish for transition from LVT / VCT flooring to porcelain tile.

2.3 SETTING AND GROUTING MATERIALS

A. Manufacturers:

1. Custom Building Products
2. Atlas Minerals & Chemicals, Inc.
3. Laticrete International Inc.
4. Mapei Corporation

B. Grout: Premium grade, pre blended, polymer modified sanded Portland cement tile grout that only requires the addition of water for mixing:

1. Meets or exceeds ANSI A118.6
2. ISO 13007: Classification CG2WA
3. Shall contain a bioblock for mold and mildew resistance.

2.4 MISCELLANEOUS MATERIALS

A. Cementitious Backer Unit at Bathroom / Restrooms Floors: ANSI A118.9 in maximum lengths available to minimize end-to-end butt joints.

1. Thickness: 5/8” (Reference Gypsum Assemblies)

B. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials.

C. Grout and Tile Sealer: Provide manufacturer's standard product for sealing grout joints that does not change color or appearance of grout and is compatible with stain protecting additive.

1. Install two (2) coats of grout and tile sealer, prior to Substantial completion.

PART 3 - EXECUTION

3.1 PREPARATION

A. Remove coatings, including curing compounds and other substances that contain soap, wax, oil, or silicone, that are incompatible with tile-setting materials.

B. Fill cracks, holes, and depressions with trowelable leveling and patching compound according to tile-setting material manufacturer's written instructions.

C. Remove protrusions, bumps, and ridges by sanding or grinding.

D. Blending: For tile exhibiting color variations, use factory blended tile or blend tiles at Project site before installing.

E. Field-Applied Temporary Protective Coating: Where indicated under tile type or needed to prevent grout from staining or adhering to exposed tile surfaces, pre-coat them with continuous film of temporary protective coating, taking care not to coat unexposed tile surfaces.

3.2 INSTALLATION, GENERAL

A. ANSI Tile Installation Standards: Comply with parts of ANSI A108 Series "Specifications for Installation of Ceramic Tile" that apply to types of setting and grouting materials and to methods indicated in ceramic tile installation schedules.

B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions, unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.

C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Grind cut edges of tile abutting trim, finish, or built-in items. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.

D. Jointing Pattern: Lay tile in grid pattern, unless otherwise indicated. Align joints when adjoining tiles on floor, base, walls, and trim are same size. Lay out tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths, unless otherwise indicated. Verify pattern with architect prior to installation.

E. Lay out tile wainscots to next full tile beyond dimensions indicated.

F. Grout tile to comply with requirements of ANSI A108.10, unless otherwise indicated.

G. Install cementitious backer units at restroom and bathroom floors and treat joints to comply with ANSI A108.11. Stagger seams.

H. Install “waterproofing and crack suppression membrane” to waterproofing manufacturer's written instructions to produce waterproof membrane of uniform thickness bonded securely to substrate. Membrane shall extend over the entirety of the floor and up all walls to receive tile and to the full height of the tile product.

    1. Do not install tile over waterproofing until waterproofing has cured and been tested to determine that it is watertight.

I. For installations indicated below, follow procedures in ANSI A108 Series tile installation standards for providing 95 percent mortar coverage.
    1. Tile floors in wet areas.

J. Install tile on floors and walls with the following joint widths:
    1. Porcelain Floor and Wall Tile 12”x12”: 1/8 inch or per manufacturer’s recommendations.

K. Thresholds: Install aluminum thresholds at locations indicated and per manufacturer’s recommendations.

L. Apply grout and tile sealer to cementitious grout joints and tile, at tile floors and walls according to grout-sealer manufacturer's written instructions. As soon as grout ant tile sealer has penetrated grout joints, remove excess sealer and sealer from tile faces by wiping with soft cloth.

M. Clean tile floors and walls immediately prior to Substantial Completion.

END OF SECTION 09 31 00

SECTION 095000- SOUND-ABSORBING WALL PANELS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Sound-absorbing wall panels, custom-fabricated and fabric-finished.

1.02 REFERENCES

A. ASTM International:
   1. ASTM C423 Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
   2. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials.

B. CDPH California Department of Public Health:
   1. CDPH/EHLB/Standard Method V1.2 Standard Method for the Testing & Evaluation of VOC Emissions

1.03 SYSTEM DESCRIPTION

A. Performance Requirements:
   1. Surface Burning Characteristics (ASTM E84):
      a. Flamespread: 25 maximum.
      b. Smoke Developed: 450 maximum.

1.04 SUBMITTALS

1. A. General: Submit listed submittals in accordance with Conditions of the Contract and Division 1 Submittal Procedures Section.
2. B. Product Data: Manufacturer’s data sheets on each product to be used, including:
3. 1. Preparation instructions and recommendations.
4. 2. Storage and handling requirements and recommendations.
5. 3. Installation methods.
6. 4. Independent testing agency test reports.
7. C. Shop Drawings: Submit shop drawings of site plans showing details of construction, product configuration and related construction.
8. D. Selection Samples: For each product specified, two complete sets of color samples representing the manufacturer's full range of available colors and patterns.
9. E. Submittal Samples: For each product specified, two samples, minimum size 6 inches (150mm) square, representing actual product, color, and patterns.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Minimum 10 years of experience in producing acoustical products of the types specified herein.

B. Installer Qualifications: Minimum 5 years of experience in installation of acoustical ceiling products of the types specified herein.

C. Single Source Responsibility: Provide acoustical components and installation components by a single manufacturer.

1.06 DELIVERY, STORAGE, AND HANDLING

A. General: Comply with Division 1 Product Requirements Section.
B. Delivery: Protect acoustical products from moisture during shipment, storage, and handling.
Store products in manufacturer's unopened containers with identification labels intact until ready for installation.
C. Storage and Protection: Store materials protected from exposure to harmful environmental conditions and at temperature and humidity conditions recommended by the manufacturer.
1. Store materials flat, in dry, well-ventilated space.
2. Do not stand material on end.
3. Protect edges from damage.
4. Handle acoustic components carefully to avoid damage.

1.07 PROJECT CONDITIONS
A. Environmental Requirements: Do not install panels until wet work, such as concrete and plastering, is complete; the building is enclosed; and the temperature and relative humidity are stabilized at 60 - 80 degrees F (16 - 27 degrees C) and 35% MINIMUM RH and 55% MAXIMUM RH, respectively.

1.08 EXTRA MATERIALS
A. General: Comply with Division 1 Product Requirements for additional provisions.
B. Provide 5 percent, but not less than 1 of each type of acoustical unit actually installed, for Owner's use in maintenance.

PART 2 PRODUCTS

2.01 MANUFACTURERS: SOUND-ABSORBING WALL PANELS
A. Manufacturer: Basis of Design: Carnegie Fabrics
1. Contact: Carnegie, Telephone: 800-727-6770
2. E-mail: acousticsolutions@carnegiefabrics.com
3. Website: www.carnegiefabrics.com
B. Approved Equal.

2.02 MANUFACTURED UNITS
A. Wall Panels: Xorel Artform Wall Panels/Tiles
1. Product Thickness: Refer to manufacturer's specification guide.
2. Size: As indicated on the drawings up to a maximum 48 inches x 120 inches panel.
3. Shape: Hex & Hex 3D. Reference Drawings.
4. rPET-Core Thickness: ~~[1/2 inch]~~ **[1 inch (24 mm)]** ~~[2 inches]~~ thick.
5. Edge Detail: [Straight] **[Beveled]** Manufacturer's Factory Hardened Edge
6. Facing: Xorel Unbacked Fabric.
a. Color: As selected from fabric manufacturer's full range of colors.
7. Sound Absorption (ASTM C423): Noise Reduction Coefficient as follows:
~~a. 1/2 inch (12 mm) core: 0.55, minimum.~~
b. **1 inch (24 mm) core: 0.70, minimum**.
~~c. 2 inches (50 mm) core: 0.80, minimum.~~
8. Mounting Accessories: [**Adhesive**] [~~Velcro~~] [~~3M Command Strips~~].

2.03 FABRICATION

A. Wrap panel edges and return facing fabric 1 - 2 inches (25.4 - 51 mm) on back of panel. Secure fabric with adhesive applied to edges and back of panel only.

PART 3 EXECUTION

3.01 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.
   1. Do not install panels until unsatisfactory conditions are corrected.

3.02 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 INSTALLATION

A. Comply with manufacturer's product data, including product technical bulletins, product catalog installation instructions and product carton instructions for installation.

3.04 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

3.05 CLEANING

A. Follow manufacturer's instructions for cleaning panels soiled during installation. Replace panels that cannot be cleaned to a new condition.

B. Keep the site free from accumulation of waste and debris

END OF SECTION

SECTION 09 51 20 - ACOUSTICAL TILE CEILINGS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes acoustical tiles and concealed suspension systems for ceilings.

1.2 SUBMITTALS

A. Product Data: For each product indicated.
B. Samples: For each acoustical tile, for each concealed suspension system member.

1.3 QUALITY ASSURANCE

A. Acoustical Testing Agency Qualifications: An independent testing laboratory or an NVLAP-accredited laboratory.

1.4 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Acoustical Ceiling Units: Provide full-size units in unbroken/unopened cartons, equal to a minimum of 5.0 percent of total quantity installed, but in no case, less than 20 cartons (4 per building).

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers for Acoustical Ceiling Tile:

1. USG
2. Armstrong
3. Approved Equal

B. Acceptable Manufacturers for Acoustical Ceiling Grid:

1. USG
2. Armstrong

3. Approved Equal

2.2 GENERAL

A. Acoustical Tile Standard: Comply with ASTM E 1264.

B. Metal Suspension System Standard: Comply with ASTM C 635.

C. Attachment Devices: Size for five times the design load indicated in ASTM C 635, Table 1, "Direct Hung," unless otherwise indicated.

D. Wire Hangers, Braces, and Ties: Zinc-coated carbon-steel wire; ASTM A 641/A 641M, Class 1 zinc coating, soft temper.

E. Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that fit acoustical tile edge details and suspension systems indicated; formed from sheet metal of same material and finish as that used for exposed flanges of suspension system runners.

2.3 ACOUSTICAL TILES

A. Main Ceiling Tile (ACT-1) – where indicated on drawings – Size 2'x2'
1. Armstrong – Fine Fissured #1728 (Basis of Design)
2. USG – Radar #2210

B. 'Wet Areas' Tile (ACT-2) – where indicated on drawings – Size 2'x2'

1. USG – Sheetrock Lay In Panel #3260
2. Armstrong – Clean Room VL #868

2.4 METAL SUSPENSION SYSTEM

A. Products:

1. Armstrong – Prelude XL 15/16" Color: White (except where ACT -4 is used the grid will be black)
2. USG – Donn DX 15/16" Color: White (except where ACT -4 is used the grid will be black)

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install acoustical tile ceilings to comply with ASTM C 636 and seismic requirements indicated, per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."

B. Measure each ceiling area and establish layout of acoustical tiles to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width tiles at borders.

C. Suspend ceiling hangers from building's structural members, plumb and free from contact with insulation or other objects within ceiling plenum. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers, use trapezes or equivalent devices.

1. Do not support ceilings directly from permanent metal forms or floor deck; anchor into concrete slabs.
2. Do not attach hangers to steel deck tabs.

D. Install edge moldings and trim at perimeter of acoustical tile ceiling area and where necessary to conceal edges of acoustical units. Screw attach moldings to substrate with concealed fasteners at intervals not more than 16 inches o.c. and not more than 3 inches from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet. Miter corners accurately and connect securely.

E. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

F. Install acoustical tiles in coordination with suspension system and exposed moldings and trim. Place splines or suspension system flanges into kerfed edges so tile-to-tile joints are closed by double lap of material. Fit adjoining tile to form flush, tight joints. Scribe and cut tile for accurate fit at borders and around penetrations through tile. Hold tile field in compression by inserting leaf-type, spring-steel spacers between tile and moldings, spaced 12 inches o.c.

END OF SECTION 09 51 20

SECTION 09 65 19.19 - RESILIENT FLOORING PRODUCTS

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. Resilient Luxury Vinyl Tile Flooring
   2. Rubber Base
   3. Transition Strips

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples for Initial Selection: For each type of product indicated.

C. Samples for Verification: For each type of product indicated, in manufacturer's standard-size samples of each resilient product color, texture, and pattern required.

D. Product Schedule: For resilient products. Use same designations indicated on Drawings**.**

1.4 QUALITY ASSURANCE

A. Installation Qualification: Contractors for floor covering installation should be experienced in managing commercial flooring projects and provide professional installers, qualified to install the various flooring materials specified. An installer is “qualified” if trained, or a certified by Tarkett or a certified INSTALL (International Standards & Training Alliance) resilient floor covering installer.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by Tarkett, but not less than 55 deg F (13 deg C) or more than 85 deg F (29 deg C).

1.6 PROJECT CONDITIONS

A. Install resilient products after other finishing operations, including painting, have been completed.

B. Maintain ambient temperatures within range recommended by Tarkett, but not less than 65 deg F (18 deg C) or more than 85 deg F (29 deg C) in spaces to receive resilient products during the following time periods:
   1. 48 hours before installation.
   2. During installation.
   3. 48 hours after installation.

C. Maintain the ambient relative humidity between 40% and 60% during installation.

D. Until Substantial Completion, maintain ambient temperatures within range recommended by Tarkett, but not less than 55 deg F (13 deg C) or more than 85 deg F (29 deg C).

PART 2 - PRODUCTS

2.1 LUXURY VINYL TILE

A. Manufacturers: Subject to compliance with requirements of the Contract Documents, Drawings, and Specifications, provide products by one of the following:

   1. Tarkett “Contour” (Basis of Design)
   2. Mannington
   3. Armstrong

B. Basis-of-Design Product: The design for LVT is based on requirements indicated below and as manufactured by Tarkett.

   1. Items by other listed manufacturers in section A must be similar in appearance, design, and quality, in order to be accepted.
   2. Requests for substitutions by manufacturers other than those listed in section A shall be submitted for approval prior to Bid, in accordance with the requirements in the Instructions To Bidders.
   3. Furnish all items related to this product from one manufacturer as much as possible.

C. Fire-Test-Response Characteristics: For resilient tile flooring, as determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.

   1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

D. Tile Standard: ASTM F 1700, Class III, Type B.

E. Wearing Surface: Embossed.

F. Edge Treatment: Square.

G. Thickness/Wearlayer: 0.120 inch.

H. Colors and Patterns: As selected by Architect from full range.
   1. Basis of Design Color: Contour, Artful Oak, #4623 “High Plains”

I. Sizes: 6” x 36” Plank

J. Test data:
   1. Techtonic™ scratch, scuff, and abrasion resistance surface
   2. Wear layer: 0.032 inches (0.8 mm)
   3. Size, Squareness, ASTM F2055: Passes
   4. Flexibilty, ASTM F137: Passes
   5. Chemical Resistance, ASTM E925: Passes
   6. Static Load Limit, ASTM F970: 250 psi, ≤ 0.005 inches
   7. Resistance to Heat, ASTM F1514: $\Delta E \leq 8$
   8. Resistance to Light, ASTM F1515: $\Delta E \leq 8$
   9. Residual Indentation, ASTM F1914: Passes
   10. Static Coefficient of Friction (SCOF), ASTM D2047: ≥ 0.5 SCOF
   11. Dimensional Stability, ASTM F2199: Passes
   12. Flamability, ASTM E648 Critical Radiant Flux: Class 1 (≥ 0.45 W/cm^2)
   13. Limited Commercial Warranty: 25 years

K. Trowelable Leveling and Patching Compounds: Latex-modified, Portland cement based or blended hydraulic-cement-based formulation.

L. Adhesives: As recommended by manufacturer to meet site conditions.

2.2 STANDARD RUBBER BASE

A. Thermoplastic rubber wall base with standard cove profile.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Flexco
   2. Roppe
   3. Johnsonite

C. Color: to be selected by architect from manufacturer’s standard offerings.

D. Size: 4” or 6” high, as scheduled.

2.3 TRANSITION STRIPS

A. Provide rubber transition strips at all changes in flooring materials.
   1. LVT tile to porcelain tile.
   2. Other transitions may be applicable to the project.

B. Transition strips shall be ADA compliant.

C. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Flexco
   2. Roppe
   3. Johnsonite

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the work.

B. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare substrates according to Tarkett written instructions to ensure proper adhesion of Resilient Flooring.
   1. Prepare concrete substrates in accordance with ASTM F 710.
      a. Concrete floors must be free of dust, solvent, paint, wax, oil, grease, residual adhesive, adhesive removers, film-forming curing compounds, silicate penetrating curing compounds, sealing, hardening or parting compounds, alkaline salts, excessive carbonation or laitence, mold, mildew, and other foreign materials that may affect dissipation rate of moisture from the concrete, discoloration or adhesive bonding.
      b. Mechanically remove contamination on the substrate that may cause damage to the resilient flooring material. Permanent and non-permanent markers, pens, crayons, paint, etc., must not be used to write on the back of the flooring material or used to mark the substrate as they could bleed through and stain the flooring material.
      c. Perform moisture testing as recommended by manufacturer. Proceed with installation only after substrates have been tested and meet the minimum requirements from the manufacturer in accordance with ASTM F1869 Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride or ASTM F2170 Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes.
      d. A pH test for alkalinity must be conducted on the concrete floor prior to installation with results conforming to manufacturer requirements. If the test results are not within the acceptable range, then installation must not proceed until the problem has been corrected.

B. Fill cracks, holes, depressions and irregularities in the substrate with good quality Portland cement based underlayment leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.

C. Floor covering shall not be installed over expansion joints.

D. Do not install resilient products until they are same temperature as the space where they are to be installed.
   1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.

E. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

3.3 RESILIENT TILE FLOORING INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient tile flooring.

B. Luxury Vinyl Tile Flooring:
   1. Install with Tarkett adhesive specified for the site conditions and follow adhesive label for proper use.
   2. Follow Tarkett’s recommendation for tile orientation.
   3. Open enough cartons of floor tiles to cover each area, and mix tile to ensure shade variations do not occur within any one area.
   4. Roll the flooring in both directions using a 100 pound three-section roller.

3.4 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protection of resilient products.

B. Perform the following operations immediately after completing resilient product installation:
   1. Remove adhesive and other blemishes from exposed surfaces.
   2. Sweep and vacuum surfaces thoroughly.
   3. Damp-mop surfaces to remove marks and soil.

C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
   1. No traffic for 24 hours after installation.
   2. No heavy traffic, rolling loads, or furniture placement for 48 hours after installation.

D. Wait 48 hours after installation before performing initial cleaning.

E. A regular maintenance program must be started after the initial cleaning.

END OF SECTION 09 65 19

SECTION 09 65 10.23 – VINYL & RUBBER FLOORING PRODUCTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following, as is applicable to the project:

1. Adjust list below to suit Project.
2. Vinyl Composition Tile (VCT).
3. Standard Rubber Base (RB)
4. Transition Strips
5. ~~Rubber Stair Treads and Risers~~

1.2 SUBMITTALS

A. Product Data: For each product indicated.

B. Samples: Units of each color and pattern of resilient floor tile offered.

1.3 Retain paragraph and subparagraph below if low-emitting materials are required for LEED Credit EQ 4.1; coordinate with requirements selected in Part 2 for adhesives.

1.4 PROJECT CONDITIONS

A. Maintain temperatures within range recommended by manufacturer.

B. Environmental Limitations: Do not install carpet until wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

C. Close spaces to traffic during floor covering installation.

D. Close spaces to traffic for 48 hours after floor covering installation.

PART 2 - PRODUCTS

~~2.1~~ VINYL COMPOSITION TILE - ~~Note: Waterjet cut patterns in areas indicated on plans~~

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Armstrong
2. Approved Equal

B. Color: to be selected by architect from manufacturers standard color offerings. There are **1 COLORS** to be used – reference plans.

C. Standard Vinyl Composition Product Line

~~D. Reference Plans for waterjet cut pattern in specific areas.~~

E. Size: 12” x 12”

2.2 STANDARD RUBBER BASE

A. Thermoplastic rubber wall base with standard cove profile.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Flexco
2. Approved Equal

C. Color: to be selected by architect from manufacturer's standard offerings.

D. Size: 4" or 6" high, as scheduled

E. Size: As scheduled on drawings.

2.3 TRANSITION STRIPS

A. Provide rubber transition strips at all changes in flooring materials.

~~1. VCT tile to carpet tile.~~
2. ~~VCT to Epoxy~~.
3. VCT to Sealed Concrete
4. VCT to LVT
5. ALL flooring shall be "transitioned" at abutted conditions throughout and shall be submitted for approval by product and condition being transitioned.

B. Transition strips shall be ADA compliant.

C. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Flexco
2. Approved Equal

~~2.4 STAIR TREADS AND RISERS~~

~~A. Pre-formed thermoplastic rubber wall base with non-slip finish, profile to match stair treads and risers.~~

~~B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:~~

~~1. Flexco - Heavy Duty Radial # 585~~
~~2. Approved Equal~~

~~C. Color: to be selected by architect from manufacturers standard offerings.~~

~~D. Size: As required to match the specified profile of the stair treads and risers.~~

~~E. Provide Stair Treads with non-slip finish and ADA-compliant integral non-slip/ contrasting abrasive strip adjacent to the nose.~~

2.5 INSTALLATION MATERIALS

A. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.

PART 3 - EXECUTION

3.1 PREPARATION

A. Prepare substrates according to manufacturer's written recommendations to ensure adhesion of resilient products.

B. Level and patch flooring surfaces as required and with appropriate material / substance for professional installation.

3.2 INSTALLATION

A. HVAC units shall be running, and the building shall be climatized, prior to installation of products included in this Section.

B. Prior to installation of vinyl flooring products, the Owner shall engage a 3rd Party Construction Materials Testing Agency to perform Calcium Chloride Moisture tests, to verify that the moisture in the slab is at or below the manufacturer's recommended limit(s) for installation.

1. Allow adequate time for the HVAC system(s) to provide drying of materials within the building, prior to scheduling or performing Calcium Chloride Tests, however, in no case shall Calcium Chloride Tests be performed within 10 days of starting 100% of the HVAC units within the building.
2. Calcium Chloride Moisture Tests shall be performed at a rate of not less than (1) test per 2,000 square feet, however, in no case, shall less than (3) tests be made, per building.
3. Notify the Architect and Owner if moisture tests reflect levels higher than recommended by the flooring material manufacturer.

C. Lay out tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.

D. If built-in items are required to be set on top of tile, indicate on Drawings and revise first paragraph below.

E. Scribe, cut, and fit tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, edgings, door frames, thresholds, and nosings.

F. Adhere tiles to flooring substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

G. Perform the following operations immediately after completing resilient product installation:

1. Remove adhesive and other blemishes from exposed surfaces.
2. Sweep and vacuum surfaces thoroughly.
3. Damp-mop surfaces to remove marks and soil.

H. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder

of construction period. Use protection methods recommended in writing by manufacturer.

I. Allow materials to reach ambient temperature prior to installation.

J. Verify conditions of substrate are suitable for installation per manufacturer's requirements.

K. Final installation shall be cleaned, waxed and buffed per manufacturer's recommendations, prior to occupancy**.**

L. Install (2) coats of wax and/or sealer, immediately prior to Owner's Acceptance of the building.

M. Verify acceptability of wax and/or sealer manufacturer & product with the Owner, prior to installation.

END OF SECTION 09 65 10

SECTION 09 90 00 - INTERIOR, EXTERIOR AND HIGH PERFORMANCE PAINTS AND COATINGS

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PART 1 GENERAL

1.1 SECTION INCLUDES

A. Interior paint and coating commercial systems including surface preparation.

B. Exterior paint and coating systems including surface preparation.

1.2 RELATED SECTIONS

A. Section 03 30 00 - Cast-in-Place Concrete.

B. Section 04 20 00 - Unit Masonry: Concrete Masonry Units (CMU) and brick.

C. Section 05 12 16 - Fabricated Fireproofed Steel Columns.

D. Section 05 50 00 - Metal Fabrications.

E. Section 06 20 00 - Finish Carpentry.

F. Section 06 40 00 - Architectural Woodwork.

G. Section 08 11 13.16 - Custom Hollow Metal Doors and Frames.

H. Section 09 21 16.23 - Gypsum Board Shaft Wall Assemblies.

I. Section 23 05 00 - Common Work Results for HVAC.

J. Section 26 05 00 - Common Work Results for Electrical.

1.3 REFERENCES

A. Steel Structures Painting Council (SSPC):
1. SSPC-SP 1 - Solvent Cleaning.
2. SSPC-SP 2 - Hand Tool Cleaning.
3. SSPC-SP 3 - Power Tool Cleaning.
4. SSPC-SP5/NACE No. 1, White Metal Blast Cleaning.
5. SSPC-SP6/NACE No. 3, Commercial Blast Cleaning.
6. SSPC-SP7/NACE No. 4, Brush-Off Blast Cleaning.
7. SSPC-SP10/NACE No. 2, Near-White Blast Cleaning.
8. SSPC-SP11, Power Tool Cleaning to Bare Metal.
9. SSPC-SP12/NACE No. 5, Surface Preparation and Cleaning of Metals by Waterjetting Prior to Recoating.
10. SSPC-SP 13 / NACE No. 6 Surface Preparation for Concrete.

B. Material Safety Data Sheets / Environmental Data Sheets: Per manufacturer's MSDS/EDS for specific VOCs (calculated per 40 CFR 59.406). VOCs may vary by base

and sheen.

C. California Department of Public Health (CDPH):
   1. CDPH v1.1-2010 and V1.2-2017

1.4 SUBMITTALS

A. Submit under provisions of Section 01 30 00 - Administrative Requirements.

B. Product Data: For each paint system indicated, including.
   1. Product characteristics.
   2. Surface preparation instructions and recommendations.
   3. Primer requirements and finish specification.
   4. Storage and handling requirements and recommendations.
   5. Application methods.
   6. Cautions for storage, handling and installation.

C. Selection Samples: Submit a complete set of color chips that represent the full range of manufacturer's products, colors, and sheens available.

D. Verification Samples: For each finished product specified, submit samples that represent the actual product, color, and sheen.

E. Coating Maintenance Manual: Upon conclusion of project, the Contractor or paint manufacturer/supplier will furnish a coating maintenance manual, such as Sherwin-Williams, "Custodian Project Color and Product Information" report or equal. Manual will include an Area Summary with finish schedule, Area Detail designating where each product/color/finish was used, product data pages, Material Safety Data Sheets, care and cleaning instructions, touch-up procedures, and color samples of each color and finish used.

F. Only submit complying products based on project requirements (i.e. LEED). One must also comply with the regulations regarding VOCs (CARB, OTC, SCAQMD, LADCO). To ensure compliance with district regulations and other rules, businesses that perform coating activities should contact the local district in each area where the coating will be used.

G. USGBC LEED V4 Submittals:
   1. MRc2 Environmental Product Declaration Product Language: Products will be selected with a preference to products that have product-specific environmental product declaration documentation.
   2. EQc2 Low Emitting Materials: The VOC content of all adhesives, sealants, paints, and coatings in this Section will not exceed the VOC limits established in Division 01 Sustainable Design sections.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A firm or individual experienced in applying paints and coatings similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.

B. Paint exposed surfaces. If a color of finish, or a surface is not specifically mentioned, Architect will select from standard products, colors, and sheens available.

C. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels unless indicated.

D. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
   1. Finish surfaces for verification of products, colors, and sheens.
   2. Finish area designated by Architect.
   3. Provide samples that designate primer and finish coats.
   4. Compatibility and Adhesion: Check after one week of drying and curing by testing in accordance with ASTM D3359; Adhesion by tape test. If the coating system is incompatible, additional surface preparation up to and including complete removal may be required.
   5. Do not proceed with remaining work until the Architect approves the mock-up.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver manufacturer's unopened containers to the work site. Packaging will bear the manufacturer's name, label, and the following list of information.
   1. Product name, and type (description).
   2. Application and use instructions.
   3. Surface preparation.
   4. VOC content.
   5. Environmental handling.
   6. Batch date.
   7. Color number.

B. Storage: Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

C. Store materials in an area that is within the acceptable temperature range, per manufacturer's instructions. Protect from freezing.

D. Handling: Maintain a clean, dry storage area, to prevent contamination or damage to the coatings.

1.7 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.

1.8 EXTRA MATERIALS

A. Furnish extra paint materials from the same production run as the materials applied and, in the quantities, described below. Package with protective covering for storage and identify with labels describing contents. Deliver extra materials to Owner.

B. Furnish Owner with an additional one percent of each material and color, but not less

than 1 gal (3.8 l) or 1 case, as appropriate.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Sherwin-Williams, which is located at:
1 Sherwin Way
Cleveland, OH 44113
Toll Free Tel: 800-4-SHERWIN (474-3794)
Tel: 216-566-2000
Fax: 216-566-1392
Email:specifications@sherwin.com
Web: https://www.sherwin-williams.com/architects-specifiers-designers
https://www.sherwin-williams.com/full-spectrum-possibilities
https://www.swspecs.com.

B. Requests for substitutions will be considered in accordance with the provisions of Section 01 60 00 - Product Requirements.

2.2 APPLICATIONS/SCOPE

A. Interior Paint and Coating Commercial Systems:
1. Masonry: Concrete masonry units, including split-face, scored, and smooth block.
2. Metal: Aluminum, galvanized steel.
3. Metal: Structural steel, joists, trusses, beams, partitions, and similar items.
4. Wood: Walls, ceilings, doors, trim and similar items.
5. Drywall: Drywall board, Gypsum board.

B. Exterior Paint and Coating Systems:
1. Concrete: Cementitious siding, flexboard, transite, and shingles; non-roof.
2. Concrete: Non-vehicular concrete floors, patios, porches, steps, and platforms.
3. Metal: Aluminum, galvanized steel.
4. Metal: Miscellaneous iron, ornamental iron, ferrous metal.
5. Steel/Concrete: Steel Floor Bar Joists.

2.3 PAINT MATERIALS - GENERAL

A. Paints and Coatings:
1. Unless otherwise indicated, provide factory-mixed coatings. When required, mix coatings to correct consistency in accordance with manufacturer's instructions before application. Do not reduce, thin, or dilute coatings or add materials to coatings unless such procedure is specifically described in manufacturer's product instructions.
2. For opaque finishes, tint each coat including primer coat and intermediate coats, one-half shade lighter than succeeding coat, with final finish coat as base color. Or follow manufactures product instructions for optimal color conformance.

B. Primers: Where the manufacturer offers options on primers for a particular substrate, use a primer categorized as "best" by the manufacturer.

C. Coating Application Accessories: Provide all primers, sealers, cleaning agents, cleaning

cloths, sanding materials, and clean-up materials required, per manufacturer's specifications.

D. Color: Refer to Finish Schedule for paint colors, and as selected.

E. LEED Requirements: LEED V4 and V4.1 EQ Credit: Indoor Environmental Quality-Low Emitting Materials.

2.4 INTERIOR PAINT AND COATING COMMERCIAL SYSTEMS

A. Masonry CMU: Concrete, Split Face, Scored, Smooth, High Density, Low Density, and Fluted.
   1. Latex Systems:
      a. Eg-Shel / Satin Finish:
         1) 1st Coat: S-W PrepRite Block Filler, B25W25 (75-125 sq ft/gal).
         2) 2nd Coat: S-W ProMar 200 Zero VOC Latex Eg-Shel, B20-2600 Series.
         3) 3rd Coat: S-W ProMar 200 Zero VOC Latex Eg-Shel, B20-2600 Series (4 mils. wet, 1.7 mils. dry per coat).

B. Metal: Aluminum and Galvanized.
   1. Latex Systems:
      a. Semi-Gloss Finish High Performance:
         1) 1st Coat: S-W Pro Industrial Pro-Cryl Universal Primer, B66-1310 Series (5.0 mils. wet, 2.0 mils. dry per coat).
         2) 2nd Coat: S-W Pro Industrial Acrylic Semi-Gloss, B66-650 Series.
         3) 3rd Coat: S-W Pro Industrial Acrylic Semi-Gloss, B66-650 Series (2.0-4.0 mils. dry per coat).

C. Metal; Galvanized: Ceilings and Duct work.
   1. Dryfall Waterborne Topcoats:
      a. Flat Finish:
         1) 1st Coat: S-W Pro Industrial Waterborne Acrylic Dryfall, B42-181 Series.
         2) 2nd Coat: S-W Pro Industrial Waterborne Acrylic Dryfall, B42-181 Series (6.0 mils. wet, 1.7 mils. dry per coat).

D. Metal: Structural Steel Columns, Joists, Trusses, Beams, Miscellaneous and Ornamental Iron, Structural Iron, and Ferrous Metal.
   1. Latex Systems:
      a. Eg-Shel / Satin Finish High Performance:
         1) 1st Coat: S-W Pro Industrial Pro-Cryl Universal Primer, B66-1310 Series (5.0 mils. wet, 2.0 mils. dry per coat).
         2) 2nd Coat: S-W Pro Industrial Acrylic Eg-Shel, B66-660 Series.
         3) 3rd Coat: S-W Pro Industrial Acrylic Eg-Shel, B66-660 Series (2.0-4.0 mils. dry per coat).

E. Wood: Walls, ceilings, doors, and trim.
   1. Latex Systems:
      a. Semi - Gloss Finish:
         1) 1st Coat: S-W Premium Wall and Wood Primer, B28W8111 (4 mils. wet, 1.8 mils. dry per coat).

2) 2nd Coat: S-W ProClassic Waterborne Acrylic Semi-Gloss, B31 Series.
3) 3rd Coat: S-W ProClassic Waterborne Acrylic Semi-Gloss, B31 Series (4 mils. wet, 1.3 mils. dry per coat).

F. Drywall: Walls, Ceilings, Gypsum Board and similar items.
1. Latex Systems:
a. Eg-Shel/Low Luster Finish:
1) 1st Coat: S-W ProMar 200 Zero VOC Interior Latex Primer, B28W2600 (4 mils wet, 1.5 mils dry).
2) 2nd Coat: S-W ProMar 200 Zero VOC Interior Low Gloss Eggshell, B41W2651
3) 3rd Coat: S-W ProMar 200 Zero VOC Interior Low Gloss Eggshell, B41W2651

2.5 EXTERIOR PAINT AND COATING SYSTEMS

A. Concrete: Cementitious Siding, Flexboard, Transite Board, Non-Roof Shingles, Common Brick, Stucco, Tilt-up, Precast, and Poured-in-place Cement.
1. Latex Systems:
a. Satin Finish:
1) 1st Coat: S-W Loxon Concrete and Masonry Primer Sealer, LX02W50 (5.3-8.0 mils. wet, 2.1-3.2 dry per coat).
2) 2nd Coat: S-W A-100 Exterior Latex Satin, A82 Series.
3) 3rd Coat: S-W A-100 Exterior Latex Satin, A82 Series (4.0 mils. wet, 1.5 mils. dry per coat).

B. Concrete: Non-Vehicular Floors, Patios, Porches, Steps and Platforms.
1. Acrylic System Water-Based:
a. Floor Finish:
1) 1st Coat: S-W Porch and Floor Enamel, A32-200 Series.
2) 2nd Coat: S-W Porch and Floor Enamel, A32-200 Series (4.0 mils. wet, 1.5 mils. dry per coat).

C. Metal: Aluminum, Galvanized.
1. Latex Systems:
a. Semi-Gloss Finish:
1) 1st Coat: S-W Pro Industrial Acrylic Semi-Gloss, B66-650 Series.
2) 2nd Coat: S-W Pro Industrial Acrylic Semi-Gloss, B66-650 Series (2.0-4.0 mils. dry per coat).

D. Metal: Miscellaneous. Iron, Ornamental Iron, Structural Iron and Steel, Ferrous Metal.
1. Latex Systems:
a. Semi-Gloss Finish:
1) 1st Coat: S-W Pro Industrial Pro-Cryl Universal Primer, B66-1310 Series (5.0-10.0 mils. wet, 1.8-3.6 mils. dry per coat).
2) 2nd Coat: S-W Pro Industrial Acrylic Semi-Gloss, B66-650.
3) 3rd Coat: S-W Pro Industrial Acrylic Semi-Gloss, B66-650 (2.0-4.0 mils. dry per coat).

E. Steel / Concrete – Steel Floor Bar Joists.
1. Epoxy System:

a. High-Build Coal Tar Epoxy Finish:
   1) 1st Coat: S-W Targuard® Coal Tar Epoxy, applied at the specified dry film thickness per current Product Data Sheet.
   2) 2nd Coat: S-W Targuard® Coal Tar Epoxy, applied at the specified dry film thickness per current Product Data Sheet.
   3) Total System DFT: Per approved coating system and current Sherwin-Williams Product Data Sheet.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until the substrates have been properly prepared; notify Architect of unsatisfactory conditions before proceeding. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

B. Proceed with work only after conditions have been corrected and approved by all parties, otherwise application of coatings will be considered as an acceptance of surface conditions.

C. Previously Painted Surfaces: Verify that existing painted surfaces do not contain lead based paints, notify Architect immediately if lead based paints are encountered.

3.2 SURFACE PREPARATION

A. General: Surfaces will be dry and in sound condition. Remove oil, dust, dirt, loose rust, peeling paint, or other contamination to ensure good adhesion.
   1. Prior to attempting to remove mildew, it is recommended to test any cleaner on a small, inconspicuous area prior to use. Bleach and bleaching type cleaners may damage or discolor existing paint films. Bleach alternative cleaning solutions are advised.
   2. Remove mildew before painting by washing with a solution of 1 part liquid household bleach and 3 parts of warm water. Apply solution and scrub the mildewed area. Allow solution to remain on the surface for 10 minutes. Rinse thoroughly with clean water and allow the surface to dry before painting. Wear protective glasses or goggles, waterproof gloves, and protective clothing. Quickly wash off any of the mixture that comes in contact with your skin. Do not add detergents or ammonia to the bleach/water solution.
   3. Remove items including but not limited to thermostats, electrical outlets, switch covers and similar items prior to painting. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.
   4. No exterior painting should be done immediately after a rain, during foggy weather, when rain is predicted, or when the temperature is below 50 degrees F (10 degrees C), unless products are designed specifically for these conditions. On large expanses of metal siding, the air, surface, and material temperatures must be 50 degrees F (10 degrees F) or higher to use low temperature products.

B. Aluminum: Remove all oil, grease, dirt, oxide, and other foreign material by cleaning per SSPC-SP1, Solvent Cleaning.

C. Block (Cinder and Concrete): Remove all loose mortar and foreign material. Surface must be free of laitance, concrete dust, dirt, form release agents, moisture curing membranes, loose cement, and hardeners. Concrete and mortar must be cured at least 30 days at 75 degrees F (24 degrees C). The pH of the surface should be between 6 and 9 unless the products are designed to be used in high pH environments. On tilt-up and poured-in-place concrete, commercial detergents and abrasive blasting may be necessary to prepare the surface. Fill bug holes, air pockets, and other voids with a cement patching compound.

D. Concrete, SSPC-SP13 or NACE 6: This standard gives requirements for surface preparation of concrete by mechanical, chemical, or thermal methods prior to the application of bonded protective coating or lining systems. The requirements of this standard are applicable to all types of cementitious surfaces including cast-in-place concrete floors and walls, precast slabs, masonry walls, and shotcrete surfaces. An acceptable prepared concrete surface should be free of contaminants, laitance, loosely adhering concrete, and dust, and should provide a sound, uniform substrate suitable for the application of protective coating or lining systems.

E. Cement Composition Siding/Panels: Remove all surface contamination by washing with an appropriate cleaner, rinse thoroughly and allow to dry. Existing peeled or checked paint should be scraped and sanded to a sound surface. Pressure clean, if needed, with a minimum of 2100 psi pressure to remove all dirt, dust, grease, oil, loose particles, laitance, foreign material, and peeling or defective coatings. Allow the surface to dry thoroughly. The pH of the surface should be between 6 and 9 unless the products are designed to be used in high pH environments.

F. Copper and Stainless Steel: Remove all oil, grease, dirt, oxide, and other foreign material by cleaning per SSPC-SP 2, Hand Tool Cleaning.

G. Exterior Composition Board (Hardboard): Some composition boards may exude a waxy material that must be removed with a solvent prior to coating. Whether factory primed or unprimed, exterior composition board siding (hardboard) must be cleaned thoroughly and primed with an alkyd primer.

H. Drywall - Exterior: Must be clean and dry. All nail heads must be set and spackled. Joints must be taped and covered with a joint compound. Spackled nail heads and tape joints must be sanded smooth, and all dust removed prior to painting. Exterior surfaces must be spackled with exterior grade compounds.

I. Drywall - Interior: Must be clean and dry. All nail heads must be set and spackled. Joints must be taped and covered with a joint compound. Spackled nail heads and tape joints must be sanded smooth, and all dust removed prior to painting.

J. Galvanized Metal: Clean per SSPC-SP1 using detergent and water or a degreasing cleaner to remove greases and oils. Apply to a test area, priming as required. Allow the coating to dry at least one week before testing. If adhesion is poor, Brush Blast per SSPC-SP16 is necessary to remove these treatments.

K. Plaster: Must be allowed to dry thoroughly for at least 30 days before painting unless the products are designed to be used in high pH environments. Room must be ventilated while drying; in cold, damp weather, rooms must be heated. Damaged areas

must be repaired with appropriate patching material. Bare plaster must be cured and hard. Textured, soft, porous, or powdery plaster should be treated with a solution of 1 pint household vinegar to 1 gallon of water. Repeat until the surface is hard, rinse with clear water and allow to dry.

L. Steel: Structural, Plate, And Similar Items: Should be cleaned by one or more of the surface preparations described below. These methods are used throughout the world for describing methods for cleaning structural steel. Visual standards are available through the Society of Protective Coatings. A brief description of these standards together with numbers by which they can be specified follow.
   1. Solvent Cleaning, SSPC-SP1: Solvent cleaning is a method for removing all visible oil, grease, soil, drawing and cutting compounds, and other soluble contaminants. Solvent cleaning does not remove rust or mill scale. Change rags and cleaning solution frequently so that deposits of oil and grease are not spread over additional areas in the cleaning process. Be sure to allow adequate ventilation.
   2. Hand Tool Cleaning, SSPC-SP2: Hand Tool Cleaning removes all loose mill scale, loose rust, and other detrimental foreign matter. It is not intended that adherent mill scale, rust, and paint be removed by this process. Beforehand tool cleaning, remove visible oil, grease, soluble welding residues, and salts by the methods outlined in SSPC-SP1.
   3. Power Tool Cleaning, SSPC-SP3: Power Tool Cleaning removes all loose mill scale, loose rust, and other detrimental foreign matter. It is not intended that adherent mill scale, rust, and paint be removed by this process. Before power tool cleaning, remove visible oil, grease, soluble welding residues, and salts by the methods outlined in SSPC-SP1.
   4. White Metal Blast Cleaning, SSPC-SP5 or NACE 1: A White Metal Blast Cleaned surface, when viewed without magnification, will be free of all visible oil, grease, dirt, dust, mill scale, rust, paint, oxides, corrosion products, and other foreign matter. Before blast cleaning, visible deposits of oil or grease will be removed by any of the methods specified in SSPC-SP1 or other agreed upon methods.
   5. Commercial Blast Cleaning, SSPC-SP6 or NACE 3: A Commercial Blast Cleaned surface, when viewed without magnification, will be free of all visible oil, grease, dirt, dust, mill scale, rust, paint, oxides, corrosion products, and other foreign matter, except for staining. Staining will be limited to no more than 33 percent of each square inch of surface area and may consist of light shadows, slight streaks, or minor discoloration caused by stains of rust, stains of mill scale, or stains of previously applied paint. Before blast cleaning, visible deposits of oil or grease will be removed by any of the methods specified in SSPC-SP1 or other agreed upon methods.
   6. Brush-Off Blast Cleaning, SSPC-SP7 or NACE 4: A Brush-Off Blast Cleaned surface, when viewed without magnification, will be free of all visible oil, grease, dirt, dust, loose mill scale, loose rust, and loose paint. Tightly adherent mill scale, rust, and paint may remain on the surface. Before blast cleaning, visible deposits of oil or grease will be removed by any of the methods specified in SSPC-SP 1 or other agreed upon methods.
   7. Power Tool Cleaning to Bare Metal, SSPC-SP11: Metallic surfaces that are prepared according to this specification, when viewed without magnification, will be free of all visible oil, grease, dirt, dust, mill scale, rust, paint, oxide corrosion products, and other foreign matter. Slight residues of rust and paint may be left in the lower portions of pits if the original surface is pitted. Prior to

power tool surface preparation, remove visible deposits of oil or grease by any of the methods specified in SSPC-SP1, Solvent Cleaning, or other agreed upon methods.

8. Near-White Blast Cleaning, SSPC-SP10 or NACE 2: A Near White Blast Cleaned surface, when viewed without magnification, will be free of all visible oil, grease, dirt, dust, mill scale, rust, paint, oxides, corrosion products, and other foreign matter, except for staining. Staining will be limited to no more than 5 percent of each square inch of surface area and may consist of light shadows, slight streaks, or minor discoloration caused by stains of rust, stains of mill scale, or stains of previously applied paint. Before blast cleaning, visible deposits of oil or grease will be removed by any of the methods specified in SSPC-SP1 or other agreed upon methods.
9. High- and Ultra-High Pressure Water Jetting for Steel and Other Hard Materials: SSPC-SP12 or NACE 5: This standard provides requirements for the use of high- and ultra-high pressure water jetting to achieve various degrees of surface cleanliness. This standard is limited in scope to the use of water only without the addition of solid particles in the stream.
10. Water Blasting, SSPC-SP12/NACE No. 5: Removal of oil grease dirt, loose rust, loose mill scale, and loose paint by water at pressures of 2,000 to 2,500 psi at a flow of 4 to 14 gallons per minute.

M. Vinyl Siding, Architectural Plastics, EIFS and Fiberglass: Clean vinyl siding thoroughly by scrubbing with a warm, soapy water solution. Rinse thoroughly. Do not paint vinyl siding with any color darker than the original color unless the paint system features Sherwin-Williams VinylSafe technology. Painting with darker colors that are not Sherwin-Williams VinylSafe may cause siding to warp. Follow all painting guidelines of the vinyl manufacturer when painting. Only paint properly installed vinyl siding. Deviating from the manufacturer's painting guidelines may cause the warranty to be voided.

N. Stucco: Must be clean and free of any loose stucco. If recommended procedures for applying stucco are followed, and normal drying conditions prevail, the surface may be painted in 30 days. The pH of the surface should be between 6 and 9 unless the products are designed to be used in high pH environments such as Loxon.

O. Wood: Must be clean and dry. Prime and paint as soon as possible. Knots and pitch streaks must be scraped, sanded, and spot primed before a full priming coat is applied. Patch all nail holes and imperfections with a wood filler or putty and sand smooth.

3.3 INSTALLATION

A. Apply all coatings and materials with the manufacturer's specifications in mind. Mix and thin coatings according to manufacturer's recommendations.

B. Do not apply it to wet or damp surfaces. Wait at least 30 days before applying to new concrete or masonry. Or follow manufacturer's procedures to apply appropriate coatings prior to 30 days. Test new concrete for moisture content. Wait until wood is fully dry after rain or morning fog or dew.

C. Apply coatings using methods recommended by manufacturer.

D. Uniformly apply coatings without runs, drips, or sags, without brush marks, and with consistent sheen.

E. Apply coatings at spreading rate required to achieve the manufacturers recommended dry film thickness.

F. Regardless of the number of coats specified, apply as many coats as necessary for complete hide, and uniform appearance.

G. Inspection: The coated surface must be inspected and approved by the Architect just prior to the application of each coat.

3.4 PROTECTION

A. Protect finished coatings from damage until completion of project.

B. Touch-up damaged coatings after substantial completion, following manufacturer's recommendation for touch up or repair of damaged coatings. Repair any defects that will hinder the performance of the coatings.

END OF SECTION

SECTION 10001 – SPECIALTY ITEMS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Toilet Accessories
2. Corner Guards
3. ~~Wall Protection – Chair Rail~~
4. Interior Room and Exit Signage
5. Fire Protection Specialties
6. ~~Cast Bronze Building Plaques~~
7. ~~Traffic & Parking Signage~~
8. Horizontal Louver Blinds
9. Markerboards
10. Tackstrip
11. Interior Building Letters and Logos
12. Metal Dimensional Letters and Logos
13. ~~Attic Access Hatches~~
14. ~~Key Lock Box~~
15. Prefinished Paint Perforated Aluminum Panels

1.2 SUBMITTALS

A. For each type of product indicated, provide the following:
1. Product Data
2. Layout and Dimensions (If applicable.)
3. Samples for selection by Architect. (If applicable.)
4. Installation Instructions, including ADA compliance. (If applicable.)

PART 2 - PRODUCTS

2.1 TOILET ACCESSORIES

A. Manufacturers: Subject to compliance with requirements of the Contract Documents, Drawings, and Specifications, provide products by one of the following:

1. Bobrick Washroom Equipment, Inc. (Basis Of Design)
2. Bradley Corporation.
3. American Specialties, Inc.

B. Basis-of-Design Product: The design for Toilet Accessories is based on requirements indicated below and as produced by the manufacturers and products listed in the toilet accessory schedule.

1. Items by other listed manufacturers in section A must be similar in appearance, design, and quality, in order to be accepted.
2. Requests for substitutions by manufacturers other than those listed in section A shall be submitted for approval prior to Bid, in accordance with the requirements in the Instructions To Bidders.
3. Furnish all items related to this product from one manufacturer as much as possible.

C. Comply with ADA requirements. Refer to drawings. When not shown, submit suppliers recommendations for locations and mounting dimensions for approval prior to proceeding.

D. The contractor is responsible for supplying blocking at all toilet accessory locations. No exceptions.

E. Toilet Accessory Schedule.

F. **Refer to the Drawings for Enlarged Restroom Drawings and Toilet Accessory Schedule.**

2.2 CORNER GUARDS

A. Manufacturers: Subject to compliance with requirements of the Contract Documents, Drawings, and Specifications, provide products by one of the following:

1. InPro “150BN BlueNose” (Basis of Design)
2. Construction Specialties
3. Wallprotex
4. Acrovyn

B. Basis-of-Design Product: The design for Corner Guards is based on requirements indicated below and as manufactured by InPro.

1. Items by other listed manufacturers in section A must be similar in appearance, design, and quality, in order to be accepted.
2. Requests for substitutions by manufacturers other than those listed in section A shall be submitted for approval prior to Bid, in accordance with the requirements in the Instructions To Bidders.
3. Furnish all items related to this product from one manufacturer as much as possible.

C. The intent of corner guards is that they “match” the paint color of the wall they are protecting. Custom corner guard colors will be required.

D. Refer to the Drawings for Corner Guard locations and counts.

E. Product Requirements:

1. Material: Rigid Vinyl
2. Size: 3" x 4'-0" Long
3. Mounting: .070" continuous retainer with a co-extruded biopolymer flex pvc apex.
4. Vinyl: .080" thick scratch and stain resistant rigid vinyl cover with end caps.
5. Color: To be selected from manufacturers full range with the option of custom colors.

~~**2.3 WALL PROTECTION – CHAIR RAIL**~~

~~A. Manufacturers: Subject to compliance with requirements of the Contract Documents, Drawings, and Specifications, provide products by one of the following:~~

~~1. InPro "Paladium Sheet and Cap Board" (Basis of Design)~~
~~2. Construction Specialties~~
~~3. Wallprotex~~
~~4. Acrovyn~~

~~B. Basis-of-Design Product: The design for Wall Protection is based on requirements indicated below and as manufactured by InPro.~~

~~1. Items by other listed manufacturers in section A must be similar in appearance, design, and quality, in order to be accepted.~~
~~2. Requests for substitutions by manufacturers other than those listed in section A shall be submitted for approval prior to Bid, in accordance with the requirements in the Instructions To Bidders.~~
~~3. Furnish all items related to this product from one manufacturer as much as possible.~~

~~C. The intent of the wall protection items is that they "match" the paint color of the wall they are protecting. Custom wall protection colors will be required.~~

~~D. Refer to the Drawings for Wall Protection locations and counts.~~

~~E. Wall Protection Product Requirements:~~

~~1. Wall Protection Sheet Material: .040" Rigid Vinyl Sheet~~
~~2. Size: As indicated on drawings.~~
~~3. Color: To be selected from manufacturers full range with the option of custom colors.~~
~~4. Sheet shall extend from height indicated on plans and shall terminate behind the wall base as scheduled on the finish schedule.~~

~~F. Chair Rail Product Requirements:~~

~~1. Size: ½" x 4" Horizontal Top Cap Board with back kerf for receiving top to rigid vinyl sheet.~~
~~2. Color: To be selected from manufacturers full range with the option of custom colors.~~

2.4 INTERIOR ROOM AND EXIT SIGNAGE

A. Manufacturers: Subject to compliance with requirements of the Contract Documents, Drawings, and Specifications, provide products by one of the following:

1. Mohawk Sign Systems "Series 200A Sand Carved" (Basis of Design)
2. ASI Sign Systems
3. Best Sign Systems

B. Basis-of-Design Product: The design for Interior Room Signs is based on requirements indicated below and as manufactured by Mohawk Sign Systems.

1. Items by other listed manufacturers in section A must be similar in appearance, design, and quality, in order to be accepted.
2. Requests for substitutions by manufacturers other than those listed in section A shall be submitted for approval prior to Bid, in accordance with the requirements in the Instructions To Bidders.
3. Furnish all items related to this product from one manufacturer as much as possible.

C. Comply with ADA requirements. Refer to drawings. When not shown, submit suppliers recommendations for locations and mounting dimensions for approval prior to proceeding.

D. Refer to the Drawings for Interior Sign types, dimensions and locations.

E. Product Requirements:

1. Material: 1/8" MP Plastic
2. Size: Per Sign Type Indicated on Drawings. Varies.
3. Mounting: Vinyl Tape.
4. Border: Borderless
5. Edge Treatment: Square
6. Background: Texture to be manufacturer's standard texture.
7. Background Color: To be selected from manufacturer's standard options.
8. Copy: Optima Font to match drawings. Raised copy with applied color "White"
9. Braile: Beneath Copy
10. Paper Insert: Where indicated. Reference Drawings.
11. Layout: Copy to be submitted for approval with images of each sign type.

F. **Refer to the Drawings for Signage Schedule and Interior Room and Exit Signage locations.**

2.5 FIRE EXTINGUISHERS

A. Manufacturers: Subject to compliance with requirements of the Contract Documents, Drawings, and Specifications, provide products by one of the following:

1. J.L. Industries

2. Larsen's
3. Kidde

B. Basis-of-Design Product: The design for Fire Extinguishers is based on requirements indicated below and as produced by the manufacturers and products listed in the fire extinguisher schedule.

1. Items by other listed manufacturers in section A must be similar in appearance, design, and quality, in order to be accepted.
2. Requests for substitutions by manufacturers other than those listed in section A shall be submitted for approval prior to Bid, in accordance with the requirements in the Instructions To Bidders.
3. Furnish all items related to this product from one manufacturer as much as possible.

C. Refer to the Drawings for Fire Extinguisher locations and counts.

D. Cabinets shall be RATED in rated wall conditions.

E. The contractor is responsible for supplying blocking at all cabinet locations if required. No exceptions.

F. **Reference to Drawings for Fire Extinguisher Schedule and Locations.**

~~2.6 **CAST BRONZE BUILDING PLAQUE**~~

~~A. Manufacturers: Subject to compliance with requirements of the Contract Documents, Drawings, and Specifications, provide products by one of the following:~~

~~1. A.R.K Ramos Signage Systems~~
~~2. Metallic Arts~~
~~3. Metal Arts~~

~~B. Basis-of-Design Product: The design for the Building Plaque is based on products provided by A.R.K. Ramos.~~

~~1. Alternate items shall be similar in appearance, design, and quality, in order to be approved as "equal".~~

~~2. Requests for substitutions shall be submitted for approval prior to Bid, in accordance with the requirements in the Instructions To Bidders.~~

~~3. Building Plaque Schedule~~

~~a. NOTE: REFERENCE DRAWINGS FOR PLAQUE LOCATION~~

~~4. Plaque Specifications~~

~~a. Material: Virgin Bronze~~

~~b. Size: 36"W. x 24"H.~~
~~c. Mounting: Style to be selected from Manufacturer's Standard options.~~
~~d. Border: Style to be selected from Manufacturer's Standard options.~~
~~e. Background Texture: Style to be selected from Manufacturer's Standard options.~~
~~f. Finish: Style to be selected from Manufacturer's Standard options.~~
~~g. Type Style: Style to be selected from Manufacturer's Standard options.~~
~~h. Layout: < To Be Provided >~~

~~2.7 TRAFFIC AND PARKING SIGNS~~

~~A. Manufacturers: Subject to compliance with requirements of the Contract Documents, Drawings, and Specifications, any manufacturer.~~

~~B. Refer to the Drawings for sign sizes, copy and locations.~~

~~C. Product Requirements:~~

~~1. Material: .080 Gauge Aluminum~~
~~2. Sheeting: High Intensity Prismatic Reflective Sheeting~~
~~3. Size: Per Sign Type Indicated on Drawings. Varies.~~
~~4. Mounting: 2"x2"x1/4" Galvanized Steel Tube with Cap. 10'-0" (8' AFG)~~
~~5. Color: Regulatory Standards.~~

~~**D. Reference to Drawings for Traffic Sign Locations.**~~

2.8 HORIZONTAL LOUVERED MINI BLINDS

A. Manufacturers: Subject to compliance with requirements of the Contract Documents, Drawings, and Specifications, any manufacturer.

B. Refer to the Drawings for min blind sizes and locations.

C. Product Requirements:

1. Material: 1" Aluminum (Fire retardant)
2. Gauge: .006
3. Provide headrail and color coordinated tassels.
4. Brackets per manufacturer's standard. Provide all installation accessories.

2.9 MARKERBOARDS

A. Salvage and Reinstall Existing Markerboards.

B. Refer to the Drawings for Markerboard locations and counts.

2.10 TACKSTRIP – (Integrally Colored Cork)

A. Manufacturers: Subject to compliance with requirements of the Contract Documents, Drawings, and Specifications, provide products by one of the following:

1. Mooreco
2. Claridge
3. Forbo
4. Nelson Adams NACO

B. Basis of Design Product: Mooreco, Map Rail 2", Product No: 523M-07.

C. Height Profile: 2"

D. Length: Reference Drawings.

E. Cork insert: Integrally-colored cork. Cork shall be self-healing, and shall conform to MS MIL-C-15116C. Flame Spread shall be 25 or less, and Smoke Developed shall be 10 or less, when tested in accordance with ASTM E-84.

F. Color Options: Provide selection from manufacturer's full-range of integrally colored cork, but no less than ten (10) colors.

G. Accessories: Provide End Stops.

H. Trim: 2" wide, 6063-T5 Alloy Aluminum with satin anodized finish. Finish shall comply with MAAMM and shall be Class II Clear Anodized Finish (Mechanical Finish: as fabricated, non-specular; Chemical Finish: etched, medium matte; Anodic Finish: Class II Architectural, film thickness 0.4 mil (minimum).

I. Mounting: Face screws, concealed screw guides behind the cork strip, Heavy-duty adhesive backing for mounting directly to walls, per manufacturer's recommendation.

2.11 INTERIOR BUILDING SIGNAGE AND LOGOS

A. Manufacturers: Subject to compliance with requirements of the Contract Documents, Drawings, and Specifications, provide products by one of the following:

1. Gemini Sign Systems "Laser Cut Acrylic" (Basis of Design)
2. A.R.K. Ramos Signage Systems
3. Metallic Arts
4. Metal Arts

B. Basis-of-Design Product: The design for Interior Building Letters and Logos is based on requirements indicated below and as manufactured by Gemini Sign Systems.

1. Alternate items must be similar in appearance, design, and quality, in order to be approved as "equal".
2. Requests for substitutions shall be submitted for approval <u>prior</u> to Bid, in accordance with the requirements in the Instructions To Bidders.

C. **SIGNAGE SCHEDULE- where indicated on drawings provide the following in ¼" Laser Cut Acrylic Letters & Logos. Reference Drawings:**

1. **REGION**
   a. Qty:1.
   b. Font: Custom font.
   c. Color: To match Sherwin Williams "Dynamic Blue" SW 6958
   d. Finish: Gloss Finish
   e. Mount: Pad Mount
2. **5**
   a. Qty:1
   b. Font: Custom font
   c. Color: To match Sherwin Williams "Izmir Purple" SW 6825
   d. Finish: Gloss Finish
   e. Mount: Pad Mount
3. **STEM CENTER**
   a. Qty:1
   b. Font: Custom font
   c. Color: To match Sherwin Williams "Gale Force" SW 7605
   d. Finish: Gloss Finish
   e. Mount: Pad Mount

2.12 METAL DIMENSIONAL LETTERS AND LOGOS

A. Manufacturers: Subject to compliance with requirements of the Contract Documents, Drawings, and Specifications, provide products by one of the following:

1. A.R.K Ramos Signage Systems "Cut Letters" (Basis of Design)
2. Gemini Sign Systems
3. Mohawk

B. Basis-of-Design Product: The design for Metal Dimensional Lettrs and Logos is based on requirements indicated below and as manufactured by A.R.K. Ramos.

1. Items by other listed manufacturers in section A must be similar in appearance, design, and quality, in order to be accepted.
2. Requests for substitutions by manufacturers other than those listed in section A shall be submitted for approval prior to Bid, in accordance with the requirements in the Instructions To Bidders.
3. Furnish all items related to this product from one manufacturer as much as possible.

C. Refer to the Drawings for Building Letters and Logos locations.

D. Product Requirements:

1. Material: 1/4" Cut Aluminum
2. Size: Per Sign Type Indicated on Drawings.
   a) STEM GYM – 15"
3. Mounting: Style to be selected from manufacturer's standard options.

4. Color: To be selected from manufacturer's standard options.
5. Copy: Font to be selected from manufacturer's standard options.
6. Layout: Copy to be submitted for approval with images of each sign type.

~~**2.13 ATTIC ACCESS HATCHES**~~

~~A. Manufacturer(s):~~
~~1. Elmdor DW 36-36~~
~~2. Approved Equal~~

~~B. Size 36" x 36" with hinges and a lock.~~

~~C. Provide solid wood blocking as required for install of hatch.~~

D. ~~Coordinate location with truss layout and room layout and attic access walkway~~.

~~**2.14 KEY LOCK BOX**~~

~~A. Basis-of-Design Manufacturer: Knox or any manufacturer capable of providing a product equal to that specified.~~

~~B. Basis-of-Design Product: Knox Box 3200 or prior approved equivalent product.~~
~~1. Alternate items must be similar in appearance, design, and quality, in order to be approved as "equal".~~
~~2. Requests for substitutions shall be submitted for approval prior to Bid, in accordance with the requirements in the Instructions To Bidders.~~

2.15 PERFORATED ALUMINUM PANELS

A. Basis of Design Manufacturer: Dri-Design Wall Panel System; Perforated Series
   1. Address: 12480 Superior Ct., Holland, Michigan 49424
   2. P.O. Box 1286 Holland, Michigan 49422-1286
   3. Phone: (616) 355-2970; Fax: (616) 355-2972; Website: www.dri-design.com

B. Basis of Design Product: Dri-Design Wall Panel System; Perforated Series with custom "image" or comparable product approved by Architect prior to bid.
   1. Items by other listed manufacturers in section A must be similar in appearance, design, and quality, in order to be accepted.
   2. Requests for substitutions by manufacturers other than those listed in section A shall be submitted for approval prior to Bid, in accordance with the requirements in the Instructions To Bidders.
   3. Furnish all items related to this product from one manufacturer as much as possible.

C. Performance requirements:

1. Metal Plate Wall Panel Assemblies: Comply with performance requirements without failure due to defective manufacturing, fabrication, installation, or other construction defects.
2. Design, fabricate, and erect a dry joint, aluminum wall panel system without use of sealants, gaskets, or butyl tape.

D. Materials – Aluminum:
1. Aluminum Plate: Alloy and temper as recommended by manufacturer for application and in compliance with manufacturers design requirements.
   a. Aluminum Material: Tension-leveled, fluoropolymer PVDF painted finish.
   b. Thickness: 0.125 inch.
   c. Finish: Two-Coat Fluoropolymer.
2. Panel Mounting: Face Fastened
3. Panel Joints: *As indicated on Drawings.*
4. Image: Custom (full area of panel.)

PART 3 - CLOSEOUT

3.1 Closeout Documentation

A. For each type of product indicated, provide the following documentation at closeout:

1. Product Data
2. Installation Instructions, including ADA compliance
3. Warranty Information

END OF SECTION 10001

SECTION 10 21 14 - SOLID PLASTIC TOILET PARTITIONS & SCREENS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Solid Plastic, floor mounted, overhead-braced Toilet Partitions and Urinal Screens.

1.2 SUBMITTALS

A. Shop Drawings

1. Complete shop drawings showing all required field measurements, all details and elevations, plans and sections required to indicate all conditions.
2. Manufacturer's installation instructions.
3. Warranty information.
4. Field verify available space and fixture layouts prior to forwarding shop drawings for the Architect’s approval.

B. Certification: Provide a certificate of compliance attesting that all materials are in accordance with manufacturer’s specifications.

1.3 FIELD MEASUREMENTS

A. Field verify dimensions prior to submittals and fabrication.

PART 2 – PRODUCTS

2.1 APPROVED MANUFACTURERS

A. Provide products by a single manufacturer, whose product meets or exceeds the Design Standards for those specified is approved for use on the Project. Manufacturers shall have a minimum of five (5) years experience manufacturing Solid Plastic Toilet Compartment products, and shall meet or exceed the specified for design, size, finish, and fabrication and comply with Division 1 requirements for substitutions in order to be considered.

1. Accurate Partitions
2. Ampco Products
3. Bobrick
4. Bradley
5. Scranton Products

2.2 MATERIALS

A. General: Comply with the requirements of the Americans with Disabilities Act (ADA), 2010 ADA Standards.

B. Doors: 1 inch thick solid plastic. Edges shall be burnished and slightly rounded. Standard door size, other than “accessible”, is 24 inches, unless indicated otherwise.

C. Panels: 1 inch thick solid plastic. Edges shall be burnished and slightly rounded.

D. Pilasters: 1 inch thick, minimum, solid plastic. Edges shall be burnished and slightly rounded.

E. Pilaster Shoes: stainless steel.

F. Wall Brackets: stainless steel.

G. Headrail: heavy duty aluminum extrusions, anodized with anti-grip configuration, and shall be fastened to the pilaster tops.

F. Hardware:

1. Hinges shall be continuous, fabricated from 11 gauge stainless steel, one piece leaf, for surface mounting. Hinge shall be equipped with one piece 3/8 inch stainless steel pintle extending the full height of the hinge. Upper and lower hinge are to both be cam operated, with the one piece pintle.
2. Coat hook and bumper shall be stainless steel, with brushed finish.
3. Door strike and keeper shall be stainless steel, with brushed finish.
4. Brackets for attachment of pilasters to walls shall be continuous, fabricated from 20 gauge stainless steel, with brushed finish.
5. Brackets for attachment of panels to pilasters and walls shall be continuous, fabricated from 20 gauge stainless steel, with brushed finish.
6. Brackets for attachment of Urinal Screens to walls shall be continuous, fabricated from 20 gauge stainless steel, with brushed finish.
7. Pilaster shall be attached to the floor by means of an 11 gauge stainless steel bracket, with integral provisions for leveling, attached to two (2) 3/8 inch diameter stainless steel studs set into expansion shields. The floor connections shall to be covered by a four (4) inch high stainless steel shoe, with a #4 brushed finish.
8. Miscellaneous hardware, fasteners, etc. shall be stainless steel.

G. Finish: Melamine color surface on material face, edges burnished. All wood grain panels larger than 57-1/4 inches will have horizontal grain.

H. Laminate Color: Shall be selected from the manufacturer's standard high pressure plastic laminate color chart. The colors available shall be no fewer than those offered for plastic laminate partitions.

I. Core Color: Core color shall be black.

PART 3 – EXECUTION

3.1 PREPARATION

A. Provide blocking/anchoring devices within walls for attachment of toilet partitions. Blocking shall be solid 2x material, continuous vertically, and securely attached to adjacent studs. Anchoring devices shall be compatible with wall type, in order to ensure adequate strength.

3.2 INSTALLATION

A. Install Toilet Compartments in accordance with the manufacturer's printed instructions.

B. Install all toilet partitions where indicated on the drawings, and as indicated on the shop drawings, anchoring all components firmly in place for long life under hard use and in complete accordance with the manufacturer's recommendations.

C. Install Handicapped Accessible Toilet Stalls, Ambulatory Stalls, and Urinal Screens in accordance with the requirements of the Americans With Disabilities Act, 2010 ADA Standards.

D. Verify interior clearances between partition panels, pilasters, and walls, as well as tow clearances below partition panels and doors at Handicapped Accessible Toilet Stalls and Ambulatory Stalls comply with with the requirements of the Americans With Disabilities Act, 2010 ADA Standards.

E. Verify door swings, door approaches, and door operation at Handicapped Accessible Toilet Stalls and Ambulatory Stalls comply with with the requirements of the Americans With Disabilities Act, 2010 ADA Standards.

F. Install latches at Handicapped Accessible Toilet Stalls and Ambulatory Stalls at 38" maximum A.F.F.

G. Install Coat Hooks at Handicapped Accessible Toilet Stalls and Ambulatory Stalls at 46" maximum A.F.F.

3.2 CLEANING AND ADJUSTING

A. Clean surfaces free of dirt, oil, grease and other contaminants which detract from appearance of partitions.

B. Except for compartments for the handicapped, adjust doors to remain at a uniformly open position when unlocked.

3.3 REPLACEMENT OF DEFECTIVE MATERIALS

A. Bowed doors, panels, or pilasters shall be considered defective, will not be accepted, and shall be rejected.

B. Defaced, damaged, scratched or marred materials will not be accepted, will be considered defective, and shall be rejected.

C. Rejected materials shall be replaced with new materials at no additional expense to Owner.

END OF SECTION 10 21 14

SECTION 10 73 00 - ALUMINUM WALKWAY COVERS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: Design, fabrication, and installation of welded extruded aluminum walkway cover systems.

1.02 REFERENCE STANDARDS

A. The Aluminum Association (AA) - The Aluminum Design Manual 2010

B. American Architectural Manufacturers Association (AAMA)

1. AAMA 611 - Anodized Architectural Aluminum
2. AAMA 2603 - Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions & Panels
3. AAMA 2605 - Performance Requirements & Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions & Panels

C. American Society of Civil Engineers (ASCE) – ASCE 7-10

D. American Society for Testing and Materials (ASTM):

1. ASTM B 209 - Aluminum & Aluminum- Alloy Sheet and Plate.
2. ASTM B 221 - Aluminum & Aluminum- Alloy Extruded Bars, Rods, Wire, and Tubes.
3. ASTM C 150 - Portland Cement.
4. ASTM C 404 - Aggregates for Masonry Grout.

E. American Welding Society (AWS) – ANSI/AWS D1.2M - Structural Welding Code - Aluminum.

1.03 SYSTEM DESCRIPTION

A. Design Requirements:

1. Design Walkways in accordance with The Aluminum Design Manual 2010.
2. Columns, beams, deck, and trim: aluminum extrusions.
3. Canopy: Self-draining from deck through bents to discharge point at ground level or otherwise shown and indicated on shop drawings.
4. Design Loads:
    1. Comply with Building Code for site location.
    2. Collateral Loads: Additional loads imposed by other materials or systems indicated in contract documents.
5. Structural Design: Prepare complete structural design calculations for canopy members including footings.
6. Comply with the wind requirements of ASCE 7-16. **The design wind speed for this area is 141 mph.**

7. Provide an all welded extruded aluminum system complete with internal drainage and weep holes. Non-welded systems are not acceptable.
8. Provide expansion joints to accommodate temperature changes of 120 degrees F. Provide expansion joints with no metal to metal contact.

B. Performance Requirements:

1. Grout: Compressive strength of 2000 psi, minimum.

1.04 SUBMITTALS

A. Product Data: Manufacturer's product information, specifications, detail sheets, and installation instructions for walkway cover components and accessories.

B. Shop Drawings:

1. Includes the complete layout, sections, details, components, finishes, sizing, spacing, and fasteners specific to the project. The site-specific shop drawings shall show reactions at surface attachment points and bear the seal of a Registered Structural Engineer in Louisiana. Design calculations shall state that the walkway cover system design complies with the wind requirements of ASCE 7-10, the stability criteria of applicable building code, and all other governing criteria.
2. General Contractor shall submit shop drawings for approval by the Architect prior to fabrication of any materials.
3. General Contractor to verify all dimensions and elevations prior to submittal to Architect.
4. Manufacturer shall field verify all dimensions prior to fabrication.

C. Samples:

1. Selection: Manufacturer's standard range of colors for the finishes selected.
2. Verification: 2-inch-square physical samples of each finish selected on the substrate specified.

D. Quality Assurance/Control Submittals:

1. Canopy shall be designed to comply with state and local building codes.
2. Canopy Manufacturer shall have a minimum of 10 years' experience in designing and installing the specified system.
3. The installation of the canopy shall be performed by the manufacturer to assure single source responsibility.
4. Qualifications: Letter certifying manufacturer's required qualifications.
    A. Structural Design Calculations.
    B. Manufacturer's Installation Instructions.

1.05 QUALITY ASSURANCE

A. Overall Standard: Structural engineering design documents and calculations stamped by a structural engineer registered to practice in Louisiana.

B. Manufacturer Qualifications: At least ten years experience in the design, fabrication, and erection of extruded aluminum walkway cover systems.

C. Installer Qualifications: The installation of the canopy shall be performed by the manufacturer to assure single source responsibility.

PART 2 PRODUCT

2.01 MANUFACTURERS

A. Peachtree Protective Covers
B. Avadek Walkway Cover Systems
C. Dittmer Architectural Aluminum

2.02 MATERIALS

A. Aluminum Members: Extruded aluminum, ASTM B 221, 6063 alloy, T6 temper.

B. Fasteners: Aluminum, 18-8 stainless steel, or 300 series stainless steel.

C. Protective Coating for Aluminum Columns Embedded in Concrete: Clear acrylic.

D. Grout:
   1. Portland Cement: ASTM C 150, Type I.
   2. Sand: ASTM C 404.
   3. Water: Potable.

E. Gaskets: Dry seal santoprene pressure type.

F. Aluminum Flashing: ASTM B 209, Type 3003 H14, 0.040 inch, minimum.

G. Fascia and backstraps

H. Footing blockouts

I. Aluminum weep hole

J. Aluminum beams and columns

K. Metal wall flashing

2.03 FASTENERS, CONNECTIONS, AND FITTINGS:

A. Bolted Connections: All bolts, nuts, washers, and screws used in joining the members shall be stainless steel up to 3/8" diameter. Over 3/8" diameter may be Hot Dipped Galvanized.

B. General Contractor shall provide structural attachment points flush with the outside surface of the building.

C. Rafters shall be heliarc welded to wall mounting plates which are bolted to walls.

D. Beams are fastened to rafters with concealed clips.

E. Blades are mechanically fastened to structure with stainless steel screws, conceal where able.

2.04 FABRICATION

A. General:

1. Shop Assembly: Assemble components in shop to greatest extent possible to minimize field assembly.

2. Welding: In accordance with ANSI/AWS D1.2.

3. Bent Construction: Factory assemble beams to columns to form one-piece rigid bents. Where used make welds smooth and uniform using an inert gas shielded arc. Perform suitable edge preparation to assure 100% penetration. Grind welds only where interfering with adjoining structure to allow for flush connection. Field welding is not permitted. Rigid mechanical joints can be used if supported by engineering calculations and/or testing.

4. Deck Construction: Fabricate from extruded modules that interlock in a self-flashing manner. Positively fasten interlocking joints creating a monolithic structural unit capable of developing the full strength of the sections. The fastenings must have minimum shear strength of 350 pounds each. Assemble deck with sufficient camber to offset dead load deflection.

B. Columns: Provide radius-cornered tubular extrusions with cutout and internal diverter for drainage where indicated. Circular downspout opening in column not acceptable.

C. Beams: Provide open-top tubular extrusion, top edges thickened for strength and designed to receive deck members in self-flashing manner.

D. Deck: Extruded self-flashing sections interlocking into a composite unit. Provide welded plate closures at deck ends.

E. Fascia: Manufacturer's standard shape. Provide fascia splices where continuous runs of fascia are jointed. Locate splices to be in line with bents and fasten in place on hidden or non-vertical surfaces.

F. Arches: For barrel vault protective covers, provide sharp-cornered tubular extrusions.

H. Factory Finishing: Finish designations prefixed by AA comply with system established by the AAMA for designating aluminum finishes.

1. ~~Class I, Clear Anodic Finish: AA-M12C22A41 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matted, Anodic Coating: Architectural Class I, clear coating 0.7 mils or thicker), complying with AAMA 611~~.

2. High performance Organic Coating Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturer's written instructions.
   a. Fluoropolymer Three-Coat Coating System: Manufacturer's standard three-coat, thermocured system consisting of specially formulated inhibitive

primer, fluoropolymer color coat, and clear fluoropolymer topcoat, with both color coat and clear topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 2605.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verification of Conditions: Verify that all concrete, masonry, and roofing work in the vicinity is complete and cleaned.

3.02 ERECTION

A. Erect protective cover true to line, level, and plumb. Protect aluminum columns embedded in concrete with clear acrylic. Fill downspout columns with grout to the discharge level to prevent standing water. Install weep holes at top of concrete in non-draining columns to remove condensation.

B. Provide hairline miters and fitted joints.

3.03 CLEANING

A. Just prior to completion of project, strip protective coatings of covering from aluminum and clean all parts. Repair to new condition to replace any materials during installation

3.04 PROTECTION

A. Protect materials during and after installation.

END OF SECTION 10 73 00

SECTION 116100 – STAGE EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:
   1. Roll-up Divider Curtains.
   2. Truss and Rigging Systems.
   3. A/V & Tournament Control Center (Media & Broadcaster Station)

1.2 SUBMITTALS

A. For each type of product indicated, provide the following:
   1. Product Data
   2. Layout and Dimensions. (If applicable.)
   3. Samples for selection by Architect. (If applicable.)
   4. Installation Instructions, including LHSAA and NCAA compliance. (If applicable.)

1.3 QUALITY CONTROL

A. All equipment and equipment installations shall meet NCAA and LHSAA competition requirements.

PART 2 - PRODUCTS

2.1 ROLL-UP DIVIDER CURTAINS

A. Manufacturers: Subject to compliance with requirements of the Contract Documents, Drawings, and Specifications, provide products by one of the following:

   1. Gared “Roll-Up Divider Curtain 4030” (Basis Of Design)
   2. Draper
   3. Gill Athletics
   4. Schelde Sports

B. Basis-of-Design Product: The design for roll up divider curtain is based on requirements indicated below and as manufactured by Gared.

   1. Items by other listed manufacturers in section A must be similar in appearance, design, and quality, in order to be accepted.

2. Requests for substitutions by manufacturers other than those listed in section A shall be submitted for approval prior to Bid, in accordance with the requirements in the Instructions To Bidders.
3. Furnish all items related to this product from one manufacturer as much as possible.

C. The contractor is responsible for coordinating structural building systems.

D. Refer to the Drawings for roll-up divider curtain locations and counts.

E. Product Requirements:
1. Description: Structure supported, electric hoist, divider curtain.
2. Superstructure: Supported from roof by directly attaching to the underside of the roof structural by means of Unistrut or structural tubing supplied with the curtain.
3. Finish of structural components: Power Coated
4. Curtain: Class A, 22oz, mildew resistant, vinyl with welded seams up to 10'. Nylon mesh above 16' A.F.F.
5. Drive Shaft: 2-3/8" O.D. drive shaft supported at 14'-0" o.c.
6. Operation: Raised using 4" polyester belts.
7. Motor: 3/4 hp, 115 volts, single phase, 60hz with limit control switch.
8. Control: Flush mounted keyed switch to raise and lower the divider curtain.
9. Length: Refer to Drawings.
10. Color: To be selected from manufacturer's full range.
11. Logo: Provide custom logo on curtain. Size, location, and colors as indicated on drawings. Coordinate logo artwork with Architect prior to fabrication.

2.2 TRUSS AND RIGGING SYSTEMS

A. Manufacturers: Subject to compliance with requirements of the Contract Documents, Drawings, and Specifications, provide products by one of the following:

1. Applied Truss and Electronics "12"x12"x10' Lite Duty Box Item No: 7-12-120, 12"x12"x5' Lite Duty Box Item No: 7-12-060, and Corner Block Item No: 7-12-006" (Basis Of Design)
2. Approved Equal

B. Basis-of-Design Product: The design for roll up divider curtain is based on requirements indicated below and as manufactured by Applied Truss and Electronics.

1. Items by other listed manufacturers in section A must be similar in appearance, design, and quality, in order to be accepted.
2. Requests for substitutions by manufacturers other than those listed in section A shall be submitted for approval prior to Bid, in accordance with the requirements in the Instructions To Bidders.
3. Furnish all items related to this product from one manufacturer as much as possible.

C. The contractor is responsible for coordinating structural building systems.

D. Refer to the Drawings for truss locations and counts.

E. Product Requirements:
1. Supply Truss Hangars, 3/8" aircraft cabling, and suspension shackles as required for proper suspension and per drawings.
2. Provide "1-3/8" half couplers" as required for mounting of all equipment and devices indicated on drawings.
3. Highly Polished Aluminum Tubing
4. 1-3/8” OD 6061-T6 Aluminum Tube
5. 0.125” Wall Thickness
6. 1/2” Solid Aluminum Rod Bracing
7. 1-3/4” x 1/4” Aluminum End Plates
8. Connecting Hardware Included
9. Fabricated by Certified Welders
10. Custom Lengths & Corners Available
11. Powder Coating Available
12. Dimensions: 12” x 12” x 10’, 12”x12”x5’, & corner block. Reference Drawings.
13. Weight: 43lbs.
14. Color: Black.

2.3 A/V & TOURNAMENT CONTROL CENTER (MEDIA & BROADCASTER STATION)

A. Manufacturers: Subject to compliance with requirements of the Contract Documents, Drawings, and Specifications, provide products by one of the following:

1. Specutrum, Shoutcaster Station 76”W x 29”D x 36.1”H, Item No: 37419-BKBKBSN00 (Basis Of Design)
2. Approved Equal

B. Basis-of-Design Product: The design for roll up divider curtain is based on requirements indicated below and as manufactured by Spectrum.

1. Items by other listed manufacturers in section A must be similar in appearance, design, and quality, in order to be accepted.
2. Requests for substitutions by manufacturers other than those listed in section A shall be submitted for approval prior to Bid, in accordance with the requirements in the Instructions To Bidders.
3. Furnish all items related to this product from one manufacturer as much as possible.

C. The contractor is responsible for coordinating structural building systems.

D. Refer to the Drawings for A/V & Tournament Control Center locations and counts.

E. Product Requirements:
1. Worksurface Height: 30”.
   a. Worksurface constructed from 1” thick NAF (no added for formaldehyde) composite board with .030” high-pressure laminate on one face, and a balancing backer on the opposing face.
   b. Worksurface edges are covered with vinyl edgeband.

c. All metal components are finished with a scratch-resistant powder coat epoxy

2. Cord channels.
3. Twin-Wheel Casters
4. ADA Compliant
5. **Accessories:**
   a. Swivel VESA Monitor Mount - 37388
      1) Provides display monitor mounting on worksurface (most monitors up to 24" diag.)
      2) Include (3) mounts.
      3) Include mounting screws.
   b. Customized Logo Panel – Double – 37394
      1) Logo panel size: 45"W x 30"H
      2) 3mm PVC sheet
      3) Attaches and removes with hook and loop fasteners
      4) New logos require a first time logo charge (to be included in base bid).
      5) Unit weight: 2 lb, Shipping weight: 2.5 lb
   c. CPU Tray – 37389
      1) Fits CPU's up to 9.13"Wx17.72"Dx19.623"H
      2) 16ga steel
      3) Black powder coat
      4) 2 CPU trays (1 per side)
6. Colors: To be selected from manufacturer's full range.

F.

END OF SECTION 116600

SECTION 12 25 13 - MOTORIZED WINDOW ROLLER SHADES

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PART 1 GENERAL

1.1 SECTION INCLUDES

A. Roller shades, motorized operation, and accessories.
   1. Intelligent encoded electronic drive system
   2. Motor controls, interfaces, and accessories.

B. Shade fabric.

1.2 RELATED SECTIONS

A. Section 06 10 00 - Rough Carpentry.

B. Section 09 21 16.33 - Gypsum Board Area Separation Wall Assemblies.

C. Section 09 51 23 - Acoustical Tile Ceilings.

D. Division 16 - Electrical: Electric service for motor controls. Electrical and low voltage requirements, internal communication, data transfer, and connection to the Internet and local PoE switches as required.

1.3 REFERENCES

A. ASTM International (ASTM):
   1. ASTM G21 and E2180 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.

B. Cradle to Cradle Products Innovation Institute (C2C):
   1. C2C (DIR) - C2C Certified Products Registry.

C. National Fire Protection Association (NFPA):
   1. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
   2. NFPA 701 - Standard Methods of Fire Tests for Flame Propagation of Textiles and Films.

D. Underwriters Laboratories (UL):
   1. UL (GGG) - GREENGUARD Gold Certified Products; Current Edition.
   2. UL 325 - Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems; Current Edition, Including All Revisions.

E. Window Covering Manufacturers Association (WCMA):
   1. WCMA A100.1 - Safety of Window Covering Products; 2018.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Where motorized shades are to be controlled by control systems provided under other sections, coordinate the work with other trades to provide compatible products.
   2. Coordinate the work with other trades to provide rough-in of electrical wiring as required for installation of hardwired motorized shades.

B. Preinstallation Meeting: One week prior to commencing work related to this section. Require attendance of all affected installers.

C. Sequencing:
   1. Do not fabricate shades until field dimensions for each opening have been taken with finished conditions in place. "Hold to" dimensions are not acceptable.
   2. Do not install shades until final surface finishes and painting are complete.

1.5 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Bid Submittal: Information Required with Submittal of Bid: In order to evaluate proposals for integrated lighting control and window shade systems, the Architect requires the following information be submitted prior to the award of the system.
   1. Bid proposal shall be accompanied with a document that notes all deviations from these specifications on a line-by-line basis.
   2. If using PoE motors, bid shall confirm that PoE motor roller shade and all related controls shall be integrated into a compatible control system as specified herein.
   3. If integrating into BAS/BMS system, bid shall include separate line items listing the control/interface components required for building automation systems and building management systems (BAS/BMS), daylighting, audiovisual, and/or central integration systems. Roller shade controls manufacturer shall list all components included in their bid and shall include a letter stating that they shall be financially responsible for any change orders and/or back charges required by the BAS/BMS, audiovisual, or lighting control systems contractors to interface with the motorized roller shade system.

C. Product Data: Manufacturer's catalog pages and data sheets for products specified including materials, finishes, dimensions, profiles, mountings, and accessories.
   1. Preparation instructions and recommendations.
   2. Styles, material descriptions, dimensions of individual components, profiles, features, finishes , accessories, and operating instructions.
   3. Storage and handling requirements and recommendations.
   4. Mounting details and installation methods.
   5. Manufacturer's Instructions: Include storage, handling, protection, examination, preparation, and installation.
   6. Project Record Documents: Record actual locations of control system components and show interconnecting wiring.
   7. Operation and Maintenance Data: Component list with part numbers, and operation and maintenance instructions.
   8. Motorized Shades: Power requirements. Typical wiring diagrams including integration of EDU controllers with building management system, audiovisual

and lighting control systems as applicable.

a. If using PoE motors, include integration of PoE motor hubs, shade motors, wall controllers, software programming, ability to integrate with building management system, audiovisual and lighting control systems as applicable.

D. Shop Drawings: Plans, elevations, sections, product details, installation details, operational clearances, wiring diagrams and relationship to adjacent work.
1. Prepare shop drawings on AutoCad or MicroStation format using base sheets provided electronically by the Architect.
2. Prepare control wiring diagrams based on zones, switching and operational requirements provided by the Architect in electronic format.
3. Include one-line diagrams, wire counts, coverage patterns, and physical dimensions of each item.
4. Provide location plan showing all motor locations, switch locations and control zones as per the performance requirements of the specifications. All switches, sensors and other control accessories must clearly be shown and called out in a bill of materials.
5. Provide elevation drawings showing shade band layout. Indicate any necessary seam or batten locations and align with horizontal mullions where possible.

E. Window Treatment Schedule: For all roller shades. Use same room designations as indicated on the Drawings and include opening sizes and key to typical mounting details.

F. Verification Samples: For each finish product specified, one complete set of shade components, unassembled, demonstrating compliance with specified requirements.
1. Shadecloth Sample: Mark face of material to indicate interior faces.
a. Test reports indicating compliance with specified fabric properties.
b. Verification Samples: 6 inches (150 mm) square, representing actual materials, color, and pattern.

G. Maintenance Data: Bill of materials for all components with part numbers. Methods for maintaining roller shades, precautions regarding cleaning materials and methods, instructions for operating hardware and controls.

H. Warranty: Provide manufacturer's warranty documents as specified in this Section.

1.6 QUALITY ASSURANCE

A. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

B. Manufacturer Qualifications: Obtain roller shades system through one source from a single manufacturer with a minimum of ten years' experience and minimum of five projects of similar scope and size in manufacturing products comparable to those specified in this section.

C. Installer for Roller Shade System - Qualifications: Installer trained and certified by the manufacturer with a minimum of ten years' experience in installing products

comparable to those specified in this section.

1. Requirements for Roller Shade Installer/Contractor:
    a. Roller Shade Hardware, shade fabric, motor, and all related controls shall be furnished and installed as a complete two-way communicating system and assembly.
    b. Roller Shade Installer/Contractor shall list all components and systems included in their bid, including but not limited to, the prime manufacturer of the motor control and automated equipment and shall be financially responsible for any change orders and/or back charges required by the BMS, AV, or Lighting Control Systems contractors to interface with the automatic solar tracking system and the motorized roller shade system.
    c. If using PoE motors, installer for roller shade system shall be trained and certified by all manufacturers involved including IP gateway, PoE motor hu bs, COAP protocol wall controllers, EnOcean enabled keypads and sensors, UPoE+ switch and be capable of complete deployment of controls, software and hardware.

D. Product Listing Organization Qualifications: Organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

E. Fire-Test-Response Characteristics: Passes NFPA 701 small and large-scale vertical burn. Materials tested shall be identical to products proposed for use.

F. Electrical Components: NFPA Article 100 listed and labeled by either UL or ETL or other testing agency acceptable to authorities having jurisdiction, marked for intended use, and tested as a system. Individual testing of components will not be acceptable in lieu of system testing.

G. Requirements for Electronic Hardware, Controls, and Switches: Roller shade hardware, shade fabric, EDU, (Electronic Drive Unit), and all related controls shall be furnished and installed as a complete two-way communicating system and assembly.
    1. If using PoE motors, roller shade hardware, shade fabric, PoE motor hub, DC shade motor, software and all related controls shall be furnished and installed as a complete two-way communicating system and assembly.

H. ShadeCloth Anti-Microbial Characteristics: 'No Growth' per ASTM G21 results for fungi ATCC9642, ATCC9644, ATCC9645 And ASTM E2180.

I. ShadeCloth Cleanability and Disinfecting: Must meet cleanability and disinfecting requirements via 3rd party testing to comply with BIFMA HCF 8.1-2014 standards using chemical solutions compliant with EPA guidelines for use against COVID-19.

J. Turn-Key Single-Source Responsibility for Wiring Motorized Interior Roller Shades: To control the responsibility for performance of motorized roller shade systems, assign the design, engineering, and installation of motorized roller shade systems, motors, controls, and low voltage electrical control wiring specified in this Section to a single manufacturer and their authorized installer/dealer. The Architect will not produce a set of electrical drawings for the installation of control wiring for the motors, or motor controllers of the motorized roller shades. Power wiring (line voltage), shall be

provided by the general contractor ("GC"), not roller shade installer/dealer (Window Coverings Subcontractor or "WC"), in accordance with the requirements provided by the manufacturer. Coordinate the following with the roller shade installer/dealer:

1. GC shall provide power panels and circuits of sufficient size to accommodate roller shade manufacturer's requirements, as indicated on the mechanical and electrical drawings.
2. GC shall coordinate with requirements of WC, before inaccessible areas are constructed.
3. GC shall run line voltage as dedicated home runs (of sufficient quantity, in sufficient capacity as required) terminating in junction boxes in locations designated by WC.
4. GC shall provide and run all line voltage (from the terminating points) to the motor controllers WC shall wire all roller shade motors to the motor controllers, and provide and run low voltage control wiring from motor controllers to switch/ control locations designated by the Architect. All above-ceiling and concealed wiring shall be plenumrated, or installed in conduit (provided by Electrical Subcontractor), as required by the electrical code having jurisdiction.
5. GC shall provide conduit with pull wire in all areas, which might not be accessible to roller shade contractor due to building design, equipment location or schedule.
6. GC shall provide wiring and labor cost difference between power requirements for AC and DC motor options in overall cost comparison of AC and DC motorized shades.

1.7 MOCK-UP

A. Provide a mock-up of one roller shade assembly for evaluation of mounting, appearance, and accessories.
   1. Locate mock-up in window designated by Architect.
   2. Mockup Size: Full size.
   3. Mockup Size(WxH): 3 x 3 feet (0.94 x 0.94 m) minimum.
   4. Intent of mock-up is to demonstrate quality of workmanship and visual appearance.
   5. If mock-up is not acceptable, rebuild mock-up until satisfactory results are achieved.
   6. Do not proceed with remaining work until, mock-up is accepted by Architect.
   7. Retain mock-up during construction as a standard for comparison with completed work.
   8. Do not alter or remove mock-up until work is completed or removal is authorized.
   9. Full-sized mock-up may become part of the final installation.
   10. Full-sized mock-up will become the property of the Owner to be used for spare parts.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver in factory-labeled packages, marked with manufacturer and product name, fire-test-response characteristics, and location of installation using same room designations indicated on Drawings and in Window Treatment Schedule.

B. Store and handle products per manufacturer's recommendations.

1.9 PROJECT CONDITIONS

A. Environmental Limitations: Install roller shades after finish work including painting is complete and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

B. Power and control wiring shall be complete and certified, fully operational with uninterrupted communication on the lines and minimal noise certified by a commissioning agent specified in other sections.
   1. 485, ICON, Lonmark and Dry Contract Network: Noise on the line not to exceed shade manufacturer's limits.

1.10 WARRANTY

A. Roller Shade Hardware and Chain Warranty: Manufacturer's standard non-depreciating warranty for interior shading.
   1. Standard Shadecloth: Manufacturer's standard 25 year warranty.
   2. Roller Shade Motors, Motor Control Systems, and Accessories: Manufacturer's standard non-depreciating 10-year warranty for AC motors and controls and 10-year warranty for DC motors, power panels and controls. Roller shade low voltage PoE motor and associated wall controller, IDF, plenum located PoE hubs and associated control systems must have manufacturer's minimum, non-depreciating 10-year warranty. Somfy motors and controls standard 5-year warranty. NuLEDs SpiceBox, keypads, sensors and associated lighting products standard 5-year warranty.
   3. Roller Shade Installation: One year from date of Substantial Completion, not including scaffolding, lifts, or other means to reach inaccessible areas, which are deemed owners responsibility.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer for Window Shade Control System as basis of design, performance and warranty:Mecho, which is located at:
   42-03 35th St.
   Long Island City, NY 11101
   Tel: 718-729-2020
   Fax: 718-729-2941
   Email: dwilhelmus@springswf.com Web:http://www.mechoshade.com

B. Or Approved Equal.

2.2 APPLICATIONS/SCOPE

A. Roller Shade Schedule:
   1. Shade Type 1: Motor operating sunscreen single roller shades and related motor control systems, mounting systems and accessories as indicated on drawings.
   2. Shade Type 2: Motor operating room darkening opaque single roller shades and related motor control systems, mounting systems and accessories as indicated on drawings.

3. Shade Type 3: Motor operating sunscreen roller and room darkening opaque double roller shades and related motor control systems, mounting systems and accessories as indicated on drawings.
4. Shade Type 4: Motor operating, door-mounted sunscreen roller shades and related mounting systems and accessories at all door locations as indicated on drawings. Door-mounted shades and associated wiring must clear panic hardware and meet all local fire egress and electrical codes.
5. Shade Type 5: PoE motor operating room darkening opaque single roller shades and related motor control systems, mounting systems and accessories as indicated on drawings. Shades shall have capability of being controlled by IP via PoE, COAP protocol from wall controller.
6. Shade Type 6: PoE motor operating sunscreen roller and room darkening opaque double roller shades and related motor control systems, mounting systems and accessories as indicated on drawings. Shades shall have capability AV and, or lighting control system, or being controlled by IP via PoE, COAP protocol from wall controller.
7. Shade Type 7: Motor operating skylight shades and related motor control systems, mounting systems and accessories as indicated on drawings. Install location to be coordinated to meet local fire safety code for sprinkler quantities and locations.
8. Shade Type 8: Motor operating Magnashades and related motor control systems, mounting systems and accessories as indicated on drawings.
9. Shade Type 9: C-Channel Fixed or Fixed Frame sunscreen with room darkening opaque or sunscreen shade cloth, and related frame or channel mounting systems and accessories as indicated on drawings.
10. Shade Type 1 O: Custom printed motor operating sunscreen or opaque roller shades and related motor control systems, mounting systems and accessories as indicated on drawings.
11. ADA Compliance: All spaces requiring full ADA compliance to be motorized with an accessible wall switch.

2.3 ROLLER SHADES, MOTORIZED OPERATION AND ACCESSORIES

A. Shade System; General:
   1. Motorized Shades: Comply with NFPA 70.
   2. Components capable of being removed or adjusted without removing mounted shade brackets, cassette support channel.
   3. Operates smoothly when raising or lowering shades.
   4. Cradle-to-Cradle certified and listed in C2C (DIR).
   5. Electrical Components: Listed, classified, and labeled as suitable for intended purpose. Test as total system. Individual component testing is acceptable.
      a. Components: FCC compliant where applicable.

B. Basis of Design: ElectroShade with WhisperShade IQ2 EDU. As manufactured by MechoShade Systems LLC. Motor operated fabric window shade system complete with mounting brackets, roller tubes, hembars, hardware, and accessories.
   1. Voltage: 120 VAC
   2. Description: Single roller.
   3. Drop Position: Regular roll.

4. Mounting: _____.
5. Fabric: As indicated under Shade Fabric article.
6. Brackets and Mounting Hardware: As recommended by manufacturer for mounting indicated and to accommodate shade fabric roll-up size and weight.
    a. Material: Provide shade hardware constructed of minimum 1/8-inch (3.18 mm) thick plated steel, or heavier, thicker, as required to support 150 percent of the full weight of each shade. Plastic components without use of steel angle construction do not meet the intent of this specification and shall not be accepted. Styrene based plastics, and/or polyester, or reinforced polyester shall not be accepted.
    b. Provide shade hardware system that allows for field adjustment of motor or replacement of any operable hardware component without requiring removal of brackets, regardless of mounting position (inside, or outside mount).
    c. Provide shade hardware system that allows for operation of multiple shade bands offset by a maximum of 8-45 degrees from motor axis between shade bands (4-22.5 degrees) on each side of the radial line, by a single shade motor (multi-banded shade, subject to manufacturer's design criteria).
    d. All bands within a single motor group shall be aligned within 1/4 inch (6 mm).
    e. Multiple Shade Operation: Provide hardware as necessary to operate more than one shade using a single motor.
7. Roller Tubes:
    a. Material: Extruded aluminum.
    b. Size: As recommended by manufacturer; selected for suitability for installation conditions, span, and weight of shades.
    c. Fabric Attachment: Utilize extruded channel in tube to accept vinyl spline welded to fabric edge. Shade band to be removable and replaceable without removing roller tube from brackets or inserting spline from the side of the roller tube.
8. Hembars: Designed to maintain bottom of shade straight and flat.
    a. Style: Full wrap fabric covered bottom bar, flat profile with heat sealed closed ends.
    b. Room-Darkening Shades: Provide a slot in bottom bar with wool-pile light seal.

2.4 INTELLIGENT ENCODED ELECTRONIC DRIVE SYSTEM

A. Electronic Drive Unit (EDU) System General Requirements:
    1. A UL 325 listed solution.
        a. Component certification in lieu of system testing is not acceptable.
    2. Listing Label and Motor Rating: To be visible for inspection without dismounting of shade assembly to remove motor or EDU from shade roller tube.
    3. Size and Configuration: As recommended by manufacturer for type, size, and arrangement of shades.
    4. Conceal EDU inside shade roller tube.
    5. EDU Rated Speed: The same nominal speed for shades in the same room.
    6. Hanging Weight of Shade Band: 80 percent of rated lifting capacity of shade EDU

and tube assembly.

7. Capable of upgrading firmware from anywhere on network without touching the motor.

B. Line Voltage EDU (120 VAC):
   1. Basis of Design: MechoShade Systems LLC; WhisperShade IQ2 System. Tubular, asynchronous, integral AC motor and reversible capacitor. 120 VAC, single phase, 60 Hz; temperature Class B, thermally-protected, totally enclosed, maintenance-free. Powered by line voltage power supply connection equipped with locking disconnect plug assembly furnished with EDU.
   2. Audible Noise: 46 dBA measured 3 ft (914 mm) from motor unit, depending on motor torque.
   3. Nominal Speed: 34 RPM. Not to vary due to load/lift capacity.
   4. Isolated, low voltage power supply for powering external accessories connected to either the dry contact or network port.
      a. Products requiring accessories to be powered by a plug-in or externally-supplied power supply are not acceptable.

C. Modes of Operation:
   1. Uniform Mode: Shades move to defined intermediate stop positions in order to maintain aesthetic uniformity.
   2. Normal Mode: Shades move to defined intermediate stop positions and any position between defined upper and lower limits.
   3. Maintenance Mode: Prevents shade from moving via dry contact or network control commands mode has been cleared/disabled.

D. Control Methods: Local isolated dry contact input and network control.
   1. Local Isolated Dry Contact Inputs:
      a. Local switch control, third party system integration without separate interface.
      b. Moving EDU/shade to upper and lower limits and local switch preset positions.
      c. Configuration of upper and lower limits, custom presets, and key modes of operation without a PC or microprocessor-based tools.
      d. Configuration under protected sequences to prevent changes by casual user.
      e. Switch Personalities: Configuration of dry contact control port over network such that any type of dry contact keypad/third-party interface and actuation methodology (maintained and/or momentary actuation) can be used to operate shade.
      f. Dry Contact Control Connection Options to Include:
         1) Three-button. Able to support configuring limits, presets, and key operating modes (default).
   2. Network Control:
      a. Bi-directional network communication to enable commanding operation of large groups of shades over a common backbone.
      b. Each EDU:
         1) Support eight network addresses capable of being employed for various levels of group control.

2) Dry Contact Ports: Assigned its own local switch address which can be matched by other EDUs within eight network addresses in order to support group control when dry contact commands are received.
   a) The EDU receiving dry contact commands may or may not be configured to operate based on commands coming through its own dry contact input port.
3) To have an independent unique identifier address (UID) enabling EDU to be independently controlled and configured over network via handheld configurator and/or PC controller.

c. Network Communication Card: Integral with tubular EDU assembly.
d. Support configuration of upper and lower limits using either a handheld removable program module/configurator or a local switch.
e. Support configuration of addresses using a handheld removable program module/configurator.

E. Alignment Positions:
1. Repeatable and precisely aligned shade positions and limits.
   a. Support positioning commands from 0 to 100 percent in 1 percent increments.
   b. Customizable Presets: 32.
   c. Include three intermediate dry contact presets
2. Shades on same switch circuit or same network group address with same opening height, to align at each intermediate stopping position when traveling from any position, up or down.
3. Shades of differing heights: Capable of custom, aligned intermediate stop positions when traveling from any position, up or down.
4. Alignment of shade bands mechanically aligned on same EDU: Plus or minus 0.125 inch (3 mm).
5. Alignment of standard shades on adjacent EDUs: Plus or minus 0.25 inch (6 mm) when commanded to same alignment position.

F. Local Switch Presets:
1. Minimum of three customizable preset positions accessible over the local dry contact control inputs or over the network connection.
2. Preset positions: Customizable to any position between and including defined upper and lower limits (initially defaults to 25, 50, and 75 percent of shade travel).
3. Configuration of Custom Preset Positions: A handheld removable program module/configurator or a local switch.

G. Network Presets:
1. Minimum of 32 customizable preset positions (including the three local switch presets) accessible via network commands.
2. Preset positions: Customizable to any position between and including defined upper and lower limits (initially defaults to defined lower limit).
3. Configuration of Custom Preset Positions: A handheld removable program module/configurator or a local switch.

2.5 MOTOR CONTROLS, INTERFACES, AND ACCESSORIES

A. Unless indicated to be excluded, provide required equipment as necessary for a complete operating system providing the control intent specified. Provide components and connections necessary to interface with other systems as indicated.

B. Low-Voltage Wall Controls; IQ Switch:
   1. Momentary dry contact switch enables manual local control or network control of any individual shade motor or shade group/sub-group on MechoNet network.
   2. Control Functions:
      a. Open: Automatically open controlled shades to fully open position when button is pressed.
      b. Close: Automatically close controlled shades to fully closed position when button is pressed.
      c. Presets: For selection of predetermined shade positions.
      d. Dual Stations: For individual control of two shades/groups.
   3. Finish: White.

2.6 ROLLER SHADE FABRICATION

A. Field measure finished openings prior to ordering or fabrication.

B. Openings Requiring Continuous Multiple Shade Units with Separate Rollers: Locate roller joints at window mullion centers; butt rollers end-to-end.

2.7 SHADE FABRIC

A. Basis of Design: Shade fabric as manufactured by MechoShade Systems LLC.
   1. Solar Shadecloths:
      a. Fabric: ThermoVeil Basket Weave: 1500 series. 3 percent open 2 by 2 dense basket-weave pattern, also 126 inches (3200 mm) wide.
         1) NRG Rating: 0.25.
         2) SAA Rating: 0.28.
         3) Low-Emitting Material Certification: Greenguard Gold certified and listed in UL (GGG).
         4) Health Product Declaration (HPD): Published declaration with full disclosure of known hazards.
         5) Environmental Product Declaration (EPD): Published disclosure of product's environmental impacts based on a full Life Cycle Assessment (LCA). Manufacturer must have EPD certification by independent 3rd party evaluation service.
      b. Color: Selected from manufacturer's standard colors.
   2. Performance Requirements:
      a. Flammability per NFPA 701: Pass. Large or small scale test.
      b. Fungal Resistance: No growth when tested per ASTM G21.
      c. Cleanability and Disinfecting: ShadeCloth must meet cleanability and disinfecting requirements via 3rd party testing to comply with BIFMA HCF 8.1-2014 standards using chemical solutions compliant with EPA guidelines for use against COVID-19.
   3. Fabrication:
      a. Fabric Orientation: Railroaded, fabric is turned 90 degrees off the roll.
      b. Battens: Manufacturer's standard material, full width of shade, and

enclosed in welded shade fabric pocket; locate as indicated on drawings.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

C. Start of installation shall be considered acceptance of substrates.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using methods recommended by manufacturer for achieving best result for substrate under the project conditions.

C. Coordinate with window installation and placement of concealed blocking to support shades.

3.3 SYSTEM STARTUP

A. Motorized Shade System: Provide services of a manufacturer's authorized representative to perform system startup.

B. Turn-Key Single-Source Responsibility for Motorized Interior Roller Shades: Design, engineering, and installation of motorized roller shade systems, motors, controls, and low voltage electrical control wiring specified is to be performed by a single manufacturer and their authorized installer/dealer.
   1. The Architect will not provide a set of electrical drawings for installation of control wiring for motors, or motor controllers of motorized roller shades.
   2. General Contractor (GC) To Provide the Following:
      a. Power Panels and Circuits: Size to accommodate roller shade manufacturer's requirements, as indicated on mechanical and electrical drawings.
      b. Coordinate with requirements of roller shade installer/dealer before inaccessible areas are constructed.
      c. Line voltage as dedicated home runs, of sufficient quantity, and capacity as required. Terminate in junction boxes at locations designated by roller shade installer/dealer.
      d. Run line voltage from terminating points to motor controllers. Wire roller shade motors to motor controllers.
         1) Above-ceiling and concealed wiring to be plenum-rated, or in conduit, as required by the electrical code having jurisdiction.
      e. Use conduit with pull wire in areas, not accessible to roller shade contractor due to building design, equipment location or schedule.
      f. Verify that wiring conditions, which have been previously installed under other sections or at a previous time, are acceptable for product installation

in accordance with manufacturer's instructions.

g. Comply with manufacturer's current product data, including shop drawings, technical bulletins, product catalog installation instructions, and product carton instructions for installation.

h. Protect installed product and finished surfaces from damage during all phases of installation including preparation, testing, and cleanup.

i. Be responsible for all other required electrical work including but not limited to roof penetrations, conduits, fireproofing, etc.

j. Provide conduit with pull wire in all areas, which might not be accessible to subcontractor due to building design, equipment location or schedule.

3. Window Covering Subcontractor (WC) responsibilities:

a. Shade Control Subcontractor shall furnish, install and fully program shade controllers, interfaces, splitters, coupler, sensors, switches, etc. mounted on the wall, in the ceiling, in shade pocket, etc.. Locations for all visible devices to be coordinated with Architect. The shade control subcontractor shall inspect all material included in this contract prior to installation. Manufacturer shall be notified of unacceptable material prior to installation.

b. Run low voltage control wiring from motor controllers to switch/control locations designated by Architect.

1) Above-ceiling and concealed wiring to be plenum-rated, or in conduit, as required by the electrical code having jurisdiction.

C. Integration with Third Party Systems:

1. Main contractor shall coordinate and provide for others to furnish, install or program any interfaces or wiring to integrate 3rd party systems to the roller shade control system as specified herein. Integration to shade control network can be accomplished locally through IP via UPoE switch with minimum of 60w output per port.

3.4 INSTALLATION

A. Contractor Furnish and Install Responsibilities:

1. Window Covering Contractor (WC) shall provide an on site, Project Manager, and shall be present for all related jobsite scheduling meeting.

2. WC shall supervise the roller shade installation, and setting of intermediate stops of all shades to assure the alignment of the shade bands within a single EDU group, which shall not exceed+/- 0.125 inches (3.175mm), and to assure the alignment between shade groups, which shall not exceed +/- 0.25" inches (6.35mm).

3. WC shall be responsible for field inspection on an area-by- area and floor-by-floor basis during construction to confirm proper mounting conditions per approved shop drawings.

4. Verification of Conditions: examine the areas to receive the work and the conditions under which the work would be performed and notify General Contractor and Owner of conditions detrimental to the proper and timely completion of the work. Do not proceed until unsatisfactory conditions have been corrected. Commencement of installation shall constitute acceptance of substrate conditions by the installer.

5. WC shall provide accurate to 0.0625 inch (1.5875 mm); field measurements for custom shade fabrication on the Roller Shades manufacturers input forms.
6. WC Installer shall install roller shades level, plumb, square, and true according to manufacturer's written instructions, and as specified here in. Blocking for roller shades furnished and installed under the contract of the interior General Contractor shall be installed plumb, level, and fitted to window mullion as per interior architect's design documents and in accordance with industry standard tolerances. The horizontal surface of the shade pocket shall not be out-of-level more than 0.625 inches (15.875 mm) over 20 linear feet (6.096 meters).
7. Shades shall be located so the shade band is not closer than 2 inches (50 mm) to the interior face of the glass. Allow proper clearances for window operation hardware.
8. Adjust, align and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.
9. Installer shall set Upper, Lower and up to 3 intermediate stop positions of all motorized shade bands, and assure alignment in accordance with the above requirements.
10. WC shall certify the operation of all motorized shades and turn over each floor for preliminary acceptance.
11. The WC shall participate and cooperate with the electrical, low voltage and commissioning agent to verify and certify the installation is in full conformance with the specifications and is fully operational. This work to occur during the commissioning stage and is in addition to preliminary acceptance required for each floor.
12. Clean roller shade surfaces after installation, according to manufacturer's written instructions.
13. WC shall train Owner's maintenance personnel to adjust, operate and maintain roller shade systems.
    a. Use operation and maintenance manual as a reference, supplemented with additional training materials as required.

3.5 PROTECTION AND CLEANING

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.
1. Clean soiled shades and exposed components as recommended by manufacturer.
2. Replace shades that cannot be cleaned to "like new" condition.

3.6 MAINTENANCE

A. Provide Owner a proposal as an alternate to the base bid and at no extra cost, a separate renewable maintenance contract for service and maintenance of motorized shade system.
1. Include a complete description of preventive maintenance, systematic examination, adjustment, parts and labor, cleaning, and testing, with a detailed schedule.
    a. Contract Duration: One year from date of Substantial Completion.
    b. Contract Duration: Two year from date of Substantial Completion.
    c. Contract Duration: _____ from date of Substantial Completion.

B. Automated Solar-Tracking Control Systems: Provide Owner a proposal as an alternate to the base bid and at no extra cost, a separate renewable software maintenance contract.
    a. Contract Duration: One year from date of Substantial Completion.
    b. Contract Duration: Two year from date of Substantial Completion.
    c. Contract Duration: _____ from date of Substantial Completion.

END OF SECTION

SECTION 12 60 00 – TELESCOPIC BLEACHERS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope

1. Seating systems comprised of multi-tiered rows of seats, deck components and risers on interconnected, retractable, supporting structure. Telescopic seating operation shall be by means of electric operation. Telescopic seating system shall be wall attached.

B. Manufacturer's Design Criteria

1. Gymnasium seat assembly is designed to support, in addition to its own weight, a live load in excess of 120 lbs. per linear foot or 100 lbs. per square foot (whichever affect is greater), front to rear sway in excess of 10 lbs. per linear foot and a parallel sway load in excess of 24 lbs. per linear foot of row.
2. Guard railings are engineered to withstand a load of 200 lbs. per foot at top rail and an intermediate load of 150 lbs. per foot.
3. Steel structure must be free standing when installed and include 4 steel columns per row, per section. Those manufacturers which only include 2 columns per row, per section are not acceptable.
4. Steel columns must be fabricated from structural high tensile steel tubing; minimum size of tubing will be 1 ½'' x 3'' x 10 ga. Those manufacturers providing formed steel or angle iron columns in place of structural tubing are not acceptable. Maximum spacing between columns shall be 11'-6".
5. Last Row columns shall be no more than 40" from end of bleacher decking, nosing and riser.
6. Two row locks per row, per bleacher section manufactured from ¼'' hot rolled steel to prevent racking of bleachers as they are retracting are required.
7. Footboards shall be produced from ¾'' plywood with top facing. Voids or boat patching on top facing is not acceptable. Top facing shall by Panelam Decking on ¾" plywood.
8. Aluminum trim shall be installed on all exposed edges. Extruded aluminum joiners shall be placed between adjacent footboards.
9. Molded seats shall be <u>one-piece</u>, 18" wide of high density polyethylene structural foam with full perimeter interlock and concealed mounting hardware. End caps shall be provided at all ends, aisle ways and ADA locations. Colors are bright without excessive streaking. "Waterfall" coloring will not be acceptable. Indents for numbers and letters shall be standard.
10. No less than 4" diameter x 1 ¼" soft faced, non marking rubber wheels to support understructure system shall be provided with sintered metal bearings and clips for easy replacement.

11. Nose beam shall be formed from 14 ga. minimum galvanized steel. Steel shall have G90 galvanized coating or better. These will encapsulate ¾" plywood decks.
12. Rear riser shall be formed from 14 ga. minimum galvanized steel. Steel shall have G90 galvanized coating or better.
13. Handicap seating provisions: Provide recoverable first tier cutouts as required by ADA. Include manufacturer's standard front guardrail and closure panel below. Shop drawings will reflect locations.

1.2 QUALITY ASSURANCE

A. Acceptable Manufacturer

1. The manufacturer shall be a firm experienced in the manufacturing of telescoping bleacher seating systems.
2. The telescopic seating system specified herein shall comply with the International Building Code 2006 Edition, NFPA 102 Standard for Grandstands, Folding and Telescopic Seating, Tents, and Membrane Structures 2006 Edition; and specifically with Chapter 5, Folding and Telescopic Seating, except where additional requirements are indicated or imposed by authorities having such jurisdiction.
3. The telescopic seating system manufacturer shall employ a registered, professional engineer to certify that equipment to be supplied meets and/or exceeds the design criteria of these specifications.
4. The telescopic seating system manufacturer shall have all welding done in a CWB/AWB certified shop.

B. Acceptable Installer

1. Installers to be recognized, trained, and certified by the telescoping bleacher seating manufacturer.

1.3 SUBMITTALS

A. Submit each of the following:

1. Manufacturer's shop drawings
2. Manufacturer's standard 1 year warranty and limited 5 year warranty.
3. Manufacturer's Operation and Maintenance instructions

B. Submit seating and deck samples, as required.

1.4 WARRANTY

A. Submit manufacturers standard warranty form for Telescopic seating systems.

1. The manufacturer shall guarantee all work performed under these specifications to be free from defects for a period of one (1) full year.

2. Replacement structural steel components, nuts, bolts, axles, and wheels as necessary to maintain the integrity of the original installation, will be provided at no charge for a period of five (5) years.
3. The guarantee shall be limited to the fair use of the Telescopic Seating System and shall not include acts of vandalism, fire, flood or other situations that do not fall into the general use requirements of the bleachers.
4. A yearly inspection and required maintenance must be performed to maintain the extended 5 year warranty.

PART 2 PRODUCTS

2.1 Manufacturers:

1. Sheridan Gymnasium Equipment Limited. (Basis of Design)
2. Hussey Seating.
3. Irwin
4. Approved Equal.

2.2 Telescopic Bleachers:

1. Model: Sheridan Rally Bleacher System (Motorized) (Basis of Design)
2. Aisle Type: Foot level Aisles with center aisle railings with curved top rail terminations.
3. End rails: Typically, self-storing ready rails.
4. Operation: Integrally powered friction electric operation.
5. Product Requirements:
   a. System to be wall attached.
   b. Total Length shall be as required by drawings.
   c. Total number of Rows shall be as required by drawings.
   d. Row rise: 10”
   e. Row spacing: 24”
6. Accessories:
   a. Handicap seating provisions: Provide first tier handicap cutouts to comply with American Disabilities Act (ADA). All handicap cutouts shall have required railings. Center cutouts will be recoverable.
   b. End railings shall be designed to withstand the following horizontal forces applied separately:
      - A concentrated load of 200 lb applied at any point and in any direction along the top railing member
      - A uniform load of 50lb/ft applied vertically downward at the top of the guardrail

      Rails shall be permanently mounted to the bleachers and automatically extend and stack with the bleachers when the bleachers are operated. The

top rail shall have a design angle of 78 degrees outward from vertical to allow the end rail system to automatically extend and stack with bleachers.

Intermediate self-storing end railings shall be 51 inches high when mounted to the deck board. Rail mount should be one-piece which will sandwich the deck board. The rail shall be 36 inches high when measured vertically from center of seat or seat board surface. The end rail shall be 20 inches wide. The vertical members of the guardrail shall be made from one inch square, 14-gauge tubular steel with mandrel formed radius edges. The stiffener bracket shall be of formed steel to withstand the required impact loads and the steel tubes shall be welded with full perimeter fillet welds on all four sides.

Each end rail shall be reinforced by a stiffener bracket clamped to the rail at seat board level and attached to the bleacher seat board with three (3) 2 - 1/4" elevator bolts. The bracket shall be 1/8" thick by 1" wide with a saddle clamp welded to one end to clamp a vertical structural member. The clamp shall be fastened to the vertical member with two 1/4" hex head bolts. All attaching hardware shall be zinc plated.

Top row end rails shall attach to the last intermediate end rail with two clamps on the adjoining vertical members and a stiffener bracket clamped to the rail at seat board level and attached to the bleacher seat board with three(3) 2 - 1/4" elevator bolts. The top row rail shall be 9 inches wide. The vertical members of the guardrail shall be made from one inch square, 14-gauge tubular steel with mandrel formed radius edges.

The five vertical structural members of the end rail shall be spaced so that the vertical openings between the members shall be such as to prevent passage of a 4-inch diameter sphere. Vertical structural members shall be 14 gage tubular steel.

End rail and bracket finish shall be a specially formulated epoxy powder coated surface that is resistant to rust, scratching, peeling and abrasions. Color choice shall be recommended by the contractor and selected by the respective school principal.

End rails are to be self-storing, nesting inside each other while bleachers open/close, without any action by the operator.

c. Obstructions: Note any obstructions (columns, drainage pipes, overhead ducts, etc.) on final shop drawings.

d. Self-storing “P” aisle rails shall be permanently mounted to the bleacher by a single pedestal mount with a minimum height of 34” high with terminating mid rail. Handrails shall be attached to a socket which shall rotate 90° for easy storage in socket. Aisle handrails that are detached from the socket, removed from the mounting bracket, or designed to lay down in the socket for storage are unacceptable. Spring loaded rails sockets for storage are unacceptable. Aisle rails are to mount to bleacher in at least 2 locations, including foot/deck board and riser/nose beam. Railings, posts, and sockets designed to withstand the following horizontal forces applied separately:

- A concentrated load of 200 lb applied at any point and in any direction along the top railing member

- A uniform load of 50lb/ft applied vertically downward at the top of the guardrail

e. Rail and bracket finish shall be a specially formulated epoxy powder coated surface that is resistant to rust, scratching, peeling and abrasions. Color choice shall be recommended by the contractor and selected by the respective school principal.

f. Safety End Closures on all open ends of bleachers.

Manufactured out of 18oz. vinyl coated polyester fabric.

- High tensile strength
- Puncture resistance
- Mildew resistant
- Water proof
- Fire resistant

Attaches to back wall, and bleachers to prevent access to underside of bleachers. Color to be chosen by owner.

2.2 Fabrication

A. Understructure System

1. Structural high-tensile steel columns fabricated from minimum size 1 ½'' x 3'' x 10 gauge structural tubing.
2. Bracing: 1 ½'' square, structural tubing
3. Row Locks: Provide two per each row, per bleacher section made of ¼'' plate, hot rolled steel.
4. Wheels shall be 4'' diameter x 1 ¼'' width.
5. Maximum spacing between columns shall be 11'-6"
6. Last Row columns shall be no more than 40" from end of bleacher decking, nosing and riser.
7. Finish: Provide manufacturers black, semi-gloss, machinery enamel

B. Deck System

1. Footboards shall be ¾'' plywood with top facing. All surfaces shall be thoroughly sealed. Top facing shall be slip resistant Panelam. Aluminum trim shall be installed on exposed edges. Adjacent foot boards shall be joined by means of extruded aluminum joiner beam sized for ¾'' footboards. The use of ½" or 5/8" footboards are unacceptable.
2. Provide thru-bolt fastening through galvanized steel riser beams at locations of splices in rear riser. Front deck connection shall be provided using front steel nose beams.

C. Decking and Riser Supports

1. Decking and riser supports shall form rigid closed deck structure. Tapered deck stiffeners shall be bolted through the front and back.

D. Seat System

1. Molded Structural Foam: Provide one-piece, high density structural polyethylene foam. Scuff resistant, textured solid color with anatomically correct tops. Color(s) for the seat modules shall be determined by the Architect by providing color charts. Contrasting color effects can be created with custom colors.

E. Electrical System

1. Friction Drive System: A series of electric drives are located under the first row in sufficient quantities as located on drawings. Each tractor drive shall consist of two 12" wide x 6" diameter cylinder wheels covered with a specially formulate white 60 durometer soft-faced rubber grooved for positive grip and low wear while reducing stress on floor.
2. The tractor is operated by a minimum ¼" HP gear reduction motor built into a height adjustable steel framework and containing additional weight plates for added traction where necessary. These drives operate from one central control box and a single plug-in, hand-held, low-voltage remote pendant controller which has, in addition to an in-and-out button, a left and a right jog button used to always allow for straight and true steering (steering provided where required). The standard system operates with 3 phase, 208 volt, 60 Hz power. Optional power source can be supplied as required.

PART 3 EXECUTION

3.1 General

A. Manufacturer's representative or bleacher system installer shall demonstrate the proper method of operation of the bleacher system to the Owner and Architect upon completion of the work.

B. Telescopic Seating Subcontractor shall verify that all areas are free of impediments interfering with the installation and that substrates are acceptable to receive seating in accordance with the manufacturer's recommendations.

C. Electrical wiring within the building as required for power operation of the bleachers shall be provided by others.

3.2 Installation

A. Seating shall be installed in accordance with the manufacturer's instructions and final shop drawings. Telescopic Seating Subcontractor will install all accessories, anchors, inserts and other items for installation of seating and for permanent attachment to adjoining construction.

B. Adjustment and Cleaning: Upon completion of installation, Telescopic Seating Subcontractor shall adjust each seating assembly to operate in compliance with manufacturer's recommendations. Telescopic Seating Subcontractor shall clean installed seating on exposed or semi-exposed surfaces and touch-up all exposed finishes.

C. The manufacturer reserves the right to incorporate design changes and material substitutions as it sees fit to improve the overall product.

END OF SECTION 126000

SECTION 13 34 16 - NON-ELEVATED ANGLE-FRAME BLEACHERS (COMPONENTS)

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Angle-frame bleacher components.

1.2 SUBMITTALS

A. Product Data: Submit manufacturer's product data.

1.3 QUALITY ASSURANCE

A. Manufacturer's Qualifications:
   1. Manufacturer regularly engaged, for past 10 years, in design and manufacture of continuous, non-elevated, angle-frame bleachers of similar type to that specified.
   2. Fabricate structural steel in an AISC-certified plant; certified "STD" at time of the bid.
   3. Manufacturer listed by AISC as a certified fabricator.
   4. Certification and inspections in accordance with IBC Chapter 17.

B. Installer's Qualifications:
   1. Installer regularly engaged, for past 5 years, in installation of continuous, non-elevated, angle-frame bleachers of similar type to that specified.
   2. Employ persons trained and experienced for installation of continuous, non-elevated, angle-frame bleachers.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Delivery Requirements: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.

B. Storage and Handling Requirements:
   1. Store and handle materials in accordance with manufacturer's instructions.
   2. Keep materials in manufacturer's original, unopened containers and packaging until installation.
   3. Do not store materials directly on ground.
   4. Protect materials and finish during storage, handling, and installation to prevent damage.

PART 2 PRODUCTS

2.1 MANUFACTURER

A. ManufacturerS:
   1. National Recreation Systems (Basis of Design)
   2. Southern Bleacher

3. AASI
4. Approved Equal

2.2 BLEACHER COMPONENTS

A. Brackets: "T" Brackets (TB-S212-00-WH)

B. Plank Seats: 1-3/4 inch by 11-1/2-inch anodized aluminum board with end caps.

C. Rise and Depth Dimensions:
1. Vertical Rise per Row: 6 inches.
2. Horizontal Depth per Row: 28 inches.
3. Seat Above its Respective Tread: 17 inches.

D. Risers: Cast in place concrete.

E. Accessories: Provide fasteners, splice plates, mounting angles, endcaps as required.

2.3 MATERIALS

A. Framework:
1. Galvanized Steel:
a. ASTM A 36, ASTM A 572 Grade 50, and ASTM A 992.
b. Hot-dipped galvanized after fabrication in accordance with ASTM A 123.

B. Seat Boards: Extruded aluminum alloy 6063-T6, clear anodized 204R1, AA-M10C22A31, Class II.

C. Concrete Foundations: Reference Drawings.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine areas to receive continuous, non-elevated, angle-frame bleachers.

B. Notify Architect of conditions that would adversely affect installation or subsequent use.

C. Do not begin surface preparation or installation until unacceptable conditions are corrected.

3.2 PREPARATION

A. Install concrete foundations for continuous, non-elevated, angle-frame bleachers as specified in Section 03 30 00 and indicated on the Drawings.

3.3 INSTALLATION

A. Install continuous, non-elevated, angle-frame bleachers in accordance with manufacturer's instructions at locations indicated on the Drawings.

B. Install bleachers plumb, level, square, straight, and secure.

C. Anchor bleachers securely in place to concrete foundations.

3.4 ADJUSTING

A. Inspect completed continuous, non-elevated, angle-frame bleachers and make necessary adjustments to ensure proper installation.

B. Repair minor damages to finish in accordance with manufacturer's instructions and as approved by Architect.

C. Remove and replace with new material, damaged components that cannot be successfully repaired, as determined by Architect.

3.5 PROTECTION

A. Protect completed continuous, non-elevated, angle-frame bleachers to ensure that, except for normal weathering, bleachers will be without damage or deterioration at time of Substantial Completion.

END OF SECTION 13 34 16



SECTION 22 00 00 – PLUMBING GENERAL PROVISIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The general provisions of the Contract, including the Conditions of the Contract (General, Supplementary, and other Conditions) and Division 00 and 01 as appropriate, apply to the Work specified in this Section.

Refer to all Sections, as well as the Specifications for the other various trades and materials and be thoroughly familiar with all provisions regarding all work.

1.2 SCOPE OF WORK

A. Furnish all labor and material necessary to provide and install the complete plumbing portion of this Contract as called for herein and on accompanying drawings. Parts of the plumbing division may be bid separately or in combination, at the Contractor's option; however, it shall be the responsibility of the General Contractor to assure himself that all items covered in the Plumbing Division have been included if he chooses to accept separate bids.

B. It is the intent of this specification that all materials with temperatures below ambient conditions or conveying any fluid/gas at temperatures below 70 deg. F be insulated to completely eliminate the potential for condensation. Unless specified elsewhere in these specifications, for materials that do not require and requiring occasional access, use 2" thick closed cell rubberized insulation with re-sealable fabric joints (hook and loop type).

C. Contractor shall refer to the Architectural and Structural drawings and install equipment, piping, etc. to meet building and space requirements. No equipment shall be bid on or submitted for approval if it will not fit in the space provided.

D. It is the intention of these specifications that all plumbing systems shall be furnished complete with all necessary valves, controls, insulation, piping devices, equipment, etc. necessary to provide a satisfactory installation that is complete and in good working order.

E. Contractor shall visit the site and acquaint himself thoroughly with all existing facilities and conditions which would affect his portion of the work. Failure to do so shall not relieve the Contractor from the responsibility of installing his work to meet the conditions.

F. This Contractor shall protect the entire system and all parts thereof from injury throughout the project and up to acceptance of the work. Failure to do so shall be sufficient cause for the Architect to reject any piece of equipment.

G. Provide as work of this Division (unless clearly and specifically indicated as a requirement of the Division 26 contractor on the Division 26 drawings) the following:

1. 120V power to all fixtures, control panels, unit controllers, field devices, etc. as required.
2. Wiring of any remote start/stop switches controlling Division 22 equipment.

1.3 DEMOLITION

A. The contractor shall visit the site prior to bid to determine the extent of work required to complete the project.

B. Contractor shall coordinate demolition with owner. All equipment shall be salvaged for owner. Locate equipment as directed by owner. All equipment and materials not salvaged by the owner shall be removed from the site and discarded at the contractor's expense.

C. Contractor shall coordinate all work with general contractor and phase work as required by project.

D. All equipment piping, etc. required to be removed to accommodate the modifications shall be removed.

E. Contractor shall maintain services to existing facilities which shall remain during and after construction is complete.

F. Contractor shall coordinate any shutdown of services with the owner. It is intended that the building will remain occupied during construction. Contractor shall schedule shut down of services with the owner in order to prevent disruption of building occupancy.

G. Contractor shall be responsible for draining down of existing systems to complete demolition. All work shall be scheduled with the owner. Contractor shall also be responsible for refilling system and removing all air in order to return the systems to proper operating conditions.

H. All shutdown of services shall be done at night during a time period approved by owner. The systems shall be required to be back up and running each morning unless otherwise approved by the owner.

1.4 GROUNDS AND CHASES

A. This Contractor shall see that all required chases, grounds, holes and accessories necessary for the installation of his work are properly built in as the work progresses; otherwise, he shall bear the cost of providing them.

1.5 CUTTING AND PATCHING

A. Initial cutting and patching shall be the responsibility of the General Contractor, with the various trades being responsible for laying out and marking any and all holes required for the reception of his work. No structural beams or joists shall be cut or thimbled without first receiving the approval of the Architect. After initial surfacing has been done, any further cutting, patching and painting shall be done at this Contractor's expense.

1.6 FILL AND CHARGES FOR EQUIPMENT

A. Fill and charge with materials or chemicals all those devices or equipment as required to comply with the manufacturer's guarantee or as required for proper operation of the equipment.

1.7 BIDDING REQUIREMENTS AND RESPONSIBILITIES

A. Prime bidder is responsible for all work, of all trades and sub-contractors bidding this project. It is the prime bidder’s responsibility, prior to submitting a bid to ensure that sub-contractors coordinate all aspects of the work between trades, sub-contractors, etc. to the fullest extent possible.

B. Prime bidder shall ensure that all sub-contractors, suppliers, equipment vendors, etc., obtain all necessary and pertinent contract document information pertaining to their work prior to the
submission of a bid. Contractor shall realize that different sub-contractors may furnish equipment, accessories, devices, etc. necessary for a complete and working installation that require provision of services by another sub-contractor or trade.

C. Bidders of all or any portions of this section or division are required to review all contract documents including but not limited to Architectural drawings, Structural drawings, Mechanical drawings, Plumbing drawings, Electrical drawings, etc. to coordinate requirements and responsibilities with and through prime bidder.

D. Bidders of all or any portions of this section or division, by furnishing a bid on a portion of the prime contract are indicating that they have received all contract documents and coordinated services provided under their portion of the work

with the prime bidder; they are indicating that they have expressed any pertinent questions (which would result from a detailed, thorough review of the entire set of contract documents) to the prime bidder in accordance with Division 00 & 01 requirements, prior to bidding.

E. All timely, pertinent, questions provided in writing prior to bids, in accordance with Division 00 & 01 requirements, will be clarified, defined, or otherwise explained in a written addendum and/or addendums prior to bids, in accordance in Division 00 & 01 requirements.

F. It is not the intention of these contract documents to leave any issue relating to coordination between trades or sub-contractors vaguely defined. The intention is to define all issues, coordination matters, equipment requirements, sizes, routing, etc. to the satisfaction of the prime bidder, prior to receipt of bids.

G. Bidders of all or any portions of this section or division, by virtue of the submission of a bid to the prime bidder, are indicating that they have reviewed the entire set of contract documents with due diligence and regard for the Owner's desire for a comprehensive and complete bid proposal; that they have expressed all concerns or questions requiring clarification on matters of coordination between trades and/or sub-contractors; that they have expressed any such concerns or questions in writing in accordance with Division 00 & 01 requirements.

H. Prime bidders, by submission of a comprehensive bid on the project are indicating that the subcontractors selected in their bid have complied with all Division 00 & 01 requirements, that they have indicated in writing, prior to bidding, all questions or concerns requiring clarification and/or explanation and have documented any and all specific exclusions involving work that would generally be considered to be work of their trade. The prime bidder shall coordinate all work so that anything excluded by the bidder of all or any portions of this section or division, have been addressed prior to bids in one of the following manners:

1. The work has been confirmed, by the prime bidder, to be work of another trade or subcontractor (whose proposal is also being accepted).
2. Clarification of the matter has been made through the prime design professional via written addendum and is clearly and mutually understood by the prime bidder and the party raising the issue/question, or seeking clarification.
3. The work has been accepted as the responsibility of the prime contractor directly.

1.8 MATERIAL AND EQUIPMENT

A. The term "provide" when used in the Contract Documents shall mean “furnish and install” and includes all items necessary for the proper execution and completion of the Work.

B. Specific reference in the Specifications to any article, device, product, material, fixture, form or type of construction by name, make or catalog number, shall be interpreted as establishing a standard of quality and shall not be construed as limiting competition; and the Contractor, in such cases, may at his option use any article, device, product, material, fixture, form or type of construction which in the judgment of the Architect expressed in writing is equal to that specified.

C. Coordinate and properly relate all Work of this Division to building structure and work of all other trades.

D. Visit premises and become thoroughly familiar with existing conditions; verify all dimensions in field. Advise Architect of any discrepancies prior to Bid Date in accordance with Division 00.

E. Do not rough-in for any item or equipment furnished by others or noted "Not in Contract" (NIC), without first receiving rough-in information from physically examining the existing equipment, receiving specific cut sheet information from the Owner’s representative, other trades and/or Architect. Rough-in services for “NIC” equipment as required, as the work progresses.

F. Provide storage and protection for all equipment and materials in accordance with requirements of Division 00 & 01. Replace any equipment and materials damaged by improper handling, storage, or protection, at no additional cost to Owner.

G. Keep premises clean in accordance with requirements of Division 00 & 01.

1.9 SUBSTITUTIONS

A. Substitutions are allowed under La. R.S. 38:2291 and La R.S. 38:2292. Any requests for prior approval (as provided for under La. R.S. 38:2295) including any re-submitted data, shall be received by the Architect/Engineer a minimum of fourteen (14) for public bid working days prior to bid date. The Contractor shall recognize that it may be necessary to submit certain requests for prior approval sooner than the final date listed in the Instructions to Bidders, depending upon the complexity and completeness of the submittal. If, in the opinion of the Architect/Engineer, there is neither sufficient time available nor adequate descriptive data attached to the submittal, the submittal will not be considered. Except as otherwise specified, materials and equipment shall be new and bear the approval label of the Underwriters Laboratories, Inc. for the type of installation required.

B. Design of systems is based on specific equipment. If the use of other manufacturer's equipment, even though approved by Architect, involves additional cost due to space requirements, foundation requirements, increased mechanical or electrical services, the cost of such extra work shall be borne by Contractor. Even though a manufacturer's name appears in the Contract Documents as having acceptable equipment, their equipment with different model numbers shall be classified as being a substitute to the equipment originally designed for and named in the Contract Documents. Substitute equipment, materials, etc., will not be allowed to deviate from Contract Document requirements. Furnish all options specified or reasonably implied from the contract documents. Specifically identify any variance in regard to submittal versus specified performance on the cover sheet of each submittal.

1.10 POST-BID VALUE ENGINEERING (V/E):

A. While it may be in the project Owner's interest to consider the first cost money saving that may be generated via alternatives and options generated via participation in Value Engineering, Division 22 contractor shall realize that substantive offers of Value Engineering (V/E), if accepted by the Owner, constitute a design-build agreement (offer and acceptance)
with the owner, and drastically change the design concept of the project, as developed by the Professional of Record identified on the Contract Documents.

B. Should contractor offer, and the owner accept value engineering options that alter aspects of the system design, equipment, performance and/or performance verification or monitoring of respective systems, Division 22 contractor shall provide duly licensed professional engineering consultants working on behalf of the Division 22 contractor (including sub-contractors and equipment vendors/manufacturers) to review, approve and take professional responsibility for performance and suitability of V/E hybrid systems, materials or operational changes related to respective V/E items. The Division 22 contractor's licensed professional engineering consultants and the Division 22 contractor assume any and all responsibility for the design and suitability in terms of performance, of hybrid systems installed, as Division 22 contractor's Professional of Record, absolving the original project Professional of Record (identified on the original Contract Documents, released for the original project Bid/Negotiation) from responsibility for the V/E hybrid systems portion of the work.

C. Division 22 contractor, via the offer and acceptance of value engineering items on the project agrees to provide professional engineering design services and take full and complete responsibility for the hybrid design. Further, the Division 22 contractor's (V/E Items) professional of record (either employees, or independent consultants to the Division 22 contractor) through the offer and acceptance of V/E items, agree to indemnify and hold harmless the project

owner, the owner's original A/E team (Professional of Record on behalf of the owner for the original Contract Documents) their heirs and assigns in regard to the V/E changes and their impact on the Division 22 systems altered, affected or modified, in whole or in part. The Professional of Record shown on the original Contract Documents in regard to the systems altered, adjusted, revised, modified or otherwise affected by the value engineering items implemented, shall be absolved of design responsibility as a result of implementation of V/E items, and their original use of Engineering Seals used for original Contract Documents, shall not apply.

1.11 DRAWINGS AND SPECIFICATIONS

A. The specific intent of these Contract Documents is to provide the various systems, equipment, etc. to the Owner complete and in a thoroughly calibrated functional condition.

B. The Drawings shall not be construed as shop drawings. In the event of a possible interference with piping or equipment of another trade, items requiring set grade and elevations shall have precedence over other items should any major interference develop, immediately notify the Architect.

C. In laying out Work, refer to mechanical, electrical, structural, and architectural drawings at all times in order to avoid interference and undue delays in the progress of the Work.

1.12 CODES AND REGULATIONS

A. Work shall be in full accord with the most stringent interpretation of the State Sanitary Code, local ordinances, building codes, and other applicable national, local, and state regulations.

B. Equipment shall conform to requirements and recommendations of the National bureau of Fire Underwriters and National Fire Protection Association (NFPA).

C. Items provided under this Division shall comply with the American National Standards Institute (ANSI) "Specifications for Making Buildings and Facilities Accessible to and Usable by Physically Handicapped People," ANSI A 117.1

D. In the possible event of conflict between codes or regulations and Contract Documents, the most stringent interpretation of either shall govern (provided if exceeds the requirements of other codes). In the event of an irreconcilable difference between codes or regulations notify the Architect/Engineer immediately.

E. In addition to the codes heretofore mentioned, all work and equipment shall conform to the applicable portions of the following specifications, codes and/or regulations:

1. National Electrical Code (NEC)
2. National Fire Protection Association (NFPA)
3. American Society of Mechanical Engineers (ASME)
4. American Gas Association (AGA)
5. Underwriters Laboratories (UL)
6. International Plumbing Code (IPC) with Louisiana Amendments

F. All materials, equipment and accessories installed under this Contract shall conform to all rules, codes, etc. as recommended by National Associations governing the manufacturer,
rating and testing of such materials, equipment and accessories. All materials shall be new and of the best quality and first class in every respect. Whenever directed by the Architect, the Contractor shall submit a sample for approval before proceeding.

G. Where laws or local regulations provide that certain accessories such as gauges, thermometers, relief valves and parts be installed on equipment, it shall be understood that such equipment be furnished complete with the necessary accessories, whether or not called for in these Specifications.

H. All unfired and fired pressure vessels shall be built in accordance with the A.S.M.E. Code and so stamped. Furnish shop certificates for each vessel. Contractor shall provide and pay for first operating certificate as per State Fire Marshal Regulations.

1.13 FEES, PERMITS, AND TAXES

A. Obtain and pay for permits required for the Work of this Division. Pay fees in connection therewith, including necessary inspection fees.

B. Pay any and taxes levied for Work of this Division, including municipal and/or state sales tax where applicable.

C. All permits, fees, certificates, etc. for the installation, inspections, plan review, service connections locations, and/or construction of the work which are required by any authority and/or agencies having jurisdiction, shall be obtained and paid for by the Contractor.

D. The Contractor shall make all tests required by the Architect, Engineer or other governing authorities at no additional cost to the Owner.

E. The Contractor shall notify the Architect and local governing authorities before any tests are made, and the tests are not to be drawn off a line covered or insulated until examined and approved by the authorities. In event defects are found, these shall be corrected and the work shall be retested.

F. Prior to requesting final inspection by the Architect, the Contractor shall have a complete coordination and adjustment meeting of all of his sub-contractors directly responsible for the operation of any portion of the system. At the time of this meeting, each and every sequence of operation shall be checked to assure proper operation. Notify the Architect in writing ten (10) days prior to this meeting, instructing him of the time, date and whom you are requesting to be present.

G. This project shall not be accepted until the above provisions are met to the satisfaction of the Architect.

1.14 MANUFACTURER'S DIRECTIONS

A. Install and operate equipment and material in strict accord with manufacturer's installation and operating instructions. The manufacturer's instructions shall become part of the Contract Documents and shall supplement Drawings and Specifications.

1.15 SUBMITTAL DATA

A. Submit shop drawings, project data, and samples in accordance with requirements of Division 00 & 01.

B. Shop drawings shall consist of published ratings or capacity data, detailed construction drawings for fabricated items, wiring and control diagrams, performance curves, installation instructions, manufacturer's installation drawings, and other pertinent data. Submit drawings showing revisions to equipment layouts due to use of alternate or substitute equipment.

C. Where approved manufacturers and suppliers of equipment, materials, etc. are unable to fully comply with Contract Document requirements, specifically call such deviations to attention of Architect on submittals. Type deviations on a separate sheet; underlined statements or notations on standard brochures, equipment fly sheets, etc. will not be accepted.

D. Approval of submittals shall not relieve Contractor from furnishing required quantities and verifying dimensions. In addition, approval shall not waive original intent of Contract Documents.

E. Failure to obtain written approval of equipment shall be considered sufficient

grounds for rejection of said equipment regardless of the stage of completion of the project.

1.16 REVIEW OF MATERIALS:

A. Whenever manufacturers or trade names are mentioned in these Plans or Specifications, the words "or approved equivalent" shall be assumed to follow whether or not so stated. Manufacturers or trade names are used to establish a standard of quality only, and should not be construed to infer a preference. Equivalent products which meet the Architect's approval will be accepted; however, these products must be submitted to the Architect a minimum of ten (10) days prior to the Bid Date.

B. Submission shall include the manufacturer's name, model number, rating table and construction features.

C. Upon receipt and checking of this submittal, the Architect will issue an addendum listing items which are approved as equivalent to those specified. The contractor shall base his bid solely on those items specified or included in the "prior approval addendum", as no other item will be acceptable.

D. Prior approval of a particular piece of equipment does not mean automatic final acceptance and will not relieve the Contractor of the responsibility of assuring himself that this equipment is in complete accord with the Plans and Specifications and that it will fit into the space provided. Shop drawings must be submitted on all items of equipment for approval as hereinafter specified.

E. Before proceeding with work and/or within thirty (30) days after the award of the General Contract for this work, the Contractor shall furnish to the Architect complete shop and working drawings of such apparatus, equipment, controls, insulation, etc. to be provided in this project. These drawings shall give dimensions, weights, mounting data, performance curves and other pertinent information.

F. The Architect's approval of shop drawings shall not relieve the Contractor from the responsibility of incorrectly figured dimensions or any other errors which may be contained in these drawings. Any omission from the shop drawings or specifications, even through approved by the Architect, shall not relieve the Contractor from furnishing and erecting same.

G. Shop drawings shall be submitted in accordance with Section 013300. These submittals shall be supplied as part of this Contractor's contract. Any drawings not approved shall be resubmitted until they are approved. Submit all shop drawings at the same time. No separate items will be accepted.

1.17 PROJECT RECORD DOCUMENTS

A. Keep Project Record Documents in accordance with requirements of Division 00 & 01.

B. During construction period, keep accurate records of installations made under this Division, paying particular attention to major interior and exterior underground and concealed piping, ductwork, etc.

C. The Contractor shall obtain at his cost, two sets of blueline prints of the original bid documents by the Architect. One set shall be kept on the site with all information as referenced below, and shall update same as the work progresses. The other set will be utilized to record all field changes to a permanent record copy for the Owner.

D. If the Contractor elects to vary from the Contract Documents and secures prior approval from the Architect for any phase of the work, he shall record in a neat and readable manner, all such variances on the blueline print in red. The original bluelines shall be returned to the Architect for documentation.

E. Provide electronic (PDF) copies of all documentation included in Final Report.

F. All deviations from sizes, locations, and from all other features of the installations shown in the Contract Documents shall be recorded.

G. In addition, it shall be possible using these drawings to correctly and easily locate, identify and establish sizes of all piping, directions and the like, as well as other features of the work which will be concealed underground and/or in the finished building.

H. Locations of underground work shall be established by dimensions to columns, lines or walls, locating all turns, etc., and by properly referenced centerline or invert elevations and rates of fall.

I. For work concealed in the building, sufficient information shall be given so it can be located with reasonable accuracy and ease. In some cases, this may be by dimension. In others, it may be sufficient to illustrate the work on the drawings in relation to the spaces in the building near which it was actually installed. The Architect's/Engineer's decision in this matter will be final.

J. The following requirements apply to all "As-Built" drawings:

1. They shall be maintained at the Contractor's expense.
2. All such drawings shall be done carefully and neatly, and in a form approved by the Architect/Engineer.

3. Additional drawings shall be provided as necessary for clarifications.
4. These drawings shall be kept up-to-date during the entire course of the work and shall be available upon request for examination by the Architect/Engineer; and when necessary, to establish clearances for other parts of the work.
5. "As-built" drawings shall be returned to the Architect upon completion of the work and are subject to approval of the Architect/Engineer.

1.18 EXCAVATING AND BACKFILLING

A. Provide excavating and backfilling necessary for Work of this Division. Comply with provisions of Division 02, Site Work, if applicable.

B. Trenches shall be inspected by Code Authorities and/or Owner's Representative before and after piping is laid. Give Owner' Representative 24-hour notice for each inspection. If any trenches are filled without Owner's Representative inspection and as subsequently found to be deficient, the trenches shall be uncovered, inspected, and then re-filled, if requested by Owner's Representative.

C. Provide minimum 18 inches of cover or in compliance with local published frost line data (if greater than 18 inches) to finish grades or paving at water piping.

D. For piping, provide bell holes at trench bottom to assure uniform bearing. Accurately grade trench bottoms by instrument before laying any pipe.

E. Protect and maintain trenches in dry condition until piping has been inspected and approved. Immediately after approval, backfill trenches in tamped layers.

F. Compact fill to satisfaction of Architect and/or Owner's Representative.

1.19 CUTTING AND PATCHING

A. Comply with requirements of Division 00 & 01 regarding cutting and patching. Locate and timely install sleeves as required to minimize cutting and patching.

B. Cutting, fitting, repairing, patching, and finishing of Work shall be done by craftsmen skilled in their respective trades. Where cutting is required, cut in such a manner as not to weaken structure, partitions, or floors. Holes required to be cut must be cut or drilled without breaking out around the holes. Where patching is necessary in finished areas of the building, the Architect will determine the extent of such patching and refinishing.

C. Repairing Roadways and Walks: Coordinate all roadway work with authorities having jurisdiction. Cut and/or bore under roadways for connection of utilities

as required. Coordinate work through General Contractor. Where this contractor cuts or breaks roadways, or walks to lay the piping, he shall repair or replace these sections to match existing, unless specifically identified as the responsibility of others.

1.20 PAINTING

A. Painting shall be provided by General Contractor's painting sub-contractor, unless specified otherwise. Leave exposed piping, materials, and equipment clean and free of rust, grease, dirt, etc. before and after painting.

B. Factory finished equipment, fixtures, and materials which are marred, chipped, scratched, or otherwise unacceptable shall be repaired or replaced under this Division to Architect satisfaction, at no additions cost to Owner.

C. Coordinate all painting requirements with prime bidder prior to bids.

D. Paint all exposed piping inside and outside of building. Label all piping after painting in accordance with Section 230553. Utilize industry standard paint colors for respective system unless directed otherwise by Architect. Review proposed color scheme with Architect/Engineer prior to ordering materials.

E. All piping shall be color coded per the following (or match existing colors):

1. Natural Gas Piping Yellow

1.21 CLEANING AND ADJUSTING:

A. Upon completion of his work, the Contractor shall clean and adjust all equipment, controls, valves, etc.; clean all piping, ductwork, etc.; and leave the entire installation in good working order.

1.22 OPERATING AND MAINTENANCE INSTRUCTIONS

A. Provide the Owner with three (3) copies of printed instructions indicating various pieces of equipment by name and model number, complete with parts lists, maintenance and repair instructions and test and balance report.

B. Copies of shop drawings will not be acceptable as operation and maintenance instructions.

C. This information shall be bound in plastic hardbound notebooks with the job name, Architect and Engineer names permanently embossed on the cover. Rigid board dividers with labeled tabs shall be provided for different pieces of equipment. Submit manuals to the Architect for approval.

D. In addition to the operation and maintenance brochure, the Contractor shall provide a separate brochure which shall include registered warranty certificates on all equipment, especially any pieces of equipment which carry warranties exceeding one (1) year.

E. The operation and maintenance brochure shall be furnished with a detailed list of all equipment furnished to the project, including the serial number and all pertinent nameplate data such as voltage, amperage draw, recommended fuse size, rpm, etc. The Contractor shall include this data on each piece of equipment furnished under this contract.

F. Contractor shall provide electronic (PDF) format copies of all Operation and Maintenance Instruction on disk.

1.23 GUARANTEE

A. The Contractor shall guarantee all materials, equipment and workmanship for a period of one (1) year from the date of final acceptance of the project. This guarantee shall include furnishing of all labor and material necessary to make any repairs, adjustments or replacement of any equipment, parts, etc. necessary to restore the project to first class condition. This guarantee shall exclude only the changing or cleaning of filters. Warranties exceeding one (1) year are hereinafter specified with individual pieces of equipment.

B. If the Contractor's office is in excess of a fifty (50) mile radius of the project, he shall appoint a local qualified contractor to perform any emergency repairs or adjustments required during the guarantee period. The name of the contractor appointed to provide emergency services shall be submitted to the Architect for his approval.

1.24 LOCAL CONDITIONS

A. The location and elevation of all utility services is based on available surveys and utility maps and are believed to be reasonably accurate; however, these shall serve as a general guide only, and the Contractor shall visit the site and verify the location and elevation of all services to his satisfaction in order to determine the amount of work required for the execution of the Contract.

B. The Contractor shall contact the various utility companies, determine the extent of their requirements and he shall include in his bid all lawful fees and payments required by these companies for complete connection and services to the building, including meters, connection charges, street patching, extensions from meters to main, etc.

C. In case major changes are required, this fact, together with the reasons

therefore, shall be submitted to the Architect, in writing, not less than seven (7) days before the date of bidding. Failure to comply with this requirement will make the Contractor liable for any changes, additions, and expenses necessary for the successful completion of the project.

1.25 MINOR DEVIATIONS

A. Plans and detail sketches are submitted to limit, explain and define conditions, specified requirements, pipe sizes, etc. Structural or other conditions may require certain modifications from the manner of installation shown, and such deviations are permissible and shall be made as required. However, specified sizes and requirements necessary for satisfactory operation shall remain unchanged. It may be necessary to shift ducts or pipes, or to change the shape of ducts, and these changes shall be made as required. All such changes shall be referred to the Architect for approval before proceeding. Extra charges shall not be allowed for these changes.

B. Only typical details are shown on the Plans. In cases where the Contractor is not certain about the installation of his work, he shall ask for details. Lack of details will not be an excuse for improper installation.

C. In general, the drawings are diagrammatic and the Contractor shall install his work in a manner so that interferences between the various trades are avoided. In cases where interferences do occur, the Architect is to state which item was first installed.

1.26 VALVE TAGS

A. Secure metal tags to all valves. Labeling on all valve tags shall include type of system the valve controls and the area of building, zone, or equipment number affected by valve operation. Tag shall be 2" minimum diameter brass, engraved with code number, service and size. A framed list of the valves, giving manufacturer's name, model number, type and location shall be mounted in the main basement equipment room.

1.27 LABELING PLUMBING EQUIPMENT

A. All equipment furnished under the contract documents shall be labeled with permanent laminated plate secured to equipment. Units shall be labeled as indicated on plans and schedules.

PART 2 - PRODUCTS (Not applicable)

PART 3 - EXECUTION (Not applicable)

END OF SECTION 22 00 00



SECTION 22 05 00 – COMMON WORK RESULTS FOR PLUMBING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The general provisions of the Contract, including the Conditions of the Contract (General, Supplementary, and other Conditions) and Division 00 and 01 as appropriate, apply to the Work specified in this Section.

B. Refer to all Sections, as well as the Specifications for the other various trades and materials and be thoroughly familiar with all provisions regarding all work.

1.2 SCOPE OF WORK

A. This Section includes the furnishing and installation of common work results for plumbing which includes the following related components:

1. Strainers
2. Water hammer arresters
3. Valves
4. Hydrants
5. Hose bibbs and sill faucets
6. Backflow preventers
7. Pressure regulating and reducing valves
8. Pressure-temperature relief valves

1.3 SUMMARY

A. This Section specifies the water distribution piping system, including potable cold, hot, and recirculated hot water piping, fittings, and specialties within the building.

1.4 DEFINITIONS

A. Water Distribution Piping: A pipe within the building or on the premises which conveys water from the water service pipe or meter to the points of usage.

B. Water Service Piping: The pipe from the water main or other source of potable water supply to the water distributing system of the building served.

1.5 SUBMITTALS

A. Refer to Division 01 and Basic Mechanical Requirements for administrative and procedural requirements for submittals.

B. Product Data: Submit manufacturer's product data for the following products that apply to this project scope:

1. Strainers
2. Water hammer arresters
3. Valves
4. Hydrants
5. Hose bibbs and sill faucets
6. Backflow preventers
7. Pressure regulating and reducing valves
8. Pressure-temperature relief valves

C. Coordination Drawings: Prepare and submit coordination drawings for Water Distribution Piping in accordance with Division 23 - Basic Mechanical Requirements.

D. Maintenance Data: Submit maintenance and operating data. Include this data in maintenance manual in accordance with requirements of Division 01 and Division 23 - Basic Mechanical Requirements for the following products that apply to this project scope:

1. Strainers
2. Valves
3. Hose bibbs and sill faucets
4. Backflow preventers
5. Pressure regulating and reducing valves
6. Pressure-temperature relief valves

E. Quality Control Submittals:

1. Submit welders' certificates specified in Quality Assurance below.
2. Submit certification of compliance with ASME and UL fabrication requirements specified in below.
3. Submit reports specified in Part 3 of this Section.

1.6 QUALITY ASSURANCE

A. Codes and Standards

1. Plumbing Code Compliance: Comply with applicable portions of Edition 2021 of the International Plumbing Code.

2. ASME Compliance: Fabricate and stamp pressure-temperature relief valves to comply with ASME Boiler and Pressure Vessel Code.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store pipe in a manner to prevent sagging and bending.

1.8 SEQUENCING AND SCHEDULING

A. Coordinate the size and location of concrete equipment pads. Cast anchor bolt inserts into pad. Concrete, reinforcement, and formwork requirements are specified in Division 03.

B. Coordinate the installation of pipe sleeves for foundation wall penetrations.

1.9 MAINTENANCE

A. Spare Parts:

1. Furnish to Owner, with receipt, one valve key for each key operated hydrant, bibb, or faucet installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturer uniformity: Conform with the requirements specified in Basic Mechanical Requirements, under "Product Options" for the following water distribution piping products.

2.2 VALVES

A. Gate, ball, butterfly, check, and drain valves are specified in Section 220519 “Plumbing Piping”.

B. Balance Cocks:

1. Threaded Ends 2" and Smaller: Class 125, bronze body, bronze plug, screw driver operated, straight or angle pattern.
2. Soldered Ends 2" and Smaller: Class 125, bronze body, bronze plug, screw driver operated, straight or angle pattern.

2.3 PIPING SPECIALTIES

A. Water Hammer Arresters: Bellows type, with stainless steel casing and bellows, pressure rated for 250 psi, tested and certified in accordance with PDI Standard WH-201.

B. Basket Strainers: Cast-iron body, 125 psi flanges, bolted type or yoke type cover; with removable non-corrosive perforated strainer basket having 1/8" perforations and lift-out handle.

C. Flexible connectors: Stainless steel bellows with a woven flexible bronze wire reinforcing protective jacket; rated for 150 psig water working pressure, 250 deg F operating temperature and suitable for up to maximum 3/4" misalignment. Connectors shall be a minimum of 12" long and have threaded or flanged ends; sweat ends are not acceptable.

D. Hose Bibbs: Bronze body, renewable composition disc, tee handle, 3/4" NPT inlet, 3/4" hose outlet.

E. Recessed Non-Freeze Wall Hydrants: Cast-bronze box, with chrome plated face, tee handle key, vacuum breaker, hinged locking cover, 3/4" inlet, and hose outlet. Bronze casing shall be length to suit wall thickness.

F. Floor Level Non-Freeze Hydrants: Cast-bronze hydrant, with rough bronze box, tee handle key, drain hole, vacuum breaker, hinged locking cover, 3/4" inlet, and hose outlet. Bronze casing shall be length to suit depth of bury.

G. Backflow Preventers: Reduced pressure principle assembly consisting of shutoff valves on inlet and outlet, and strainer on inlet. Assemblies shall include test cocks, and pressure-differential relief valve located between 2 positive seating check valves, and comply with requirements of ASSE Standard 1013. Backflow preventer shall be with drain funnel.

H. Pressure Regulating Valves: Single seated, direct operated type; having bronze body with integral strainer, and complying with requirements of ASSE Standard 1003.

I. Relief Valves:

1. Provide proper size for relief valve, in accordance with ASME Boiler and Pressure Vessel Codes, for indicated capacity of the appliance for which installed.
2. Combined Pressure- Temperature Relief Valves: Bronze body, test lever, thermostat, complying with ANSI Z21.22 listing requirements for temperature discharge capacity. Provide temperature relief at 210 deg. F, and pressure relief at 150 psi.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify all dimensions by field measurements. Verify that all water distribution piping may be installed in accordance with pertinent codes and regulations, the original design, and the referenced standards.

B. Examine rough-in requirements for plumbing fixtures and other equipment having water connections to verify actual locations of piping connections prior to installation.

C. Do not proceed until unsatisfactory conditions have been corrected.

3.2 JOINING PIPES AND FITTINGS

A. Copper Tubing: Solder joints in accordance with the procedures specified in ANSI B9.1, using lead free piping, solder, and flux. Lead free, when used with respect to solder and flux, refer to solder and flux containing not more than 0.2 percent lead. When used with respect to pipe and fittings, lead free refers to pipe and fittings containing not more than 6.0 percent lead.

3.3 PIPING INSTALLATION

A. Refer to the separate Division 230020 section: “Basic Mechanical Requirements”, for general piping installation instructions.

B. General Locations and Arrangements: Drawings (plans, schematics, and diagrams) indicate the general location and arrangement of the piping systems. Location and arrangement of piping layout take into consideration pipe sizing and friction loss, expansion, pump sizing, and other design considerations. So far as practical, install piping as indicated.

3.4 INSTALLATION OF VALVES

A. Installation requirements for general duty valves are specified in a separate Section of Division 23.

B. Sectional Valves: Install sectional valves on each branch and riser, close to main. For sectional valves 2" and smaller, use ball valves; for sectional valves 2-1/2" and larger, use gate or butterfly valves.

C. Shutoff Valves: Install shutoff valves on inlet of each plumbing equipment item, and on inlet of each plumbing fixture, and elsewhere as indicated. For shutoff

valves 2" and smaller, use ball valves; for shutoff valves 2-1/2" and larger, use butterfly valves.

D. Drain Valves: Install drain valves on each plumbing equipment item, located to completely drain equipment for service or repair. Install drain valves at the base of each riser, at low points of horizontal runs, and elsewhere as required to completely drain distribution piping system. For drain valves 2" and smaller, use gate or ball valves; for drain valves 2-1/2" and larger, use gate or butterfly valves.

E. Check Valves: Install swing check valves on discharge side of each pump, and elsewhere as indicated.

F. Balance Cocks: Install in each hot water recirculating loop, discharge side of each pump, and elsewhere as indicated.

3.5 INSTALLATION OF PIPING SPECIALTIES

A. Install pressure regulating valves with inlet and outlet shutoff valves, and balance cock bypass. Install pressure gage on valve outlet.

3.6 EQUIPMENT CONNECTIONS

A. Piping Runouts to Fixtures: Provide hot and cold-water piping runouts to fixtures of sizes indicated on plans. Connect cold water to hot and cold-water faucet connections where hot water is not provided.

B. Mechanical Equipment Connections: Connect hot and cold-water piping system to mechanical equipment. Provide shutoff valve and union for each connection, provide drain valve on drain connection. For connections 2-1/2" and larger, use flanges instead of unions.

3.7 FIELD QUALITY CONTROL

A. Inspections:

1. Do not enclose, cover, or put into operation water distribution piping system until it has been inspected and approved by the Architect.
2. During the progress of the installation, notify the Architect, at least 24 hours prior to the time such inspection must be made. Perform tests specified below in the presence of the Architect.
3. Rough-in Inspection: Arrange for inspection of the piping system before concealed or closed-in after system is roughed-in, and prior to setting fixtures.

4. Final Inspection: Arrange for a final inspection by the Architect to observe the tests specified below and to ensure compliance with the requirements of the plumbing code.
5. Reinspections: Whenever the Architect finds that the piping system will not pass the test or inspection, make the required corrections, and arrange for reinspection by the Architect.
6. Reports: Prepare inspection reports, signed by the Architect.

B. Piping System Test:

1. Test for leaks and defects all water distribution piping systems. If testing is performed in segments, submit a separate report for each test, complete with a diagram of the portion of the system tested.
2. Leave uncovered and unconcealed all water distribution piping until it has been tested and approved. Expose all such work for testing, that has been covered or concealed before it has been tested and approved.
3. Cap and subject the piping system to a static water pressure of 50 psi above the operating pressure without exceeding the pressure rating of the piping system materials. Isolate the test source and allow to stand for a period of 4 hours. Leaks and loss in test pressure constitute defects which must be repaired.
4. Repair all leaks and defects using new materials and retest system or portion thereof until satisfactory results are obtained.
5. Prepare reports for all tests and required corrective action.

3.8 ADJUSTING AND CLEANING

A. Cleaning and Disinfecting:

1. Purge all new water distribution piping systems and parts of existing systems, which have been altered, extended, or repaired prior to use.
2. Reports:
   a. Prepare reports for all purging and disinfecting activities.

3.9 STERILIZATION

A. Sterilize water lines in strict accordance with State Board of Health requirements. After flushing out, obtain approval of water sample analysis from State Board of Health and submit to Architect.

END OF SECTION 22 05 00



SECTION 22 05 19 – PLUMBING PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The general provisions of the Contract, including the Conditions of the Contract (General, Supplementary, and other Conditions) and Division 00 and 01 as appropriate, apply to the Work specified in this Section.

B. Refer to all Sections, as well as the Specifications for the other various trades and materials and be thoroughly familiar with all provisions regarding all work.

1.2 SCOPE OF WORK

A. This Section includes the following basic mechanical materials and methods to complement other Divisions and Sections.

1. Piping materials and installation instructions common to most piping systems.
2. Pipe Specialties.
3. Sleeves.
4. Valves and Unions.
5. Shock Absorbers.
6. Escutcheons.
7. Flashing.
8. Access Panels.
9. System Accessories.

B. Pipe and pipe fitting materials are specified in individual piping system Sections.

1.3 ELECTRICAL WORK

A. All electrical equipment shall have the U.L. Label and shall meet the standards of the National Electrical Code and NEMA.

PART 2 - PRODUCTS

2.1 PIPE:

A. Sanitary Sewer Waste Lines Above Slab (PVC):

1. Piping above slab, unless otherwise shown or specified, shall be constructed of solid wall Schedule 40 PVC "DWV" plastic pipe and fittings conforming to ASTM D265 and ASTM D1785 with solvent welded joints.

B. Sanitary Sewer Waste Lines Below Slab (PVC):

1. Piping below slab, unless otherwise shown or specified, shall be constructed of solid wall Schedule 40 PVC "DWV" plastic pipe and fittings conforming to ASTM D265 and ASTM D1785 with solvent welded joints.

C. Sanitary Grease Waste Lines Above Slab (Cast Iron - Hub and Spigot):

1. Piping above slab, unless otherwise shown or specified, shall be constructed of service weight bell and spigot cast iron pipe by Tyler Pipe Co. Charlotte Pipe & Foundry Co, AB&I Pipe Foundry Company or equivalent. All cast iron pipe shall comply with ASTM A74. All cast iron soil pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute and be listed by NSF International. Joints shall be made with bell and spigot neoprene gaskets conforming to ASTM C 564.

D. Sanitary Sewer Waste Lines/Grease Waste Lines Below Slab (Cast Iron - Hub and Spigot):

1. Piping below the slab, unless otherwise shown or specified, shall be constructed of service weight bell and spigot cast iron pipe by Tyler Pipe Co. Charlotte Pipe & Foundry Co, AB&I Pipe Foundry Company or equivalent. All cast iron pipe shall comply with ASTM A74. All cast iron soil pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute and be listed by NSF International. Joints shall be made with bell and spigot neoprene gaskets conforming to ASTM C 564.

E. Sanitary Sewer Vent Lines Above Slab (PVC):

1. These shall be constructed of solid wall Schedule 40 PVC “DWV” plastic pipe fittings conforming to ASTM D2665 and ASTM D1785 with solvent welded joints.
2. Sanitary sewer pipe penetrating concrete slabs shall be wrapped with Virginia Chemical K-501, Benjamin Manufacturing Model 6200, or equal foam insulation tape.

F. Domestic Cold and Hot Water Lines:

1. All such lines shall be Government Type "L", hard copper water tubing of standard weight and thickness as made by Mueller, Chase, Anaconda or equivalent, unless indicated otherwise. Use 95-5 lead-free solder on all piping above slab. Use Silfos 1000° lead-free solder on all piping beneath the slab.
2. In certain areas, type "L" soft copper without joints below slab shall be used only where indicated on the Plans. Piping shall be completely insulated per Section 220700.
3. Domestic cold-water lines penetrating concrete slabs shall be wrapped with "Protect-O-Sleeve" vinyl flexible tube as manufactured by Robert H. Harris Co., or equivalent. Sleeve shall have a minimum thickness of .025" (0.635 mm).
4. Domestic hot water lines shall be insulated at all penetrations through slab per insulation (see Section 220700).
5. Domestic cold-water piping within 5'-0" of building may be Schedule 40 PVC plastic pipe with solvent welded joints, or slip joint fittings with EPDM seals. Provide thrust blocks all at changes in direction. Installation shall be in accordance with manufacturer's recommendations.

G. Water Heater Relief Lines:

1. These shall be Government Type "L" hard copper.

H. Trap Primer Lines:

1. All such lines shall be Type "L" soft copper, without joints.

I. Storm Drain Piping (PVC):

1. All such piping shall be Schedule 40 PVC plastic pipe and fittings conforming to ASTM D2665 and ASTM D1785 with solvent welded joints.
2. Contractor shall support all joints and elbows rigidly. All elbows below vertical rises shall be supported rigidly within 18" of the elbow.

J. Storm Drain Piping - Below Slab:

1. PVC Schedule 40 solid wall pipe shall be Iron Pipe Size (IPS) conforming to ASTM D 1785 and ASTM D 2665. Injection molded PVC DWV fittings shall conform to ASTM D 2665. Fabricated PVC DWV fittings shall conform to ASTM F 1866. Pipe and fittings shall be manufactured as a system and be the product of one manufacturer. All pipe and fittings shall be manufactured in the United States. All systems shall utilize a separate waste and vent system. Pipe and fittings shall conform to NSF

International Standard 14. Installation shall comply with the latest installation instructions published by the manufacturer and shall conform to all applicable plumbing, building, and fire code requirements. Buried pipe shall be installed in accordance with ASTM D2321 and ASTM F 1668. Solvent cement joints shall be made in a two-step process with primer conforming to ASTM F 656 and solvent cement conforming to ASTM D 2564. The system shall be protected from chemical agents, fire stopping materials, thread sealant, plasticized vinyl products, or other aggressive chemical agents not compatible with PVS compounds. System shall be hydrostatically tested after installation.

2.2 PIPE SPECIALTIES

A. Dielectric unions shall be used between copper and iron pipe.

2.3 PIPE WARNING TAPE AND TRACER WIRE

A. Provide warning tape for buried piping as per the following:

1. During the backfilling process, all PVC and Ductile Iron mains, service lines and system appurtenances shall have a continuous warning tape placed immediately above them and throughout their length at a depth of eighteen (18) inches above the utility line surface.
2. The tape shall be six (6) inches wide. Tape material shall be formulated from 100 percent virgin polyolefin resins. Resins shall be pigmential for chemical stability and resistance to sulfide staining (color fastness).
3. Tape shall be constructed by the mechanical (non-adhesive) lamination of two plies of three layers blown film in such a manner as to produce a bi-axially oriented structure. The tape shall be able to provide a 700 percent elongation prior to rupture as per ASTM-D882.
4. The tape shall meet or exceed the standards provided in the Materials Specification List, included in these Standards. The warning tape shall be manufactured with a permanent APWA line color pigment at a maximum of every thirty (30) inches along its length, be imprinted with a continuous warning message as follows:
   a. “CAUTION: (State Type) LINE BURIED BELOW”
5. At tees, tape ends, etc., the warning tape shall be tied together (spliced) with knot to create a continuous warning tape throughout the length of the pipeline and associated branch lines, appurtenances, etc.

B. Provide tracer wire for buried piping as per the following:

1. In addition to the installation of warning tape, copper tracing wire is to be installed with all PVC mains. This includes all mains, and individual

hydrants. The tracing wire shall be taped, using electrical tape, on top of the pipe at ten (10) foot centers, for the total length of the pipe.

2. The tracing wire shall be 12 AWG (Average wire gauge), solid core, copper wire (solid core meaning one (1) single continuous strand of copper wire). In addition, the wire insulating coating (jacket) shall be blue in color and shall have 45 mils of polyethylene insulation thickness and high molecular weight. In addition, the tracing wire shall be HMW-PE and rated for UL 600V construction. The wire shall be suitable for wet or dry applications.
3. The wire size (gauge) shall be continuously affixed (printed on) the entire length of all tracing wire coating and shall be easily read.
4. Where a splice is required, or when a three (3)-way splice is necessary, the wires shall be joined together with an appropriate size (blue) wire nut which shall then be placed inside a 3M brand Direct Bury Splice kit (DBR), or approved equal, of appropriate size. No bare wire shall be left exposed anywhere. All wires shall be spliced to all other wires for a continuous tracing wire system.
5. On all hydrants and above ground appurtenances, the tracing wire shall be run up and protected. This wire end shall not be bare, but shall have the coating jacket intact. Location and frequency of test boxes shall be as directed by P.M., or designee. Test boxes shall be required where hydrants are not used or where hydrant spacing exceeds 500 feet.
6. No electrical connections of the tracing wire to any metal pipes or metal service lines will be allowed and care shall be taken to ensure that the tracing wire is not damaged during installation.
7. The tracing wire will be tested for continuous signal (continuity test) and shorts to ground across all main and service lines before asphalt is installed, and prior to sub grade preparation. Tracing wire must be able to conduct a continuous signal before pipe is accepted.

2.4 PIPE HANGERS AND SUPPORTS

A. This Contractor shall furnish and install all foundations and supports required for his equipment unless indicated otherwise on the Drawings.

B. This Contractor shall furnish and install all escutcheons, inserts, thimbles, hangers, etc. required for the proper support and installation of his equipment and piping and he shall cooperate with other trades in locating and placing these items.

2.5 PROVIDE SLEEVES FOR ALL PIPES PASSING THROUGH WALLS, FLOORS, BEAMS, ETC.

A. Sleeves passing through structural members or concrete footings shall be of cast iron or Schedule 40 steel pipe. Sleeves passing through nonstructural walls or floors shall be of 26-gauge galvanized iron. Joints between sleeves and pipes

passing through floors shall be made weather tight with plastic materials. Where pipes pass through water proofing membrane, flashing sleeves shall be installed.

B. Provide Grinnell, Fee & Mason, or equivalent malleable iron split ring hangers with rod supports throughout. Strap hangers or wire will not be accepted.

C. Maximum spacing of hangers for cast iron pipes shall be 5 ft.; for other than soil, use 10 ft.

D. Provide galvanized iron shields between hangers and pipe covering.

E. Provide Grinnell, Fee & Mason, Crane or equivalent heavy steel riser clamps on vertical risers at floors to support pipes.

F. Provide producer specialty, Jones Manufacturing or equal chrome plated brass escutcheons wherever pipes pass through floors, walls, or ceilings in exposed or finished areas.

G. All piping projecting from chases shall be rigidly supported in the wall or chase. Loosely supported fixtures or accessories will not be accepted.

2.6 VALVES AND UNIONS

A. Furnish and install all valves, unions, stops, connections, etc. shown on plans and necessary to make a complete system in working order. Provide valves on inlet and outlet of all equipment and fixtures and on branch lines to fixtures or groups of fixtures.

B. Ball Valves, 3" and smaller, rated for 150 PSI saturated steam pressure, 600 PSI WOG pressure; shall be 2-piece construction, bronze body conforming to ASTM B-62, conventional port, chrome-plated brass ball, replaceable TFE seats and seals, blow-out proof stem, and vinyl-covered steel handle. Provide solder ends for domestic hot and cold-water service of NIBCO Design S-580-70, Milwaukee BA-150-S or equal, threaded ends of heating hot water and low pressure steam of NIBCO Design T-580-70, Milwaukee BA-100-S or equal. At Contractor's option, Victaulic Style 722 or 721 ball valves may be used.

C. All valves, unions, etc. where pipe is chrome plated shall have similar finish. All exposed supplies to plumbing fixtures shall be chrome plated.

D. Domestic water valves (below grade): M & H AWWA Series C-509 resilient gate valve with low torque operation, positive shut-off, O- Ring seals, full epoxy coating and square valve stem end. Provide two (2) adjustable "TEE" handle valve wrenches to be turned over to the owner after construction is complete.

E. Gate Valves, 2-Inch and Smaller: MSS SP-80; Class 125, body and bonnet of ASTM B 62 cast bronze; with threaded or solder ends, solid disc, copper-silicon alloy or bronze stem, brass packing gland, "Teflon" impregnated packing, and malleable iron handwheel. Provide Class 150 valves meeting the above where system pressure requires.

F. Gate Valves, 2-1/2-Inch and Larger: MSS SP-70; Class 125 iron body, bronze mounted, with body and bonnet conforming to ASTM A 126 Class B; with flanged ends "Teflon" impregnated packing, and two-piece backing bland assembly.

G. Globe Valves, 2-Inch and Smaller: NSS SP-80; Class 125; body and screwed bonnet of ASTM B 62 cast bronze; with threaded or solder ends, brass or replaceable composition disc, copper-silicon alloy stem, brass packing gland, "Teflon" impregnated packing, and malleable iron handwheel. Provide Class 150 valves meeting the above where system pressure requires.

H. Butterfly Valves, 2-1/2-Inch and Larger: MSS SP-67; rated at 200 psi; cast-iron body conforming to ASTM A 126, Class B. Provide valves with field replaceable EPDM sleeve, nickel-plated ductile iron disc (except aluminum bronze disc for valves installed in condenser water piping), stainless steel stem, and EPDM O-ring stem seals. Provide lever operators with locks for sizes 2 through 6 inches and gear operators with position indicator for sizes 8 through 24 inches. Provide "Non-Leakage" full threaded lug flange body type capable of being broken down at one side of the valve remaining closed. Drill and tap valves on dead-end service or requiring additional body strength. At Contractor's option Victaulic 300 BFV for grooved piping systems may be used.

I. Wafer Check Valves: Class 2500, cast-iron body; with replaceable bronze seat, and non-slam design lapped and balanced twin bronze flappers and stainless-steel trim and torsion spring. Provide valves designed to open and close at approximately one-foot differential pressure.

J. Select Valves with the following ends or types of pipe/tube connections:

1. Copper Tube Size 2 Inch and Smaller: Solder ends, except provide threaded ends for heating hot water.
2. Steel Pipe Sizes, 2 Inch and Smaller: Threaded or grooved end.
3. Steel Pipe Sizes, 2-1/2 Inch and Larger: Grooved end or flanged.

2.7 SHOCK ABSORBERS

A. All water service to fixtures or groups of fixtures shall have concealed lead free ASSE 1010 compliant water hammer arrestors on both hot and cold-water branches. Locate shock absorbers close to fixture or at end of header.

B. Shock arrestors shall be installed for sterilizer water supplies.

2.8 ESCUTCHEONS

A. Provide escutcheons for all exposed lines passing through floors, walls, and ceilings. They shall be chrome plated brass and shall be of such flange size as to cover necessary penetrating openings.

2.9 FLASHING

A. Flash all vent penetrations through roof. Extend flashing approximately 10 inches in all directions at base and turn ends down into top of pipe. Off-set vents where necessary to provide 4 feet minimum clearance from other flashing such as outside walls, curbs, etc. Note: All vents shall be 25 feet from fresh air intakes.

2.10 ACCESS PANELS

A. Furnish and install access panels where valves, dampers, control boxes, etc. are concealed in walls, ceilings, floors, or otherwise inaccessible or where specifically called for on plans. Panels shall be Milcor Style DW, or Bar-Co. Model 500, J-L Industries Model WB, or equal sized as required and furnished with prime coat finish.

2.11 SYSTEM ACCESSORIES

A. Automatic Drain Valves for Compressed Air Piping shall be corrosion-resistant metal body and internal parts, rated for 200 psig minimum working pressure, capable of automatic discharge of collected condensate. Plug End shall be flow-sensor bleeder, check-valve type, with serrated outlet for hose.

PART 3 - EXECUTION

3.1 INSTALLATION OF PIPING:

A. All pipe shall be true and straight, without sags or traps.

B. The Contractor shall exercise care in cleaning joints after making cuts on pipe to prevent pipe particles from entering the system.

C. All pipe fittings shall be same as piping specified unless indicated otherwise.

D. Arrange, install piping approximately as indicated, straight, plumb and as direct as possible; form right angles, or parallel lines with building walls. The most

practical appearance of piping runs is required. Keep pipes close to walls, partitions, ceilings; off-set only where necessary to follow walls as directed.

E. Before installing piping, check plumbing drawings with architectural, mechanical, structural, electrical drawings; make accurate layout of plumbing and HVAC piping. Where interferences may appear and departures from indicated arrangements are required, consult with other trades involved; come to agreement as to changed locations and elevations of piping; obtain approval of proposed changes. Note runs of other contractor's piping and large conduits and cooperate to achieve neat appearance.

F. Unless otherwise indicated, conceal all piping in building construction in finished areas. Install such piping in time so as not to cause delay to work of other trades and to allow ample time for tests and approval; do not cover before approval is obtained.

G. Locate groups of pipes parallel to each other and building lines; space them at distance to permit access for servicing, valves, and to create most practical appearance when racked with conduits, refrigerant, etc., provided by other contractors.

H. Keep fixture branches concealed to points above floor close to fixtures; expose only as much as necessary for final connection. Rigidly support pipes projecting from walls, chases, etc. in wall or chase to make firm, well-braced installation. Loosely supported pipe or accessory is not acceptable.

I. Install horizontal piping to coordinate with other trades and install without sags or humps.

J. Grade inside sewer piping at uniform slope of 1/4 inch per foot, minimum; where this is impossible, maintain slope as directed but in no case less than 1/8 inch per foot. Waste lines 3 inches and smaller must grade at minimum 1/4 inch per foot. See Drawings for fall on exterior sewer lines.

K. Grade other piping as specified under heading or service where used, or as directed.

L. Keep piping free from scale and dirt, protect open pipe ends wherever work is suspended during construction. To prevent foreign bodies entering and lodging in pipe, use temporary plugs or other approved material.

M. Where changes in pipe sizes occur, do not bush down; use only reducing fittings. For drainage piping changes in direction, use long sweep bends where possible; otherwise, short sweep 1/4 bends or combination Y and 1/8 bends; also, Ys in combination with other bends.

N. Provide shut off valves at all supply connections to all equipment. Supplier of equipment shall provide rough-in drawings and this contractor shall fully connect all items, supply necessary piping and fittings as required, unless otherwise noted individually.

O. Buried thermoplastic piping systems shall be installed in accordance with ASTM D2321.

P. Do not locate valves with stems below horizontal.

Q. Locate valves for easy access and operations. Where concealed, notify General Contractor of exact location in order that he may leave openings for access panels. Provide access panels.

R. Provide unions, screwed or flanged, where indicated, and in following locations even if not indicated.

S. In connection to equipment requiring disconnection for repairs or replacement. Locate between shut-off and equipment.

T. Approved expansion joints or flexible couplings shall be provided as necessary.

U. Care shall be taken in making up pipe and fittings such that the pipe does not extend into fitting sufficiently to reduce the waterway.

V. Standard, one-piece reducing fittings of approved design shall be used wherever a change in size is made. Changes in pipe sizes shall not be made by means of reducing flanges.

W. Bushings may be used only where standard, one-piece reducing fittings are not available and shall be subject to the following:

1. Bushings shall be of the face or flush type.
2. Bushings shall not be used in elbow fittings.
3. Bushings shall not be used when the reduction in size of the outlet is less than ½".
4. Bushings shall not be used in more than one outlet of any tee or two outlets of any cross fitting.

3.2 INSTALLATION OF VALVES

A. Use ball and butterfly valves for shut-off duty.

B. Locate valves for easy access and provide separate support where necessary.

C. Install valves and unions for each fixture and item of equipment arranged to allow equipment removal without system shutdown. Unions are not required on flanged devices.

D. Install three-valve bypass around each pressure reducing valve using throttling-type valves.

E. Install valves in horizontal piping with stem at or above the center of the pipe.

F. Install valves in a position to allow full stem movement.

G. All valves, unions, etc. where pipe is chrome plated shall have similar finish. All exposed supplies to plumbing fixtures shall be chrome plated.

H. All valves, on insulated piping shall be complete with extended lever handle stem.

3.3 PIPE MARKERS

A. Provide pipe markers and directional arrows on all piping in mechanical equipment rooms, or which is exposed in building, and on both sides of all valves located above ceiling. Markers shall be as manufactured by W.H. Bradley Co., or the equivalent. All letters shall be color-coded and sized as recommended by OSHA. Samples of the type of letters to be used shall be submitted with shop drawings.

B. The following pipe and valves shall be identified:

		Piping	Valves
1.	Domestic Cold Water	X	X
2.	Domestic Hot Water Supply	X	X
3.	Domestic Hot Water Return	X	X
4.	Sanitary	X	
5.	Storm	X	

C. Pipe markers with arrows shall indicate lines content and shall be located 20 feet on center and at each change of direction of line. Identification bands shall be color coded to match pipe markers and shall be provided 10 feet on center. Pipe identification markers shall be taped at each end and shall be taped around the entire circumference of pipe.

3.4 TEST

A. Make such tests of work as specified, or required by Architect or by State and Municipal Bureaus having jurisdiction, and under their supervision. Perform

tests in presence of Architect's representative. Notify Architect two days prior to testing.

B. Provide apparatus, temporary piping connections, or other requirements necessary for tests. Take precautions to prevent damage to building or contents by tests. Contractor is required to repair and make good at his expense damage so caused.

C. For Drain, Waste, and Vent piping, use hydrostatic test to 10 feet of head. Do not use compressed air or gas.

D. Correct leaks, defects, or deficiencies discovered as result of tests. Repeat tests until test requirements are fully complied with. Caulking of pipe joints to remedy leaks is not permitted, except on lead and oakum joints.

3.5 STERILIZATION

A. Sterilization all water lines in strict accordance with State Board of Health requirements. After flushing out, obtain approval of water sample analysis from State Board of Health and submit approval report to Architect.

END OF SECTION 22 05 19



SECTION 22 07 00 – PLUMBING INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The general provisions of the Contract, including the Conditions of the Contract (General, Supplementary, and other Conditions) and Division 00 and 01 as appropriate, apply to the Work specified in this Section.

B. Refer to all Sections, as well as the Specifications for the other various trades and materials and be thoroughly familiar with all provisions regarding all work.

1.2 SCOPE OF WORK

A. Pipe insulation shall not begin until all work has been tested and found to be tight. All insulation adhesives, sealers, tapes and mastic shall meet the latest NFPA requirements and shall meet 25/50/50 flame spread and smoke developed ratings.

B. All insulation shall be installed in strict accordance with the manufacturer's recommendations.

C. All pipe insulation where recommended by the manufacturer shall be banded with aluminum bands, three to a section and with one band on each side of each fitting, valve, etc.

D. Insulation shall be continuous through walls and ceilings.

E. All valves, strainers, etc. shall be insulated to maintain the same thermal resistance rating as its adjacent piping and the covering shall extend all the way up to the equipment.

F. Use high density insulation inserts at hangers on all piping 1-1/2" and above to prevent crushing of insulation.

PART 2 - PRODUCTS

2.1 THERMAL INSULATION

A. After all work has been tested and approved, insulate as follows:

1. Insulation shall be installed in accordance with the manufacturer's

recommendations and instructions.

2.2 DOMESTIC WATER PIPING

A. Cover all domestic cold and hot water lines and hot water return lines above slab with 1" thick, high density fiberglass insulation with Universal Fire-Retardant Jacket, Owens/Corning "25 ASJ/SSL", Knauf ASJ-SSL, or equal. All laps are to be sealed and stapled in place. Fittings are to be mitered segments of insulation held in place with white vapor barrier tape for concealed areas and Zeston 25/50 PVC, Knauf 25/50 rated PVC, pre-molded insulated fitting covers in exposed areas.

B. Domestic cold and hot water lines 1-1/2" and above shall be insulated with 1-1/2" thick fiberglass with jacket.

C. All water lines exposed, including mechanical rooms, shall be covered with 0.030 PVC jacket with solvent welded seams and joints.

D. All water lines on the outside of the building exposed to the weather shall be covered with 0.016” smooth aluminum jacket and elbows.

E. Domestic cold and hot water lines run below slab within building shall be insulated with 3/4" thick closed cell tube insulation. Apply two (2) coats of mastic on insulation.

2.3 WASTE LINE P-TRAPS

A. P-traps receiving HVAC condensate (exposed to weather or above ceilings) shall be insulated with 2.33" thick 3/4 # density fiberglass ductwrap insulation with aluminum foil vapor barrier. Insulation shall be sealed at all seams and joints.

2.4 STORM DRAIN PIPING

A. All storm drain piping shall be insulated with 2.33" thick 3/4 # density fiberglass ductwrap insulation with aluminum foil vapor barrier. Insulation shall be sealed at all seams and joints.

B. <u>All storm drain piping and fittings exposed in the gym shall be covered with black-color 0.030 PVC jacket.</u>

C. Insulation for exposed storm drain piping and fittings with PVC jacket shall have a neat, clean appearance when complete. Insulation and jackets shall be continuous through hangers with sheet metal saddles.

2.5 LAVATORY P-TRAP & SUPPLY LINES

A. Unless specified otherwise on drawings, insulate p-trap, tailpiece and water supplies on lavatories/sinks with white, Truebro Model 102 Handi Lav-Guard, Pro-Wrap A.D.A. lavatory insulation kit, or approved equivalent insulating system to meet A.D.A. Requirements. Provide accessories for offset tailpiece as required.

PART 3 - EXECUTION

3.1 INSULATION THROUGH HANGERS AND SLEEVES

A. The insulation shall be continuous through pipe hangers and pipe sleeves. At hangers where the pipe is supported by insulation, provide a galvanized iron protection shield. Provide pipes 2-inch i.p.s. and larger in insulation inserts at points of hanger supports. The inserts shall be of calcium silicate, cellular glass, prestressed molded glass fiber of minimum 13-pound density, or other approval material of the same thickness as adjacent insulation and not less than 13-pound density. The inserts shall have sufficient compression strength to adequately support the pipe without compressing the inserts to a thickness less than the adjacent insulation. Inserts shall be 180 degrees and not less than the length of the protection shield. Vapor barrier facing of the insert shall be the same as the facing on the adjacent insulation. Where copper clad hangers are used on domestic copper pipe, insulation may cover pipe and hanger. Provide 18-gauge metal saddles between all hangers and insulation.

END OF SECTION 22 07 00



SECTION 22 13 19 – PLUMBING SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The general provisions of the Contract, including the Conditions of the Contract (General, Supplementary, and other Conditions) and Division 00 and 01 as appropriate, apply to the Work specified in this Section.

Refer to all Sections, as well as the Specifications for the other various trades and materials and be thoroughly familiar with all provisions regarding all work.

1.2 SCOPE OF WORK

A. This Section includes plumbing specialties for water distribution systems; soil, waste, and vent systems; and storm drainage systems.

1.3 SYSTEM PERFORMANCE REQUIREMENTS

A. Provide components and installation capable of producing piping systems with following minimum working pressure ratings, except where otherwise indicated:

1. Water Distribution Systems, Below Ground: 250 psig.
2. Water Distribution Systems, Above Ground: 250 psig.
3. Soil, Waste, and Vent Systems: 10-foot head of water.
4. Storm Drainage Systems: 10-foot head of water.

1.4 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 01 Specification Sections, and Utility Company requirements.

B. Submit product data including rated capacities of selected models and weights (shipping, installation, and operation). Indicate materials, finishes, dimensions, required clearances, and methods of assembly of components; and piping and wiring connections for the following plumbing specialty products that apply to this project scope:

1. Drain valves.
2. Trap seal primer valves.
3. Cleanouts, cover plates, and access panels.

4. Floor drains, open receptors, trench drains, and roof drains.
5. Sleeve penetration systems.

C. Maintenance data for inclusion in Operating and Maintenance manuals as specified in Division 01.

1.5 QUALITY ASSURANCE

A. Comply with ASME B31.9, "Building Services Piping," for materials, products, and installation.

B. Electrical Component Standard: NFPA 70, "National Electrical Code."

C. Listing and Labeling: Provide equipment that is listed and labeled.

D. The Terms "Listed" and "Labeled": As defined in the "National Electrical Code," Article 100.

E. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" (NRTL) as defined in OSHA Regulation 1910.7.

1.6 EXTRA MATERIALS

A. Deliver extra materials to Owner. Furnish extra materials matching products installed as described below. Package them with protective covering for storage and identify with labels clearly describing contents.

B. Operating Keys (Handles): Furnish 1 extra key for each key-operated hose bibb and hydrant installed.

PART 2 - PRODUCTS

2.1 MISCELLANEOUS PIPING SPECIALTIES

A. Piping specialties such as escutcheons, dielectric fittings, sleeves, and sleeve seals are specified in Division 23 Section "Basic Mechanical Materials and Methods."

B. Stop-and-Waste Drain Valves: Ball valve or MSS SP-80 gate valve, rated for 200 psig WOG minimum, ASTM B 62 bronze body, with 1/8-inch side drain outlet and cap.

C. Trap Seal Primer Valves: ASSE 1018, water-supply-fed type, with the following characteristics:

1. 30-75 psig minimum operating pressure.
2. Bronze body with atmospheric-vented drain chamber.
3. Inlet and Outlet Connections: 1/2 inch threaded, union, or solder joint.
4. Gravity Drain Outlet Connection: 1/2 inch threaded or solder joint.
5. Finish: Chrome plated, or rough bronze for units used with pipe or tube that is not chrome finished.

D. Stack Flashing Fittings: Counterflashing-type, cast-iron fitting, with bottom recess for termination of roofing membrane, and with threaded or hub top for extension of vent pipe.

2.2 CLEANOUTS

A. General: Size cleanouts as indicated on drawings, or where not indicated, same size as connected drainage piping.

B. Cleanouts larger than 4 inches are not required except where indicated.

C. Cleanouts: ASME A112.36.2M, cast-iron body with straight threads and gasket seal or taper threads for plug, flashing flange and clamping ring, and a brass closure plug. Cleanouts for installation in floors not having membrane waterproofing may be furnished without clamping ring.

D. Covers of clean-outs shall be extra-heavy duty, AASHTO H20-44 or greater due to high wheel/point loads.

E. Cleanout top styles shall be coordinate with floor types.

2.3 SLEEVE PENETRATION SYSTEMS

A. Description: UL 1479, through-penetration firestop assembly consisting of sleeve and stack fitting with firestopping plug.

1. Sleeve: Molded PVC plastic, of length to match slab thickness and with integral nailing flange on 1 end for installation in cast-in-place concrete slabs.
2. Stack Fitting: ASTM A 48, cast-iron, hubless-pattern, wye branch stack fitting with neoprene O ring at base and cast-iron plug in thermal-release harness in branch.
   Include PVC protective cap for plug.
   a. Special Coating: Include corrosion-resistant interior coating on fittings for vent stacks.

2.4 FLASHING MATERIALS

A. Elastic Membrane: Nonreinforced flexible, black elastic, sheet, 50 to 65 mils thick and complying with the following:

1. Shore A Hardness: ASTM D 2240, 50 to 70.
2. Tensile Strength: ASTM D 412, 1200 psi.
3. Tear Resistance: ASTM D 624, Die C, 20 lb per linear inch.
4. Ultimate Elongation: ASTM D 412, 250 percent.
5. Low-Temperature Brittleness: ASTM D 746, minus 30 deg F.
6. Resistance to Ozone Aging: ASTM D 1149, no cracks for 10 percent elongated sample for 100 hours in ozone at 104 deg F.
7. Resistance to Heat Aging: ASTM D 573, maximum hardness increase of 15 points, elongation reduction of 40 percent, and tensile strength reduction of 30 percent, for 70 hours at 212 deg F.
8. Fasteners: Metal compatible with material and substrate being fastened.

PART 3 - EXECUTION

3.1 PIPING SPECIALTY INSTALLATION

A. Install strainers on supply side of each control valve, pressure-regulating valve, and solenoid valve, and where indicated.

B. Install trap seal primer valves with valve outlet piping pitched down toward drain trap a minimum of 1/8 inch per foot (1:100) (1 percent) and connect to floor drain body, trap, or inlet fitting. Adjust valve for proper flow.

C. Install expansion joints on vertical risers, stacks, and conductors.

D. Install cleanouts in above-ground piping and building drain piping where indicated, and where not indicated, according to the following:

1. Size same as drainage piping up to 4 inches size. Use 4 inches size for larger drainage piping except where larger size cleanout is indicated.
2. Locate at each change in direction of piping greater than 45 degrees.
3. Locate at minimum intervals of 50 feet for piping 3 inches and smaller and 80 feet for larger piping.
4. Locate at base of each vertical soil or waste stack.

E. Install cleanout deck plates (covers), of types indicated, with top flush with finished floor, for floor cleanouts for piping below floors.

F. Install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall, for cleanouts located in concealed piping.

G. Install flashing flange and clamping device with each stack and cleanout passing through floors having waterproof membrane.

H. Install vent flashing sleeves on stacks passing through roof. Secure over stack flashing according to the manufacturer's written instructions.

I. Install frost-proof vent caps on each vent pipe passing through roof. Maintain 1-inch clearance between vent pipe and roof substrate.

3.2 CONNECTIONS

A. Supply Runouts to Fixtures: Install hot- and cold-water supply piping runouts to fixtures of sizes indicated, but not smaller than required by equipment/fixture connection size and/or required by the plumbing code.

B. Drainage Runouts to Fixtures: Provide drainage and vent piping runouts to plumbing fixtures and drains, with approved trap, of sizes indicated, for equipment/fixture connection size and/or required by the but not smaller than required by plumbing code.

C. Locate drainage piping runouts as close as possible to bottom of floor slab supporting fixtures or drains.

3.3 FLASHING INSTALLATION

A. Provide flashing manufactured in a single piece except where large pans, sumps, or other drainage shapes are required.

B. Install 4 psf lead flashing or 16 oz. per sq. ft. copper, except when another weight or material is specified.

C. Install 6 psf lead flashing or heavier where burning (welding) of lead sheets is required.

D. Solder joints of metal sheet flashing utilized sheets where required.

E. Install sheet flashing on pipes, sleeves, and specialties passing through or embedded in floors and roofs with membrane waterproofing.

1. Pipe Flashing: Sleeve type, matching pipe size, with minimum sleeve length of 10 inches, and skirt or flange extending at least 8 inches around pipe.
2. Sleeve Flashing: Flat sheet, with skirt or flange extending at least 8 inches around sleeve.

3. Embedded Specialty Flashing: Flat sheet, with skirt or flange extending at least 8 inches around specialty.

F. Set flashing on floors and roofs in solid coating of bituminous cement.

G. Secure flashing into sleeve and specialty clamping ring or device.

H. Install flashing for piping passing through roofs with counter flashing or commercially made flashing fittings, according to Division 07 Section "Sheetmetal Flashing and Trim."

I. Extend flashing up vent pipe passing through roofs and turn down into pipe or secure flashing into cast-iron sleeve having calking recess.

J. Fabricate and install metal sheet flashing and pans, sumps, and other drainage shapes consistent with Architectural details and materials identified. Install drain connection at all equipment requiring drain piping connection.

3.4 COMMISSIONING

A. Preparation: Perform the following checks before start-up:

1. Systems tests are complete.
2. Damaged and defective specialties and accessories have been replaced or repaired.
3. There is clear space for servicing of specialties.

B. Before operating systems, perform these steps:

1. Close drain valves, hydrants, and hose bibbs.
2. Open valves to full open position.
3. Remove and clean strainers.
4. Verify drainage and vent piping are clear of obstructions. Flush with water until clear.

C. Starting Procedures: Follow manufacturer's written procedures.

3.5 ADJUSTING

A. Adjust operation and correct deficiencies discovered during commissioning.

3.6 PROTECTION

A. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

B. Place plugs in ends of uncompleted piping at end of day or when work stops.

END OF SECTION 22 13 19



SECTION 22 14 00 – DRAINAGE AND VENT SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The general provisions of the Contract, including the Conditions of the Contract (General, Supplementary, and other Conditions) and Division 00 and 01 as appropriate, apply to the Work specified in this Section.

B. Refer to all Sections, as well as the Specifications for the other various trades and materials and be thoroughly familiar with all provisions regarding all work.

1.2 SCOPE OF WORK

A. This Section specifies building sanitary drainage and vent piping systems, building condensate drainage system, building grease waste drainage and vent system, and storm drainage and vent piping systems, including drains and drainage specialties.

1.3 DEFINITIONS

A. Building Drain: That part of the lowest piping of a drainage system which receives the discharge from soil, waste, and other drainage pipes inside the walls of the building and conveys it to the building sewer.

B. Building Sewer: That part of the drainage system which extends from the end of the building drain and conveys its discharge to a public sewer, private sewer, individual sewage disposal system, or other point of disposal.

C. Drainage System: Includes all the piping within a public or private premise which conveys sewage, rain water or other liquid wastes to a point of disposal. It does not include the mains of public sewer systems or a private or public sewage treatment or disposal plant.

D. Vent System: A pipe or pipes installed to provide a flow of air to or from a drainage system, or to provide a circulation of air within such system to protect trap seals from siphonage and back pressure.

1.4 SUBMITTALS

A. Refer to Division 01 and Division 23, Basic Mechanical Requirements for administrative and procedural requirements for submittals.

B. Product Data: Submit product data for the following products that apply to this project scope:

1. Drainage piping specialties
2. Floor drains.
3. Roof Drains

C. Quality Control Submittals:

1. Submit reports specified in Part 3 of this Section.

1.5 QUALITY ASSURANCE

A. Codes and Standards:

1. Plumbing Code Compliance: Comply with applicable portions of Edition 2021 of the International Plumbing Code.

1.6 SEQUENCING AND SCHEDULING

A. Coordinate the installation of roof drains, flashing, and roof penetrations.

B. Coordinate flashing materials installation of roofing, waterproofing, and adjoining substrate work.

C. Coordinate the installation of drains in poured-in-place concrete slabs, to include proper drain elevations, installation of flashing, and slope of slab to drains.

D. Coordinate with installation of sanitary and storm sewer systems as necessary to interface building drains with drainage piping systems.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturer Uniformity: conform with the requirements specified in Division 23, Basic Mechanical Requirements, under "Product Options" for the following drainage and vent systems.

2.2 DRAINAGE PIPING SPECIALTIES

A. Backwater Valves: Valve assembly shall be bronze fitted cast-iron, with bolted cover. Flapper shall provide a maximum 1/4" clearance between flapper and seat for air circulation. Valve ends shall suit piping material.

B. Trap Primers: Bronze body valve with automatic vacuum breaker, with 1/2" connections matching piping system. Complying with ASSE 1018.

C. Expansion Joints: Cast-iron body with adjustable bronze sleeve, bronze bolts with wing nuts.

D. Cleanout Plugs: Cast-bronze or brass, threads complying with ANSI B2.1, countersunk head.

E. Floor Cleanouts: Cast-iron body and frame, and adjustable round top as follows:

1. Nickel-Bronze Top: Manufacturer's standard cast unit with the following patterns:
2. Exposed flush type, standard non-slip scored or abrasive finish.
3. Cast-iron Top: Manufacturer's extra-heavy duty cast unit with the following patterns:
   a. Exposed flush type, standard non-slip scored or abrasive finish.
4. Wall Cleanouts: Cast-iron body adaptable to pipe with cast-bronze or brass cleanout plug; stainless steel cover including screws.
5. Flashing Flanges: Cast-iron watertight stack or wall sleeve with membrane flashing ring. Provide underdeck clamp and sleeve length as required.
6. Vent Flashing Sleeves: Cast-iron calking type roof coupling for cast-iron stacks, cast-iron threaded type roof coupling for steel stacks, and cast bronze stack flashing sleeve for copper tubing.
7. Frost-Proof Vent Caps: Construct of galvanized iron, copper, or lead-coated copper, sized to provide 1" air space between outside of vent pipe and inside of flashing collar extension.
8. Vandal-Proof Vent Caps: Cast-iron body full size of vent pipe, with calked base connection for cast-iron pipes, threaded base for steel pipes.

2.3 FLOOR DRAINS

A. Floor drain type designations, descriptions, and sizes are indicated on Drawings.

2.4 ROOF DRAINS

A. Roof Drain type designation, description and sizes are indicated on drawings.

B. Roof Drains: Cast-iron body and combined flashing collar and gravel stop, cast-iron dome, shall have the following features (unless otherwise noted):

1. Underdeck clamp
2. 1-1/2" Extension
3. Sump receiver

4. Expansion Joint
5. Deep sump body
6. Vandal-proof dome
7. Bottom outlet, inside caulk except side outlet where specifically shown on plans.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify all dimensions by field measurements. Verify that all drainage and vent piping and specialties may be installed in accordance with pertinent codes and regulations, the original design, and the referenced standards.

B. Verify all existing grades, inverts, utilities, obstacles, and topographical conditions prior to installations.

C. Examine rough-in requirements for plumbing fixtures and other equipment having drain connections to verify actual locations of piping connections prior to installation.

D. Examine walls, floors, roof, and plumbing chases for suitable conditions where piping and specialties are to be installed.

E. Do not proceed until unsatisfactory conditions have been corrected.

3.2 PREPARATION FOUNDATION FOR UNDERGROUND BUILDING DRAINS

A. Grade trench bottoms to provide a smooth, firm and stable foundation, free from rock, throughout the length of the pipe.

B. Remove unstable, soft, and unsuitable materials the surface upon which pipes are to be laid and backfill with clean sand and pea gravel to indicate invert elevation.

C. Shape bottom of trench to fit bottom of pipe for 90-degrees (bottom 1/4 of the circumference). Fill unevenness with tamped sand backfill. At each pipe joint dig bell holes to relieve the bell of the pipe of all loads and to ensure continuous bearing of the pipe barrel on the foundation.

3.3 JOINING PIPES AND FITTINGS

A. Copper Tubing: Solder joints in accordance with the procedures specified in ANSI B9.1.

B. Cast-Iron Soil Pipe: Make lead and oakum calked joints, compression joints, and hubless joints in accordance with the recommendations in the CISPI Cast Iron Soil Pipe and Fittings Handbook, Chapter IV.

3.4 INSTALLATION

A. Refer to the separate Division 23 section: Basic Piping Materials and Methods, for general piping installation instructions.

B. Install supports and anchors in accordance with Division-23 Basic Mechanical Materials and Methods section "Supports and Anchors".

C. General Locations and Arrangements: Drawings (plans, schematics, and diagrams) indicate the general location and arrangement of the piping systems. Location and arrangement of piping layout take into account many design considerations. So far as practical, install piping as indicated.

D. Make changes in direction for drainage and vent piping using appropriate 45-degree wyes, half-wyes, or long sweep quarter, sixth, eighth, or sixteenth bends. Sanitary tees or short quarter bends may be used on vertical stacks of drainage lines where the change in direction of flow is from horizontal to vertical, except use long-turn fittings where two fixtures are installed back-to-back and have a common drain. Straight tees, elbows, and crosses may be used on vent lines. No change in direction of flow greater than 90 degrees shall be made. Where different sizes of drainage pipes and fittings are connected, use proper size, standard increasers and reducers. Reduction of the size of drainage piping in the direction of flow is prohibited.

E. Install underground building drains to conform with the plumbing code, and in accordance with the Cast Iron Soil Pipe Institute Engineering Manual. Lay underground building drains beginning at low point of systems, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install required gaskets in accordance with manufacturer's recommendations for use of lubricants, cements, and other special installation requirements. Maintain swab or drag in line and pull past each joint as it is completed.

F. Install building drain pitched down at minimum slope of 1/4" per foot (2 percent) for piping 3" and smaller, and 1/8" per foot (1 percent) for piping 4" and larger.

G. Extend building drain to connect to sewer piping, of size and in location indicated for service entrance to building. Sewer piping is specified in a separate section of Division 02.

H. Install sleeve and mechanical sleeve seal through foundation wall for watertight installation.

3.5 INSTALLATION OF PIPING SPECIALTIES

A. Install backwater valves in sanitary building drain piping as indicated, and as required by the plumbing code.

B. Install expansion joints on vertical risers as indicated, and as required by the plumbing code.

C. Above Ground Cleanouts: Install in above ground piping and building drain piping as indicated, and as required by plumbing code;

1. At each change in direction of piping greater than 45 degrees;
2. At minimum intervals of 50' for piping 3" and smaller and 80' for larger piping;
3. At base of each vertical soil or waste stack.

D. Clean-outs Covers (extra heavy duty): Install floor and wall cleanout covers for concealed piping, types as indicated at all cleanouts.

E. Flashing Flanges: Install flashing flange and clamping device with each stack and clean-out passing through waterproof membranes.

F. Vent Flashing Sleeves: Install on stacks passing through roof, secure over stack flashing in accordance with manufacturer’s instructions.

G. Frost-Proof Vent Caps: Install frost-proof vent caps on each vent pipe passing through roof. Maintain 1" clearance between vent and pipe and roof substrate.

3.6 INSTALLATION OF FLOOR DRAINS

A. Install floor drains in accordance with manufacturer's written instructions and in locations indicated.

B. Install floor drains at low points of surface areas to be drained, or as indicated. Set tops of drains flush with finished floor.

C. Set drain elevation depressed below finished slab elevation as listed below to provide proper slope to drain:

DEPRESSION	RADIUS OF AREA DRAINED
1/2"	5'-0"
3/4"	10'-0"

1”	15'-0"
1-1/4"	20'-0"
1-1/2"	25'-0"

D. Trap all drains connected to the sanitary sewer. Provide 6" deep seal p-traps, and trap primers.

E. Install drain flashing collar or flange so that no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes, where penetrated.

F. Position drains so that they are accessible and easy to maintain.

3.7 INSTALLATION OF TRAP PRIMERS

A. Install trap primers with piping pitched towards drain trap, minimum of 1/8" per foot (1 percent). Adjust trap primer for proper flow.

3.8 INSTALLATION OF ROOF DRAINS

A. Install roof drains at low points of roof areas, in accordance with the roof membrane manufacturer’s installation instructions, and related Architectural instruction and/or details, that apply.

B. Install drain flashing collar or flange so that no leakage occurs between roof drain and adjoining roofing. Maintain integrity of waterproof membranes, where penetrated.

C. Position roof drains so that they are accessible and easy to maintain.

3.9 CONNECTIONS

A. Piping Runouts to Fixtures: Provide drainage and vent piping runouts to plumbing fixtures and drains, with approved trap, of sizes indicated.

B. Locate piping runouts as close as possible to bottom of floor slab supporting fixtures or drains.

3.10 FIELD QUALITY CONTROL

A. Inspections:

1. Do not enclose, cover, or put into operation drainage and vent piping system until it has been inspected and approved by the Architect.

2. During the progress of the installation, notify the Architect, at least 24 hours prior to the time such inspection must be made. Perform tests specified below in the presence of the Architect.
3. Rough-in Inspection: Arrange for inspection of the piping system before concealed or closed-in after system is roughed-in, and prior to setting fixtures.
4. Final Inspection: Arrange for a final inspection by the Architect to observe the tests specified below and to ensure compliance with the requirements of the plumbing code.
5. Re-inspections: Whenever the piping system fails to pass the test or inspection, make the required corrections, and arrange for reinspected by the Architect.
6. Reports: Prepare inspection reports, signed by the Architect.

B. Piping System Test:

1. Test for leaks and defects all new drainage and vent piping systems and parts of existing systems, which have been altered, extended or repaired. If testing is performed in segments, submit a separate report for each test, complete with a diagram of the portion of the system tested.
2. Leave uncovered and unconcealed all new, altered, extended, or replaced drainage and vent piping until it has been tested and approved. Expose all such work for testing, that has been covered or concealed before it has been tested and approved.

C. Drainage and Venting System Testing Procedures:

1. Rough Plumbing: Except for outside leaders and perforated or open jointed drain tile, test the piping of plumbing drainage and venting systems upon completion of the rough piping installation. Tightly close all openings in the piping system, and fill with water to the point of overflow, but not less than 10 feet head of water. Water level shall not drop during the period from 15 minutes before the inspection starts, through completion of the inspection. Inspect all joints for leaks.
2. Finished Plumbing: After the plumbing fixtures have been set and their traps filled with water, their connections shall be tested and proved gas and water-tight. Plug the stack openings on the roof and building drain where it leaves the building, and introduce air into the system equal to a pressure of 1" water column. Use a "U" tube or manometer inserted in the trap of a water closet to measure this pressure. Air pressure shall remain constant without the introduction of additional air throughout the period of inspection. Inspect all plumbing fixture connections for gas and water leaks.

3. Repair all leaks and defects using new materials and retest system or portion thereof until satisfactory results are obtained.
4. Prepare reports for all tests and required corrective action.

3.11 ADJUSTING AND CLEANING

A. Clean interior of piping. Remove dirt and debris as work progresses.

B. Clean drain strainers, domes, and traps. Remove dirt and debris.

3.12 PROTECTION

A. Protect drains during remainder of construction period, to avoid clogging with dirt and debris, and to prevent damage from traffic and construction work.

B. Place plugs in ends of uncompleted piping at end of day or whenever work stops.

END OF SECTION 22 14 00



SECTION 22 40 00 – PLUMBING FIXTURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The general provisions of the Contract, including the Conditions of the Contract (General, Supplementary, and other Conditions) and Division 00 and 01 as appropriate, apply to the Work specified in this Section.

Refer to all Sections, as well as the Specifications for the other various trades and materials and be thoroughly familiar with all provisions regarding all work.

1.2 SCOPE OF WORK

A. This Section includes plumbing fixtures and trim, fittings, and accessories, appliances, appurtenances, equipment, and supports associated with plumbing fixtures.

B. Products unloaded, uncreated, set in place, installed and final connections made but not furnished under this Section include:

1. Plumbing Fixtures described in Plumbing Fixture Schedule.
2. Accessories, appliances, appurtenances, and equipment specified in other sections, requiring plumbing services or fixture-related devices such as ice makers for refrigerators, as indicated.

1.3 DEFINITIONS

A. Accessible: Describes a plumbing fixture, building, facility, or portion thereof that can be approached, entered, and used by physically handicapped people.

B. Accessory: Device that adds effectiveness, convenience, or improved appearance to a fixture but is not essential to its operation.

C. Appliance: Device or machine designed and intended to perform a specific function.

D. Appurtenance: Device or assembly designed to perform some useful function when attached to or used with a fixture.

E. Equipment: Device used with plumbing fixtures or plumbing systems to perform a certain function for plumbing fixtures but that is not part of the fixture.

F. Fitting: Fitting installed on or attached to a fixture to control the flow of water into or out of the fixture.

G. Fixture: Installed receptor connected to the water distribution system that receives and makes available potable water and discharges the used liquid or liquid-borne wastes directly or indirectly into the drainage system. The term "Fixture" means the actual receptor, except when used in a general application where terms "Fixture" and "Plumbing Fixture" include associated trim, fittings, accessories, appliances, appurtenances, support, and equipment.

H. Roughing-In: Installation of piping and support for the fixture prior to the actual installation of the fixture.

I. Support: Device normally concealed in building construction, for supporting and securing plumbing fixtures to walls and structural members. Supports for urinals, lavatories, and sinks are made in types suitable for fixture construction and the mounting required. Categories of supports are:

1. Carrier: Floor-mounted support for wall-mounted water closet, and support fixed to wall construction for wall-hung fixture.
2. Chair Carrier: Support for wall-hung fixture, having steel pipe uprights that transfer weight to the floor.
3. Chair Carrier, Heavy Duty: Support for wall-hung fixture, having rectangular steel uprights that transfer weight to the floor.
4. Reinforcement: Wood blocking or steel plate built into wall construction, for securing fixture to wall.

J. Trim: Hardware and miscellaneous parts, specific to a fixture and normally supplied with it required to complete fixture assembly and installation.

1.4 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 01 Specification Sections.

B. Product data for each type of plumbing fixture specified, including fixture and trim, fittings, accessories, appliances, appurtenances, equipment, supports, construction details, dimensions of components, and finishes.

1.5 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with requirements of ANSI Standard A117.1, "Buildings and Facilities -- Providing Accessibility and Usability for Physically Handicapped People," and Public Law 90-480, "Architectural Barriers Act, 1968," with respect to plumbing fixtures for the physically handicapped.

B. Regulatory Requirements: Comply with requirements of ATBCB (Architectural and Transportation Barriers Compliance Board) "Uniform Federal Accessibility Standards (UFAS) - 1985-494-187" with respect to plumbing fixtures for the physically handicapped.

C. Listing and Labeling: Provide electrically (battery) operated fixtures specified in this Section that are listed and labeled.

1. The terms "listed" and "labeled" shall be as defined in the National Electrical Code, Article 100.
2. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" (NRTL) as defined in OSHA Regulation 1910.7.

D. Design Concept: The drawings indicate types of plumbing fixtures and are based on the specific descriptions, manufacturers, models, and numbers indicated. Plumbing fixtures having equal performance characteristics by other manufacturers may be considered provided that deviations in dimensions, operation, color or finish, or other characteristics are minor and do not change the design concept or intended performance as judged by the Architect. Burden of proof for equality of plumbing fixtures is on the proposer.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver plumbing fixtures in manufacturer's protective packing, crating, and covering.

B. Store plumbing fixtures on elevated platforms in a dry location.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work as described in plumbing fixture schedule on drawings.

2.2 PLUMBING FIXTURES, GENERAL

A. Contractor shall install all plumbing fixtures shown on accompanying Drawings. Refer to both Plumbing and Architectural, and install all fixtures shown on either.

B. Provide plumbing fixtures and trim, fittings, other components, and supports as specified in "Plumbing Fixture Schedule" identified on plans.

C. All brass must be of the best quality. Lightweight goods will not be accepted.

D. All brass pipe shall be seamless brass tubing and nipples shall be extra heavy.

E. All fittings and trim shall be chromium plated heavy brass unless otherwise specified.

F. "P" traps on lavatories and sinks shall be cast brass with cleanouts.

G. All exposed piping shall be chromium plated.

H. Provide cut-off valves at each fixture in both hot and cold-water piping.

I. For the purpose of establishing type and class of fixtures required, the following plate numbers have been taken from the Manufacturer's Catalog as indicated Fixture manufacturers and Model numbers with prior approval will be acceptable, however fixtures and accessories shall meet standards and features consistent with basis of design fixtures and accessories identified.

J. Provide plumbing fixtures and trim, fittings, other components, and supports as specified in "Plumbing Fixture Schedule" identified on plans.

2.3 PLUMBING FIXTURE SUPPORTS

A. Supports: ASME A112.6.1M, categories and types as required for wall-hanging fixtures specified, and wall reinforcement.

1. Support categories are:
   a. Carriers: Supports for wall-hanging fixtures supported from wall construction.
   b. Reinforcement: 2 inches by 4 inches wood blocking between studs or 1/4 inch by 6 inches steel plates attached to studs, in wall construction, to secure floor-mounted and special fixtures to wall.
   c. Support Types: Provide support of type having features required to match fixture.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in for potable cold water and hot water supplies and soil, waste, and vent piping systems to verify actual locations of piping connections prior to installing fixtures.

B. Examine walls, floors, and cabinets for suitable conditions where fixtures are to be installed.

C. Do not proceed until unsatisfactory conditions have been corrected.

3.2 APPLICATION

A. Install plumbing fixtures and specified components, in accordance with designations and locations indicated on Drawings.

B. Install supports for plumbing fixtures in accordance with categories indicated, and of type required:

1. Carriers for following fixtures:
    a. Wall-hanging fixtures supported from wall construction.
2. Chair carriers for the following fixtures:
    a. Wall-hanging urinals.
    b. Wall-hanging lavatories and sinks.
    c. Wall-hanging drinking fountains and electric water coolers.
3. Heavy-duty chair carriers for the following fixtures:
    a. Fixtures where specified.
4. Reinforcement for the following fixtures:
    a. Floor-mounted sinks required to be secured to wall.
    b. Recessed, box-mounted electric water coolers.

3.3 INSTALLATION OF PLUMBING FIXTURES

A. Install plumbing fixtures level and plumb, in accordance with fixture manufacturers' written installation instructions, roughing-in drawings, and referenced standards.

B. Install water closets with closet flanges and gasket seals.

C. Install wall-hanging, back-outlet urinals with gasket seals.

D. Fasten wall-hanging plumbing fixtures securely to supports attached to building substrate when supports are specified, and to building wall construction where no support is indicated.

E. Fasten wall-mounted fittings to reinforcement built into walls.

F. Fasten counter-mounting-type plumbing fixtures to casework.

G. Secure supplies behind wall or within wall pipe space, providing rigid installation.

H. Install stop valve in an accessible location in each water supply to each fixture.

I. Install trap on fixture outlet except for fixtures having integral trap.

J. Install escutcheons at each wall, floor, and ceiling penetration in exposed finished locations and within cabinets and millwork. Use deep pattern escutcheons where required to conceal protruding pipe fittings.

K. Seal fixtures to walls, floors, and counters using a sanitary-type, one-part, mildew-resistant, silicone sealant in accordance with sealing requirements specified in Division 07. Match sealant color to fixture color.

3.4 CONNECTIONS

A. Piping installation requirements are specified in other sections of Division 22. The Drawings indicate general arrangement of piping, fittings, and specialties. The following are specific connection requirements:

1. Install piping connections between plumbing fixtures and piping systems and plumbing equipment specified in other sections of Division 22.
2. Install piping connections indicated between appliances and equipment specified in other sections, direct connected to plumbing piping systems.

3.5 FIELD QUALITY CONTROL

A. Inspect each installed fixture for damage. Replace damaged fixtures and components.

B. Test fixtures to demonstrate proper operation upon completion of installation and after units are water pressurized. Replace malfunctioning fixtures and components, then retest. Repeat procedure until all units operate properly.

3.6 ADJUSTING AND CLEANING

A. Operate and adjust faucets and controls. Replace damaged and malfunctioning fixtures, fittings, and controls.

B. Operate and adjust disposers, hot water dispensers, and controls. Replace damaged and malfunctioning units and controls.

C. Adjust water pressure at drinking fountains, electric water coolers, and faucets, shower valves, and flushometers having controls, to provide proper flow and stream.

D. Replace washers of leaking and dripping faucets and stops.

E. Clean fixtures, fittings, and spout and drain strainers with manufacturers' recommended cleaning methods and materials.

1. Review the data in Operating and Maintenance Manuals. Refer to Division 01.

3.7 PROTECTION

A. Provide protective covering for installed fixtures and fittings.

B. Do not allow use of fixtures for temporary facilities, except when approved in writing by the Owner.

END OF SECTION 22 40 00



SECTION 23 00 10 - MECHANICAL GENERAL PROVISIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The general provisions of the Contract, including the Conditions of the Contract (General, Supplementary, and other Conditions) and Division 00 and 01 as appropriate, apply to the Work specified in this Section.

B. Refer to all Sections, as well as the Specifications for the other various trades and materials and be thoroughly familiar with all provisions regarding all work.

1.2 SCOPE OF WORK

A. Furnish all labor and material necessary to provide and install the complete mechanical portion of this Contract as called for herein and on accompanying drawings. Parts of the mechanical division may be bid separately or in combination, at the Contractor's option; however, it shall be the responsibility of the Contractor to assure himself that all items covered in the mechanical Division have been included if he chooses to accept separate bids.

B. It is the intent of this specification that all materials with temperatures below ambient conditions or conveying any fluid/gas at temperatures below 70 deg. F be insulated to completely eliminate the potential for condensation. Unless specified elsewhere in these specifications, for materials that do not require and requiring occasional access, use 2" thick closed cell rubberized insulation with re-sealable fabric joints (hook and loop type).

C. Contractor shall refer to the Architectural and Structural drawings and install equipment, piping, etc. to meet building and space requirements. No equipment shall be bid on or submitted for approval if it will not fit in the space provided.

D. It is the intention of these specifications that all mechanical systems shall be furnished complete with all necessary valves, controls, insulation, piping devices, equipment, etc. necessary to provide a satisfactory installation that is complete and in good working order.

E. Contractor shall visit the site and acquaint himself thoroughly with all existing facilities and conditions which would affect his portion of the work. Failure to do so shall not relieve the Contractor from the responsibility of installing his work to meet the conditions.

F. Contractor shall protect the entire system and all parts thereof from injury throughout the project and up to acceptance of the work. Failure to do so shall be sufficient cause for the Architect to reject any piece of equipment.

G. Provide as work of this Division (unless clearly and specifically indicated as a requirement of the Division 26 contractor on the Division 26 drawings) the following:

1. 120V power to all temperature control panels, unit controllers, field devices, etc. as required.
2. Wiring of any remote start/stop switches, occupancy sensors, manual or automatic motor speed control devices, motorized damper actuators controlling Division 23 equipment.

1.3 BIDDING REQUIREMENTS AND RESPONSIBILITIES

A. Prime bidder is responsible for all work, of all trades and sub-contractors bidding this project. It is the prime bidder's responsibility, prior to submitting a bid to ensure that sub-contractors coordinate all aspects of the work between trades, sub-contractors, etc. to the fullest extent possible.

B. Prime bidder shall ensure that all sub-contractors, suppliers, equipment vendors, etc., obtain all necessary and pertinent contract document information pertaining to their work prior to the submission of a bid.

C. Bidders of all or any portions of this section or division are required to review all contract documents including but not limited to Architectural drawings, Structural drawings, Mechanical drawings, Plumbing drawings, Electrical drawings, and Fire Alarm drawing section to coordinate requirements and responsibilities with and through prime bidder.

D. Bidders of all or any portions of this section or division, by furnishing a bid on a portion of the prime contract are indicating that they have received all contract documents and coordinated services provided under their portion of the work with the prime bidder; they are indicating that they have expressed any pertinent questions (which would result from a detailed, thorough review of the entire set of contract documents) to the prime bidder in accordance with Division 01 requirements, prior to bidding.

E. All timely, pertinent, questions provided in writing prior to bids, in accordance with Division 01 requirements, will be clarified, defined, or otherwise explained in written addendum and / or addendums prior to bids, in accordance in Division 01 requirements.

F. It is not the intention of these contract documents to leave any issue relating to coordination between trades or sub-contractors vaguely defined. The intention is to define all issues, coordination matters, equipment requirements, sizes, routing, etc. to the satisfaction of the prime bidder, prior to receipt of bids.

G. Bidders of all or any portions of this section or division, by virtue of the submission of a bid to the prime bidder, are indicating that they have reviewed the entire set of contract documents with due diligence and regard for the Owner's desire for a comprehensive and complete bid proposal; that they have expressed all concerns or questions requiring clarification on matters of coordination between trades and/or sub-contractors; that they have expressed any such concerns or questions in writing in accordance with Division 01 requirements.

H. Prime bidders, by submission of a comprehensive bid on the project are indicating that the subcontractors selected in their bid have complied with all Division 01 requirements, that they have indicated in writing, prior to bidding, all questions or concerns requiring clarification and/or explanation and have documented any and all specific exclusions involving work that would generally be considered to be work of their trade. The prime bidder shall coordinate all work so that anything excluded by the bidder of all or any portions of this section or division, have been addressed prior to bids in one of the following manners:

1. The work has been confirmed, by the prime bidder, to be work of another trade or subcontractor (whose proposal is also being accepted).
   a. Clarification of the matter has been made through the prime design professional via written addendum and is clearly and mutually understood by the prime bidder and the party raising the issue/question, or seeking clarification.
   b. The work has been accepted as the responsibility of the Contractor directly.

1.4 POST-BID VALUE ENGINEERING (V/E):

A. Value Engineering (V/E) defined: For purposes of Division 23 Specifications, in accordance with all Division 01 Requirements and all Terms and Conditions of proposed contract between Owner and Contractor, Value Engineering (V/E) shall be defined as a “post bid” process, whereby the apparent low bidder (having submitted a proposal in strict accordance with Project Contract Documents, that exceeds the Owner’s available funds for construction [AFC] for this specified project offers proposed changes (“Value Engineering”) to the work. This proposed value engineering may alter or adjust aforementioned contract document requirements in exchange for financial and/or other

consideration (in response to a specific request by the Owner/Owner's Representative).

B. Value Engineering may not be considered, prior to scheduled receipt and review of Bid Proposals by the Owner and an official written request from the Owner/Owner's Representative expressing the Owner's desire to consider value engineering items.

C. While it may be in the project Owner's interest to consider the first cost money saving that may be generated via alternatives and options generated via participation in Value Engineering, Division 23 contractor shall realize that substantive offers of Value Engineering (V/E), if accepted by the Owner, constitute a design-build agreement (offer and acceptance) with the owner, and drastically change the design concept of the project, as developed by the Professional of Record identified on the Contract Documents.

D. Should Contractor offer, and the owner accept value engineering options that alter aspects of the system design, equipment, performance and/or performance verification or monitoring of respective systems, Contractor shall provide duly licensed professional engineering consultants working on behalf of the Contractor (including sub-contractors and equipment vendors/manufacturers) to review, approve and take professional responsibility for performance and suitability of V/E hybrid systems, materials or operational changes related to respective V/E items. The Contractor's licensed professional engineering consultants and the Contractor assume any and all responsibility for the design and suitability in terms of performance, of hybrid systems installed, as Contractor's Professional of Record, absolving the original project Professional of Record (identified on the original Contract Documents, released for the original project Bid/Negotiation) from responsibility for the V/E hybrid systems portion of the work.

E. Division 23 Contractor, via the offer and acceptance of value engineering items on the project agrees to provide professional engineering design services and take full and complete responsibility for the hybrid design. Further, the Contractor's (V/E Items) professional of record (either employees, or independent consultants to the Contractor) through the offer and acceptance of V/E items, agree to indemnify and hold harmless the project owner, the owner's original A/E team (Professional of Record on behalf of the owner for the original Contract Documents) their heirs and assigns in regard to the V/E changes and their impact on the Division 23 systems altered, affected or modified, in whole or in part. The Professional of Record shown on the original Contract Documents in regard to the systems altered, adjusted, revised, modified or otherwise affected by the value engineering items implemented, shall be absolved of design responsibility as a result of implementation of V/E items, and

their original use of Engineering Seals used for original Contract Documents, shall not apply.

1.5 MATERIAL AND EQUIPMENT

A. The term "provide" when used in the Contract Documents shall mean “furnish and install” and includes all items necessary for the proper execution and completion of the Work.

B. Specific reference in the Specifications to any article, device, product, material, fixture, form or type of construction by name, make or catalog number, shall be interpreted as establishing a standard of quality and shall not be construed as limiting competition; and the
Contractor, in such cases, may at his option use any article, device, product, material, fixture, form or type of construction which in the judgment of the Architect expressed in writing is equal to that specified.

C. Coordinate and properly relate all Work of this Division to building structure and work of all other trades.

D. Visit premises and become thoroughly familiar with existing conditions; verify all dimensions in field. Advise Architect of any discrepancies prior to Bid Date in accordance with Division 00.

E. Do not rough-in for any item or equipment furnished by others or noted "Not in Contract" (NIC), without first receiving rough-in information or determining rough-in requirements from physically examining the existing equipment, receiving specific cut sheet information from the Owner’s representative, other trades and/or Architect. Rough-in services for “NIC” equipment as required, as the work progresses.

F. Provide storage and protection for all equipment and materials in accordance with requirements of Division 00 and Division 01. Replace any equipment and materials damaged by improper handling, storage, or protection, at no additional cost to Owner.

G. Keep premises clean in accordance with requirements of Division 00 and Division 01.

1.6 SUBSTITUTIONS

A. Substitutions are allowed under La. R.S. 38:2291 and La R.S. 38:2292. Any requests for prior approval (as provided for under La. R.S. 38:2295) including any re-submitted data, shall be received by the Architect/Engineer a minimum

of fourteen (14) working days prior to bid date. The Contractor shall recognize that it may be necessary to submit certain requests for prior approval sooner than the final date listed in the Instructions to Bidders, depending upon the complexity and completeness of the submittal. If, in the opinion of the Architect/Engineer, there is neither sufficient time available nor adequate descriptive data attached to the submittal, the submittal will not be considered. Except as otherwise specified, materials and equipment shall be new and bear the approval label of the Underwriters Laboratories, Inc. for the type of installation required.

B. Basis of design of systems is based on specific equipment for performance, size, shape, color, construction material, etc... If the use of other manufacturer's equipment, even though approved by Architect, involves additional cost due to space requirements, foundation requirements, increased mechanical or electrical services, the cost of such extra work shall be borne by the contractor. Even though a manufacturer's name appears in the Contract Documents as having acceptable equipment, his equipment shall be classified as being a substitute to the equipment originally designed for and named in the Contract Documents. Substitute equipment, materials, etc., will not be allowed to deviate from basis of design requirements.

C. All requests for prior approval shall identify where proposed material matches or exceeds the performance of the equipment specified. In addition, such submittal shall also clearly identify all deficiencies compared to specified product. Submittal of general cut sheets will be returned rejected.

1.7 DRAWINGS AND SPECIFICATIONS

A. The specific intent of these Contract Documents is to provide the various systems, equipment, etc. to the Owner complete and in a thoroughly calibrated and functional condition.

B. The Drawings shall not be construed as shop drawings. In the event of a possible interference with piping or equipment of another trade, items requiring set grade and elevations shall have precedence over other items. Should any major interference develop, immediately notify the Architect.

C. In laying out Work, refer to Contract Documents at all times in order to avoid interference and undue delays in the progress of the Work.

D. Furnish all plumbing fixtures (with required accessories) shown on either the plumbing drawings or the architectural drawings. Review Architectural casework elevations and identify fixtures indicated. Provide fixtures indicated. Rough-in for all fixtures as work progress. Verify plumbing fixtures required

from review of Mechanical and Architectural drawings, prior to fixture shop drawing submittal.

1.8 CODES AND REGULATIONS

A. Work shall be in full accord with the most stringent interpretation of the State Sanitary Code, local ordinances, building codes, and other applicable national, local, and state regulations.

B. Equipment shall conform to requirements and recommendations of the National Bureau of Fire Underwriters and National Fire Protection Association (NFPA).

C. Items provided under this Division shall comply with the American National Standards Institute (ANSI) "Specifications for Making Buildings and Facilities Accessible to and Usable by Physically Handicapped People," ANSI A 117.1

D. In the possible event of conflict between codes or regulations and Contract Documents, notify the Architect immediately. Codes and Standards represent minimum requirements. These specifications may exceed requirements in various codes and standards.

1.9 FEES, PERMITS, AND TAXES

A. Obtain and pay for permits required for the Work of this Division. Pay fees in connection therewith, including necessary inspection fees.

B. Pay any and all taxes levied for Work of this Division, including municipal and/or state sales tax where applicable.

1.10 MANUFACTURER'S DIRECTIONS

A. Install and operate equipment and material in strict accord with manufacturer's installation and operating instructions. The manufacturer's instructions shall become part of the Contract Documents and shall supplement Drawings and Specifications.

1.11 SUBMITTAL DATA

A. Submit shop drawings, project data, and samples in accordance with requirements of Division 01.

B. Shop drawings shall consist of published ratings or capacity data, detailed construction drawings for fabricated items, wiring and control diagrams, performance curves, installation instructions, manufacturer's installation

drawings, and other pertinent data. Submit drawings showing revisions to equipment layouts due to use of alternate or substitute equipment.

C. Where approved manufacturers and suppliers of equipment, materials, etc. are unable to fully comply with Contract Document requirements, specifically call such deviations to
attention of Architect on submittals. Type deviations on a separate sheet; underlined statements or notations on standard brochures, equipment fly sheets, etc. will not be accepted.

D. Approval of submittals shall not relieve Contractor from furnishing required quantities and verifying dimensions. In addition, approval shall not waive original intent of Contract Documents.

E. Failure to obtain written approval of equipment shall be considered sufficient grounds for rejection of said equipment regardless of the stage of completion of the project.

1.12 PROJECT RECORD DOCUMENTS

A. Keep Project Record Documents in accordance with requirements of Division 00 and/or Division 01.

B. During construction period, keep accurate records of installations made under this Division, paying particular attention to major interior and exterior underground and concealed piping, ductwork, etc.

1.13 EXCAVATING AND BACKFILLING

A. Provide excavating and backfilling necessary for Work of this Division. Comply with provisions of Division 31, Earth Work, if applicable.

B. Trenches shall be inspected by Code Authorities and/or Owner's Representative before and after piping is laid. Give Owner' Representative 24-hour notice for each inspection. If any trenches are filled without Owner's Representative inspection and as subsequently found to be deficient, the trenches shall be uncovered.

C. Inspected, and then re-filled, if requested by Owner's Representative.

D. Provide minimum 18 inches of cover or in compliance with local published frost line data (if greater than 18 inches) to finish grades or paving at water piping.

E. For piping, provide bell holes at trench bottom to assure uniform bearing. Accurately grade trench bottoms by instrument before laying any pipe.

F. Protect and maintain trenches in dry condition until piping has been inspected and approved. Immediately after approval, backfill trenches in tamped layers.

G. Compact fill to satisfaction of Architect and/or Owner's Representative.

1.14 CUTTING AND PATCHING

A. Comply with requirements of Division 00 and Division 01 regarding cutting and patching. Locate and timely install sleeves as required to minimize cutting and patching.

B. Cutting, fitting, repairing, patching, and finishing of Work shall be done by craftsmen skilled in their respective trades. Where cutting is required, cut in such a manner as not to weaken structure, partitions, or floors. Holes required to be cut must be cut or drilled without breaking out around the holes. Where patching is necessary in finished areas of the building, the Architect will determine the extent of such patching and refinishing.

C. Repairing Roadways and Walks: Coordinate all roadway work with authorities having jurisdiction. Cut and/or bore under roadways for connection of utilities as required.
Coordinate work through Contractor. Where this Contract cuts or breaks roadways, or walks to lay the piping, he shall repair or replace these sections to match existing, unless specifically identified as the responsibility of others.

1.15 PAINTING

A. Painting shall be provided under Division 09, unless specified otherwise. Leave exposed piping, materials, and equipment clean and free of rust, grease, dirt, etc. before and after painting.

B. Factory finished equipment, fixtures, and materials which are marred, chipped, scratched, or otherwise unacceptable shall be repaired or replaced under this Division to Architect satisfaction, at no additional cost to Owner.

C. Coordinate all painting requirements with prime bidder prior to bids.

D. Paint all exposed piping inside and outside of building. Label all piping after painting in accordance with Section 230553. Utilize industry standard paint colors for respective system unless directed otherwise by Architect. Review

proposed color scheme with Division 23 Requirements prior to ordering materials.

1.16 GUARANTEE

A. The Contractor shall guarantee all materials, equipment, and workmanship for a period of one (1) year from the date of final acceptance of the project. This guarantee shall include furnishing of all labor and material necessary to make any repairs, adjustments or replacement of any equipment, parts, etc. necessary to restore the project to first class condition. This guarantee shall exclude only the changing or cleaning of filters. Warranties exceeding one (1) year are hereinafter specified with individual pieces of equipment.

B. If the Contractor's office is in excess of a fifty (50) mile radius of the project, he shall appoint a local qualified contractor to perform any emergency repairs or adjustments required during the guarantee period. The name of the contractor appointed to provide emergency services shall be submitted to the Architect for his approval.

PART 2 - PRODUCTS

2.1 OPERATING AND MAINTENANCE INSTRUCTIONS

A. Furnish manufacturers operating and maintenance instructions, parts lists and sources of supply for replacements in accordance with Division 01.

B. Provide the following operations and maintenance data:

1. Complete sets of final and correct shop drawings, maintenance and replacement parts manuals, and operating instructions, for equipment supplied.
2. Bind each set within a common binder. Index and organize with a table of contents, to permit quick and convenient reference.
3. Provide a minimum of five (5) days of instruction in operation and maintenance of equipment to Owner’s Representative maintenance force. Design a 2-week period, convenient to Owner’s Representative, during which qualified personnel, including manufacturers' technicians and authorized factory trainers shall be available for Architect/Owner's Representative instruction.

2.2 RECORD DRAWINGS

A. Provide "Record Drawings" in accordance with the Division 01, General Requirements, indicating in a neat and accurate manner a complete record of all revisions of the original design of the work.

1. Include all changes and provide for an accurate record, on reproductions of the Contract drawings or on appropriate shop drawings, all deviations between the work shown and work installed.

B. Submit for approval bound sets of the required drawings, manuals and operating instructions.

2.3 IDENTIFICATION MARKINGS

A. General: Apply identification tags, markers, etc. after insulation and field painting are completed.

PART 3 - EXECUTION

3.1 COORDINATION AND LAYOUT

A. Study Drawings and Specifications to ensure completeness of work required.

1. Include supplementary items normal to manufacturers' requirements or standard accepted trade practices as necessary to complete work, though not specifically indicated or specified.

B. Verify measurements and conditions in field before starting work.

C. Examine materials to which work is to be applied and notify the Architect/Owner's Representative, in writing, of any conditions existing which are detrimental to proper and expeditious installation of work.

1. Starting of work shall be construed as acceptance of conditions.

D. Confer with other trades, install work to avoid interference with other trades, and possible necessary adjustments to conform to structural conditions and work of other trades.

E. Coordinate and set inserts and locate openings in floors and walls in new construction.

1. Locate pipes and ducts to avoid interference with other work shown on the drawings and as directed by the Architect/Owner's Representative.

2. Keep all concealed pipes and ducts within the enclosing construction provided.
3. Arrange exposed work neatly in parallel runs and parallel with walls or structure, with uniformly spaced hangers and supports, and within the spaces assigned for each kind of work.

F. Make coordinated layouts showing concrete work required for housekeeping pads, equipment bases and inertia masses which are cast in place, including the location of anchors and dowels.

1. Coordinate the scheduling and placing of the concrete to suit the mechanical work schedules.
2. Concrete housekeeping pads are to cover the full area of each piece of equipment.
   Concrete bases are to be of dimension and heights to suit the equipment. The forming and placing of concrete shall be provided under this specification section.

3.2 MAINTENANCE OF EQUIPMENT AND SYSTEM PRIOR TO FINAL ACCEPTANCE

A. Maintain all installed equipment and systems in accordance with the manufacturer's published instructions, until final acceptance by the Architect/Owner's Representative, and take such measures as necessary to ensure adequate protection of all equipment and materials during delivery, storage, installation, operating and shut-down conditions.

1. This responsibility shall include all provisions required to meet the conditions incidental to the delays pending final test of systems and equipment.
2. Maintain and periodically clean all equipment until final acceptance.

B. After installation of systems has been completed, operate the system to determine the capability of the equipment and controls to conform to the requirements of the drawings and specifications prior to performance testing.

3.3 DAMAGED EQUIPMENT

A. Any and all equipment, parts, components, etc., provided under this division which is damaged by the Contract or which is received in damaged condition during shipping, transit, handling, or during installation shall be replaced. Dented, or damaged non-structural equipment jackets or surface casings such as but not limited to water heater jackets, boiler jackets, chiller insulation jackets, etc., shall either be repaired or replaced at the option of the Owner's

Representative. If repaired, the finished product shall match original equipment exactly.

B. Any equipment which develops surface rust, either through improper storage, handling or installation, shall be refinished by grinding the affected area down to bare (white) metal, then prepared with a rust preventive primer and finished with the original manufacturer's touch-up paint to match existing color.

3.4 EQUIPMENT INSTALLATION

A. Locate and set equipment anchor bolts, dowels and aligning devices for all equipment requiring them. Coordinate requirements of concrete work with Contractor and other trades.

1. Level the equipment and grout solid between the equipment and the surface below. Grout to be premixed grout mixed in accordance with manufacturer's specifications.

B. The field assembly, installation and alignment of equipment is to be done under field supervision provided by the manufacturer or with inspections, adjustments and approval by the manufacturer.

C. Equipment startup.

1. Contractor shall provide qualified start-up personnel, certified by equipment manufacturer, to inspect and approve equipment and to supervise the operating tests of the equipment. System commissioning shall be performed in accordance with ASHRAE standards.

D. Equipment and system test operation.

1. Note: Equipment and system test operation is separate and apart from additional requirements of training and demonstration. Refer to individual sections for requirements regarding training and demonstration. Notify the Owner's Representative in advance of beginning the equipment and system test operation.
   All equipment testing/demonstration shall be performed in the presence of the Architect/Owner's Representative. A minimum of seven (7) days notice is required before equipment and system testing.
2. Each piece of equipment shall be operated in its system as long as required to provide proper functioning.
3. Perform an operating test of each complete system for twenty-four hours continuous operation as a minimum, or as long as required to provide coordination and proper functioning of all related systems and controls.

4. The operating criteria for each test shall be determined in advance with the Owner's Representative approval whenever seasonal conditions shall not produce a full design load on any equipment or system.
5. Certify to the Owner's Representative that all equipment is functioning properly.
6. Should the apparatus fail to meet the Contract requirements, adjust, repair or replace all defective or inoperative parts and again conduct the complete performance tests.

3.5 CLEANING AND ADJUSTING OF SYSTEMS

A. Blow out, clean and flush each system of piping, ductwork and equipment to thoroughly clean the systems.

1. Clean all materials and equipment, and leave in condition ready to operate and receive succeeding finishes where required.
2. Adjust and align all equipment interconnected with couplings or belts.
   a. Adjust valves of all types and operating equipment of all types to provide proper operation.
   b. Remove and clean elements in all steam trap bodies.
   c. Clean all strainers. Replace temporary construction screens with new permanent screens.

B. Permanent equipment operated during construction shall not be abused or be used in service different from its design application.

1. Temporary disposable filters shall be used during temporary operation.
2. All expendable media, including belts used for temporary operation and similar expendable materials shall be replaced just prior to acceptance.
3. Packing boxes of equipment operated during construction must be replaced just prior to system acceptance, using materials and methods specified by the supplying manufacturer.

C. Equipment furnished with factory finishes where damaged shall be retouched and repainted to present a new appearance.

D. Furnish and maintain protection for all of the work whether completed or in progress.

1. Furnish and install coverings and enclosures as required.

E. New and existing operating equipment and systems shall be clean and dust free inside and out.

1. Concealed and unoccupied areas such as plenums, pipe and duct spaces and Equipment Rooms shall be free of rubbish and swept, vacuumed, or wiped clean at time of acceptance.

3.6 CONTRACTOR REQUESTED FIELD OBSERVATIONS

A. During the course of, and at stages appropriate to the progress of construction, the Contractor may request field observations of the design professional. If the field observation is a request of and by the Contractor, the Contractor shall provide all necessary ladders, scaffolding, lifts, safety harnesses or other equipment in order for the Architect to safely and adequately perform the requested observations.

1. Requests for observations shall be made a minimum of seven (7) days in advance of the requested date of observation.
2. All equipment, ladders, lifts, safety nets, scaffolding, etc., shall be provided and in place for the use of the Architect.
3. All equipment panel covers, electrical panels, or other equipment shall be opened by the Contractor for viewing by the Architect.
4. The Contractor shall make available a mechanic or technician of that field in order to answer questions of the designer, make any and all adjustments and/or corrections and to assist the Architect.

3.7 TESTING AND BALANCING

A. Refer to Specifications Section 230593.

3.8 PAINTING

A. General painting is typically performed by the Division 09 Contractor. This Contract shall however, either perform specialized painting as called for below in the following conditions or he shall advise the Contractor of these requirements as follows:

1. Thoroughly clean all surfaces, requiring prime painting, of rust, loose scale, oil and grease.
2. Dry surfaces before painting.
3. Do not paint controls, nameplates, labels or sprinklers.

B. Paint all equipment unless otherwise specified not to be painted at the factory with one prime coat of rust prohibitive paint.

C. Provide field painting as follows:

1. All exposed iron work, including un-insulated ferrous piping and conduit system components, hangers, supports, equipment bases, and apparatus; prime coat with a red lead-free paint.
2. Un-insulated duct work and casing exposed to view and exposed galvanized surfaces of conduit and piping and of equipment prime painted at the shop: Prime coat, zinc chromate for galvanized surfaces.
3. Inside of all duct work where visible through registers and grilles: One coat of flat black paint.

3.9 CONNECTIONS TO EQUIPMENT

A. Provide mechanical connections to equipment and fixtures requiring such connections which are supplied by Architect/Owner's Representative or under other divisions.

B. Provide unions, nipples, adapters, valves, flexible connections, and other trim required for final connections for each such fixture or item of equipment, as required for complete operation, servicing, and maintenance.

3.10 WORKMANSHIP

A. Perform all work in a practical, neat and workmanlike manner with mechanics skilled in work, and using the best practices of the trade involved.

B. No work shall be concealed until it has been inspected and approved by the Architect/Owner's Representative.

C. Workmanship or materials not meeting with requirements of the specifications and drawings and satisfaction of the Architect/Owner's Representative shall be rejected and immediately replaced in an acceptable manner, without additional cost to the Architect/Owner's Representative.

3.11 LUBRICATION

A. All equipment furnished, installed, or connected under this division, shall be inspected for proper lubrication when connected and before operation of the equipment is begun, as recommended by the Manufacturer.

B. The Contractor for the work of this division shall be held responsible for any damage to equipment that is operated without having been properly lubricated.

3.12 USE OF PREMISES AND CLEANING

A. Remove and dispose of all waste materials and rubbish due to all construction operations under the Contract, except as otherwise noted, and keep the building free from rubbish and dirt caused by his and/or his Sub-Contractors' employees.

1. During the entire progress of the work, rubbish removal shall be made frequently so as to prevent any potential safety or health hazard.

B. Upon completion of the work, remove all protection, paint, putty, and other stains from all fixtures and glass and leave the premises thoroughly broom cleaned.

3.13 CUTTING, ALTERING AND PATCHING

A. Provide all cutting, chasing, drilling, altering and rough patching required for the work of this division.

B. Do all shoring, bracing, cutting, patching, piecing out, filling in, repairing and refinishing of all present work as made necessary by the alteration and the installation of new work.

C. All holes and openings occurring in the existing floors after equipment, partitions, floors, steel work, conduits and pipes are removed or installed shall be closed up with materials similar to the adjacent work.

D. The size and location of items requiring an opening, chase or other provisions to receive it shall be given by the trade requiring same in ample time to avoid undue cutting of any new work to be installed. These provisions shall not relieve the Contractor from keeping other trades informed as to the required opening, chases, etc., nor from responsibility for the correctness thereof, nor for cutting and repairing after the new work is in place.

E. Include all cutting, repairing, and patching in connection with the work that may be required to make the several parts come together properly and fit it to receive or be received by the work of other trades, as shown on the drawings and/or specified, or reasonably implied by the drawings and specifications.

F. All repairing, patching, piecing-out, filling-in, restoring and refinishing shall be neatly done by mechanics skilled in their trade to leave same in condition satisfactory to the Architect/Owner’s Representative.

G. Materials and their methods of application for patching shall comply with applicable requirements of the specifications.

1. Materials and workmanship not covered by the specifications and items of work exposed to view adjoining existing work to remain shall conform to similar materials and workmanship existing in or adjacent to the spaces to be altered.

H. Cutting, repairing, and patching shall include all items shown on the drawings, specified in the specifications or required by the installation of new work or the removal of existing work.

I. Remove partitions, walls, suspended ceilings, etc., as necessary to perform the required alterations or new construction work.

1. Avoid damage to construction and finishes that are to remain.

J. Protect and be responsible for the existing building, facilities and improvements if any.

1. Any disturbance or damage to the work, the existing building, and improvements, or any impairments of facilities resulting from the construction operations, shall be promptly rectified, with the disturbed, damaged, or impaired work, restored, repaired or replaced at no extra cost.

K. All alterations which are not indicated on the drawings nor specified herein but necessary to make good existing work disturbed by reason of the work shall be restored to a condition satisfactory to the Architect/Owner's Representative.

L. All holes in masonry floors and walls are to be core drilled.

M. Disturbed concrete and /or cement floor areas shall be patched with approved type latex mortar.

1. When cement mortar is used for patching, the surfaces shall be depressed a minimum depth of one inch (1").

N. Reinstall all weather protection work in waterproof manner.

O. Openings in roofs:

1. Openings in roofs shall be kept properly plugged and caulked at all times, except when being worked on, to preclude the possibility of flooding due to storms or other causes. After completion of work, openings shall be permanently sealed.

P. Temporary openings.

1. All temporary openings cut in walls, floors or ceilings for pipe or duct work shall be closed off with transite or an equally non-combustible material except when mechanics are actually working at the particular opening.

3.14 USE OF PERMANENT SYSTEMS:

A. Heating System:

1. The Contractor may, at his option, utilize the permanent heating systems provided under this Contract to provide space heating prior to Project completion date. The fuel for such space heating and for required tests of heating equipment shall be provided by Contractor.
2. The heating system shall be operated only by qualified personnel, and shall be operated with all auxiliaries, and in accordance with manufacturer's' instructions and good operating practice. If at any time the Owner's Representative determines that the equipment is being improperly operated or maintained, Contractor may be directed to disconnect its use.
3. Heating systems shall be operated and controlled to prevent temperature in any room or space in any building from exceeding 90 deg. F.
4. Systems may be activated without diffusers and registers in place, but filters with same efficiency as those specified shall be provided both in air handling equipment and at return air grille locations. Filter return air entering duct work, to prevent return air duct work from accumulating dust or otherwise becoming dirty.
5. Contractor shall, prior to final acceptance of the Work, place heating systems and related equipment in a condition equal to new.

B. Air Conditioning System:

1. The Contractor may, at his option, utilize the permanent air conditioning systems provided under this Contract to provide space cooling prior to the Project completion date.
2. The fuel, electricity or other energy required for space cooling and for any subsequent operation or testing shall be provided for by the Contractor.
3. The cooling system shall be operated only by fully qualified personnel and shall be operated with all auxiliaries, and in accordance with manufacturer's instructions and good operating practice. Start up of equipment for use by the Contractor shall not commence any warranty period.

4. Cooling systems shall be operated and controlled to prevent temperature in any room or space in any building from falling below 70 deg. F.
5. Systems may be activated without diffusers and registers in place, but filters with same efficiency as those specified shall be provided both in air handling equipment and at return air grille locations. Filter all return air entering duct work, to prevent return air duct work from accumulating dust or otherwise becoming dirty.
6. Contractor shall, prior to final acceptance of the Work, place cooling systems and related equipment in a condition equal to new.

3.15 PENETRATIONS THROUGH FIRE SEPARATIONS

A. Pack annular space between sleeve and pipe (insulation) and / or conduit in fire rated construction with fire retardant putty, sealant and / or caulk in accordance with listed assemblies utilized on the project. Material shall be non-asbestos based and installed in accordance with manufacturers instructions 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.

END OF SECTION 23 00 10



SECTION 23 00 20 – BASIC MECHANICAL REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The general provisions of the Contract, including the Conditions of the Contract (General, Supplementary, and other Conditions) and Division 00 and 01 as appropriate, apply to the Work specified in this Section.

B. Refer to all Sections, as well as the Specifications for the other various trades and materials and be thoroughly familiar with all provisions regarding all work.

1.2 SCOPE OF WORK

A. This Section specifies the basic requirements for mechanical installations and includes requirements common to more than one section of Division 23. It expands and supplements the requirements specified in sections of Division 01.

1.3 ACCESSIBILITY

A. Install equipment and materials to provide required access for servicing and maintenance. Coordinate the final location of concealed equipment and devices requiring access with final location of required access panels and doors. Allow ample space for removal of all parts that require replacement or servicing. Verify exact location and placement of all access panels with/through Architect prior to any equipment rough-in.

B. Extend all grease fittings to an accessible location.

C. Refer to the Division 08 Section: Access Doors.

1.4 ROUGH-IN

A. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected.

B. Refer to equipment specifications in Divisions 23 for rough-in requirements.

1.5 MECHANICAL INSTALLATIONS

A. Coordinate mechanical equipment and materials installation with other building components.

B. Verify all dimensions by field measurements.

C. Arrange for chases, slots, and openings in other building components to allow for mechanical installations.

D. Coordinate the installation of required supporting devices and sleeves to be set in poured in place concrete and other structural components, as they are constructed.

E. Sequence, coordinate, and integrate installations of mechanical materials and equipment for efficient flow of the Work. Give particular attention to large equipment requiring positioning prior to closing-in the building.

F. Coordinate the cutting and patching of building components to accommodate the installation of mechanical equipment and materials.

G. Where mounting heights are not detailed or dimensioned, install mechanical services and overhead equipment to provide the maximum headroom possible.

H. Install mechanical equipment to facilitate maintenance and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations.

I. Coordinate the installation of mechanical materials and equipment above ceilings with suspension system, light fixtures, and other installations.

J. Coordinate connection of mechanical systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies. Provide required connection for each service.

1.6 MECHANICAL COORDINATION DRAWINGS

A. Prepare and submit a set of coordination drawings showing major elements, components, and systems of mechanical equipment and materials in relationship with other building components. Prepare drawings to an accurate scale of 1/4"=1'-0" or larger. Indicate the locations of all equipment and materials, including clearances for installing and maintaining insulation, servicing, and maintaining equipment, valve stem movement, and similar requirements. Indicate movement and positioning of large equipment into the building during construction.

B. Prepare floor plans, reflected ceiling plans, elevations, sections, and details to conclusively coordinate and integrate all installations. Indicate locations where space is limited, and where sequencing and coordination of installations are of importance to the efficient flow of the Work, including (but not necessarily limited to) the following:

1. Mechanical equipment room layouts;
2. Specific equipment installations, including:
   a. Ductwork and diffusers;
   b. Pumps (new and existing) and piping connections
   c. Air Handling equipment, fan coils and terminal units with accessories requirements.
3. Work in pipe spaces, chases, trenches, and tunnels;
4. Exterior wall penetrations;
5. Ceiling plenums which contain piping, ductwork, or equipment in congested arrangement;
6. Installations in mechanical riser shafts, at typical sections and crucial offsets and junctures;
7. Division 23 Contractor shall furnish drawings, to Contractor, once approved by reviewing Architect, to fully coordinate with all trades and subcontractors required. Failure to fully coordinate via this process shall not relieve the contractor of his responsibility to coordinate structural supports, electrical service routing of mechanical systems and provisions for required access.

1.7 CUTTING PATCHING AND SEALING OF PENETRATIONS

A. This Article specifies the cutting and patching of mechanical equipment, components, and materials to include removal and legal disposal of selected materials, components, and equipment.

B. Refer to the Division 01 Section: CUTTING AND PATCHING for general requirements for cutting and patching.

C. Refer to Division 26 Section for BASIC ELECTRICAL REQUIREMENTS for requirements for cutting and patching electrical equipment, components, and materials.

D. Do not endanger or damage installed Work through procedures and processes of cutting and patching.

E. Arrange for repairs required to restore other work, because of damage caused as a result of mechanical installations.

F. No additional compensation will be authorized for cutting and patching Work that is necessitated by ill-timed, defective, or non-conforming installations.

G. Perform cutting, fitting, and patching of mechanical equipment and materials required to:

1. Uncover Work to provide for installation of ill-timed Work.
2. Remove and replace defective Work.
3. Remove and replace Work not conforming to requirements of the Contract Documents.
4. Remove samples of installed Work as specified for testing.
5. Install equipment and materials in existing structures.
6. Upon written instructions from the Architect, uncover and restore Work to provide for Architect observation of concealed Work.

H. Cut, remove, and legally dispose of selected mechanical equipment, components, and materials as indicated, including, but not limited to removal of mechanical piping, heating units, plumbing fixtures and trim, and other mechanical items made obsolete by the new Work.

I. Protect the structure, furnishings, finishes, and adjacent materials not indicated or scheduled to be removed.

J. Provide and maintain temporary partitions or dust barriers adequate to prevent the spread of dust and dirt to adjacent areas.

K. Locate identify, and protect mechanical and electrical services passing through remodeling or demolition area and serving other areas required to be maintained operational. When transit services must be interrupted, provide temporary services for the affected areas and notify the Owner prior to changeover.

L. Seal all penetrations of building envelope air and water tight. For complete closure of openings, where necessary, provide 1/8" thick elastomeric barrier anchored to materials penetrating building envelope and adjacent envelope surfaces involved - seal connections with caulk and mechanical fasteners. Refer to Architectural Sections on joints and sealants. Seal all conduit systems communicating between conditioned and unconditioned spaces. Coordinate all work with and through prime bidder and other trades. Unless otherwise directed, caulk sealant shall be long lasting polyurethane based products, resistant to UV exposure, installed in accordance with manufactures instructions. Sealant joints shall withstand building pressures variance with respect to ambient of 0.25 inches water gauge, with no leakage in terms of air and or water vapor.

1.8 MECHANICAL SUBMITTALS

A. Refer to the Conditions of the Contract (General and Supplementary) and Division 01 Section: Submittal Procedures for submittal definitions, requirements, and procedures.

B. Submittal of bound shop drawings, product data, and samples will be accepted only when submitted by the Contractor. Data submitted from subcontractors and material suppliers directly to the Architect will not be processed.

PART 2 - PRODUCTS

2.1 PRODUCT OPTIONS AND SUBSTITUTIONS

A. Refer to the Instructions to Bidders for requirements in selecting products and requesting substitutions.

2.2 PRODUCT LISTING

A. Prepare listing of major mechanical equipment and materials for the project. A sample schedule is included at the end of this Section to complete this requirement.

B. Provide all information requested.

C. Submit this listing as a part of the submittal requirement specified in the Division 01.

D. When two or more items of same material or equipment are required (plumbing fixtures, pumps, valves, air conditioning units, etc.) they shall be of the same manufacturer. Product manufacturer uniformity does not apply to raw materials, bulk materials, pipe, tube, fittings (except flanged and grooved types), sheet metal, wire, steel bar stock, welding rods, solder, fasteners, motors for dissimilar equipment units, and similar items used in Work, except as otherwise indicated.

E. Provide products which are compatible within systems and other connected items.

2.3 NAMEPLATE DATA

A. Provide permanent operational data nameplate on each item of power operated mechanical equipment, indicating manufacturer, product name, model number, serial number, capacity, operating and power characteristics, labels of tested

compliance, and similar essential data. Locate nameplates in an accessible location.

2.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to project properly identified with names, model numbers, types, grades, compliance labels, and similar information needed for distinct identifications; adequately packaged and protected to prevent damage during shipment, storage, and handling.

B. Store equipment and materials at the site, unless off-site storage is authorized in writing. Protect stored equipment and materials from damage.

C. Coordinate deliveries of mechanical materials and equipment to minimize construction site congestion. Limit each shipment of materials and equipment to the items and quantities needed for the smooth and efficient flow of installations.

2.5 RECORD DOCUMENTS

A. Refer to the Division 01 Section: Closeout Procedures for requirements. The following paragraphs supplement the requirements of Division 01.

B. Mark Drawings to indicate revisions to piping and ductwork, size and location both exterior and interior; including locations of coils, dampers and other control devices, filters, boxes, and similar units requiring periodic maintenance or repair; actual equipment locations, dimensioned from column lines; actual inverts and locations of underground piping; concealed equipment, dimensioned to column lines; mains and branches of piping systems, with valves and control devices located and numbered, concealed unions located, and with items requiring maintenance located (i.e., traps, strainers, expansion compensators, tanks, etc.); Change Orders; concealed control system devices.

C. Mark Specifications to indicate approved substitutions, Change Orders, actual equipment and materials used.

2.6 OPERATION AND MAINTENANCE DATA

A. Refer to the Division 01 Section for Project Closeout or Operation and Maintenance Data for procedures and requirements for preparation and submittal of maintenance manuals.

B. In addition to the information required by Division 01 for Maintenance Data, include the following information:

1. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of all replaceable parts.
2. Manufacturer's printed operating procedures to include start-up, break-in, routine and normal operating instructions; regulation, control, stopping, shut-down, and emergency instructions; and summer and winter operating instructions.
3. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.
4. Servicing instructions and lubrication charts and schedules.

C. Submit in accordance with Section 017800.

D. Use multiple binders if a single binder would exceed 2-1/2 inches in thickness; arrange the data in the same sequence as the specification sections; delete or mark through extraneous data.

E. Provide tab pages with metal or plastic reinforced holes to separate each major item or closely related group of items with typed item names on the tabs. Supply a table of contents at the beginning of each volume listing at items, the manufacturers and the name, address and phone number of the nearest authorized service representative.

F. A copy of the completed manual shall be submitted to the Contracting Officer one week before the user instruction for perusal. This copy will be returned to the Contractor with the user, comments. These comments shall be incorporated in the final copies of the manual. The Contractor shall obtain a signed receipt for the manual.

G. The O & M Manual outline shall be prepared in two parts along the lines suggested in the 2019 HVAC Applications, Chapter 40.

H. All contents shall be project specific, typewritten.

2.7 WARRANTIES

A. Refer to individual equipment specifications for warranty requirements.

B. Compile and assemble the warranties specified in Division 23, into a separated set of vinyl covered, three ring binders, tabulated and indexed for easy reference.

C. Provide complete warranty information for each item to include product or equipment to include date of beginning of warranty or bond; duration of warranty or bond; and names, addresses, and telephone numbers and procedures for filing a claim and obtaining warranty services.

2.8 CLEANING

A. Refer to the Division 01 Section for general requirements for final cleaning.

B. Refer to Division 230593 Section: TESTING, ADJUSTING, AND BALANCING for requirements for cleaning filters, strainers, and mechanical systems prior to final acceptance.

PART 3 - EXECUTION

3.1 WARRANTIES

A. Refer to the Division 01 Section for procedures and submittal requirements for warranties. Refer to individual equipment specifications for warranty requirements.

B. Compile and assemble the warranties specified in Division 23, into a separated set of vinyl covered, three ring binders, tabulated, and indexed for easy reference.

C. Provide complete warranty information for each item to include product or equipment to include date of beginning of warranty or bond; duration of warranty or bond; and names, addresses, and telephone numbers and procedures for filing a claim and obtaining warranty services.

3.3 CLEANING

A. Refer to the Division 01 Section for general requirements for final cleaning.

B. Refer to Division 23 Section: TESTING, ADJUSTING, AND BALANCING for requirements for cleaning filters, strainers, and mechanical systems prior to final acceptance.

END OF SECTION 23 00 20



SECTION 23 05 10 - ELECTRICAL REQUIREMENTS FOR MECHANICAL EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The general provisions of the Contract, including the Conditions of the Contract (General, Supplementary, and other Conditions) and Division 00 and 01 as appropriate, apply to the Work specified in this Section.

B. Refer to all Sections, as well as the Specifications for the other various trades and materials and be thoroughly familiar with all provisions regarding all work.

1.2 SCOPE OF WORK

A. Compliance with National Electric Code Requirements

1. Minimum Requirements:
   a. The requirements of this Division supercede the “minimum” requirements of National Codes such as NEC in many areas. Where reference to this National Code is made, it is understood that the requirements of these codes are meant to indicate the “minimum” requirements required by these Contract Documents and are not to infer that these “minimum” requirements eliminate or in any way diminish the requirements of individual sections of these Contract Documents.
   b. Wherever compliance with this National Code is required, it shall be taken as a minimum requirement and applicable whenever the Contract Documents are silent with respect to specific requirements or installation procedures. The Contractor shall as a minimum, comply with the more stringent of the requirements.

B. Interlock Wiring for Mechanical Equipment

1. Interlocks & Wiring of Mechanical Equipment: It is the intent of the contract documents to note or include most of the obvious physical wiring, conduit, relays, and necessary interlocks between various pieces of mechanical/electrical equipment. Plans, details, specifications and drawings however, do not typically indicate the exact extent and encompassment of all required mechanical/electrical interlocks, routing, control voltages, conduit, wiring diagrams, etc., between mechanical and electrical devices and equipment that may be required for the proper

operation and sequencing of equipment. Also, typically not indicated on the drawings is the differentiation between field installed and factory provided wiring because of the significant differences in requirements between various equipment manufacturer's requirements and/or job site conditions. It is the responsibility of this contractor to first verify that all mechanical related items affecting other trades are properly coordinated, accounted for and included in pricing prior to bid date. Additional costs for interlocks after bids are received will not be allowed for failure to coordinate. Reference is made to coordination and responsibility of providing the required wiring diagrams and requirements between the various subs, etc. It remains however, the responsibility of this Contractor as further described in the following articles, to properly coordinate, be responsible for, and to allow for any and all costs associated with the requirements of the equipment manufacturer's recommendations in order to preserve guarantees and warranties. (Note: For informational purposes only) - Typical mechanical/electrical/control/wiring interlocks covered under this section include but are not limited to the following examples:

a. Domestic water pump interlocks with aquastats & thermostats.
b. Exhaust fans and supply fan general ventilation interlocks.
c. Smoke detector interlocks with supply air fans.
d. Hi-Limit Temperature (firestat) interlocks with supply air fans.
e. Lo-Limit Temperature (freezestat) interlocks with supply air fans.
f. Interlocks between automatic safety float switches in emergency drain pans and respective fan motors and/or condensing units.
g. Interlocks between Air Handling Unit "Kill" switches and fan motor starters.
h. Damper interlocks between required fire suppression systems.
i. Fresh air damper interlocks with supply air fans.
j. Two speed fan motors, number of conductors, and interlocks between motor starters and fan speed controllers.
k. High limit temperature interlocks with unit heater thermostats.
l. High and low water level limit interlocks with sump and ejector pumps.
m. All other factory wired mechanical equipment requiring field installed connections and interfaces.

1.3 SUMMARY OF RESPONSIBILITY

A. In order to ensure proper operation of mechanical equipment installed, it is the intent of this section of the specifications to ensure that the Division 23 Contractor is the ultimate party responsible for the proper electrical installation of the equipment provided under the technical specifications of this Division.

Unless the Division 23 Contractor is fully licensed and qualified to provide a complete electrical installation, he shall obtain the services of a fully qualified electrical Contractor to perform those services required to provide a complete and operational system. If, however, the services of other Contractors or sub-contractors are required by the Division 23 Contractor in order that the equipment provided is to operate and perform as specified, the Division 23 Contractor shall obtain, pay for, and coordinate the services of such Contractor(s) in order to provide a complete a fully operational mechanical system. The Division 23 Contractor shall be fully responsible for the work of all sub-contractors and shall fully warrant their work in accordance with the requirements of Division 01 of these specifications.

B. This section includes the basic requirements for field installed electrical conduits, power circuits, breakers, wiring, interlocks, and other electrical components which are to become an integral part of mechanical equipment provided under Division 23. All work performed under this section shall fully as a minimum, comply with Division 26 Specifications and National Electric Code - (latest edition) and shall be provided as listed below:

1. All "field-installed" interlock and/or control/power wiring necessary to provide a complete and operating mechanical system shall be ultimately provided by, and be the responsibility of the Division 23 Contractor. These components shall include, but are not limited to the following examples:
    a. Automatic Temperature Control panels
    b. Installation and connection of factory installed motors
    c. Variable frequency drives
    d. Motors (single & multi-speed)
    e. Motor starters (single and multi-speed) for all Division 23 equipment
    f. Fire protection control panels
    g. Supply, return, & exhaust fan interlocks
    h. Plumbing fixture automatic flush valves
    i. Interlocks between domestic water circulating pumps & aquastats
    j. Exhaust fan/supply fan interlocks
    k. Filters at AHU's
    l. AHU, hi-limit temperature interlocks, lo-limit temperature interlocks, smoke detectors, and other interlocks related to Life Safety protection.
    m. Other various interlocks between items of mechanical equipment, safeties, and field wired interconnections.

C. It is the responsibility of the Division 23 Contractor to fully coordinate the electrical requirements of his mechanical equipment with the Division 26 Contractor prior to bidding and to ensure that other contractors and divisions are made aware of the requirements of his equipment that he intends to provide. The Division 23 Contractor shall provide wiring and control diagrams of all mechanical, air conditioning, ventilation, plumbing and /or fire protection equipment clearly delineating between factory wiring and field installed wiring. The mechanical contractor shall ensure that all field installed wiring, interlocks, etc., required to provide a complete and operable system are inclusive with his bid.

D. Specific electrical power requirements (i.e., horsepower and electrical characteristics) where known, for mechanical equipment are scheduled on the Drawings or within the body of the individual technical specifications.

E. Low Voltage Wiring: Low voltage wiring is not typically shown on the contract documents or plans. It remains however, the responsibility of the Division 23 Contractor to fully coordinate the low voltage electrical requirements of his mechanical equipment with the Division 26 Contractor prior to bidding and to ensure that other Contractors and Divisions are made aware of the requirements of his equipment that he intends to provide. The Division 23 Contractor shall also provide the low voltage wiring and control wiring diagrams of all mechanical, air conditioning, ventilation, plumbing and /or fire protection equipment clearly delineating between factory wiring and field installed wiring.

1. The Division 23 Contractor shall coordinate with the Division 26 Contractor for all necessary power requirements.

1.4 REFERENCES

A. NEMA Standards MG 1: Motors and Generators

B. NEMA Standard ICS 2: Industrial Control Devices, Controllers, and Assemblies.

C. NEMA Standard 250: Enclosures for Electrical Equipment.

D. NEMA Standard KS 1: Enclosed Switches.

E. As a minimum, comply with National Electrical Code (NFPA 70).

1.5 SUBMITTALS

A. Motors, Starters, & VFD Drives: Provide manufacturer's product data. If starters are an integral part of packaged mechanical equipment, then a separate starter submittal is not required.

B. Submit product data for motors, starters, variable frequency drives and other electrical components with submittal data required for the equipment for which it serves, as required by the individual equipment specification sections.

1.6 QUALITY ASSURANCE

A. All electrical components and materials shall be UL labeled.

PART 2 - PRODUCTS

2.1 MOTORS

A. The following are basic requirements for simple or common motors. For special duty motors, more detailed and specific requirements are specified in Section 230513 – "Electric Motors".

1. Torque characteristics shall be sufficient to satisfactorily accelerate the driven loads.
2. Motor sizes shall be large enough so that the driven load will not require the motor to operate in the service factor range.
3. Temperature Rating: Rated for 50 deg. C environment with maximum 50 deg. C temperature rise for continuous duty at full load (Class A Insulation).
4. Starting capability: Frequency of starts as indicated by automatic control system, and not less than 5 evenly time spaced starts per hour for manually controlled motors.
5. Service Factor: 1.15 for poly-phase motors and 1.35 for single phase motors.
6. Motor construction: NEMA Standard MG 1, general purpose, continuous duty, Design "B", except "C" where required for high starting torque.
    a. Frames: NEMA Standard No. 48 or 54; use driven equipment manufacturer's standards to suit specific application.
    b. Bearings: Ball or roller or pillow block bearings with inner and outer shaft seals; re-greaseable, except permanently sealed where motor is normally inaccessible for regular maintenance; designed to resist thrust loading where belt drives or other drives produce lateral or axial thrust in motor; for fractional horsepower, light duty motors, sleeve type bearings are permitted.

7. Enclosure Type: Open drip-proof motors for indoor use where satisfactorily housed or remotely located during operation; totally enclosed, fan cooled for exterior applications or where specifically indicated on drawings.
8. Overload protection: Built-in thermal overload protection.
9. Noise rating: "Quiet"
10. Efficiency: "Premium Energy Efficient" motors shall have a minimum efficiency as scheduled in accordance with IEEE Standard 112, test method B. If efficiency not specified, motors shall have a higher efficiency than "average standard industry motors", in accordance with IEEE Standard 112, test method B.
11. Nameplate: Indicate the full identification of manufacturer, ratings, characteristics, construction, special features and similar information.

2.2 STARTERS, ELECTRICAL DEVICES, AND WIRING

A. Motor Starter Characteristics:

1. Enclosures: Unless otherwise specifically identified, provide NEMA 1, general purpose enclosures with padlock ears, except in wet or exterior locations, where enclosures shall be NEMA 3R with conduit hubs, or units in hazardous or dust laden atmospheres or other locations which shall have NEC rating for that particular proper class and division.
2. Type and size of starter shall be as recommended by motor manufacturer and the driven equipment manufacturer for applicable protection and start-up condition.

B. Magnetic Starters:

1. Refer to Section 230514 - “Motor Starters” for full requirements of motor starters.
2. As a minimum, provide the following items on each motor starter:
   a. Maintained contact push buttons and pilot lights, properly arranged for single speed or multi-speed operation as indicated.
   b. Trip-free thermal overload relays, each phase.
   c. Interlocks, pneumatic switches and similar devices as required for coordination with control requirements of Division 23- “Building Automation System” controls sections.
   d. Built-in 120 volts control circuit transformer, fused from line side, where incoming electrical service exceeds 240 volts.
   e. Lockable “Off” position handle.
   f. H-O-A selector switch.
   g. Externally operated manual reset.
   h. Under-voltage release or protection.

C. Motor connections:

1. Flexible conduit, weatherproof type where installed in damp or wet locations as defined by the NEC, except where plug-in electrical cords are specifically indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify equipment physical size and clearances required.

B. Verify electrical interlocks required.

3.2 THERMAL STOPS & BARRIERS

A. Thermal Barriers: Where electrical equipment, conduit, wiring, etc., penetrates or comes into contact with cold or hot mechanical equipment, provide thermal barriers to prevent intrusion of unconditioned air into mechanical equipment or to prevent electrical devices from sweating or accumulating condensation.

1. Examples: Examples of the above include but are not limited to:
   a. Air handling conduit penetrations at or into AHU casings.
   b. Smoke detectors attachment to hot or cold ductwork.

3.3 TRAINING & DEMONSTRATION

A. Provide training as described in individual technical specifications.

END SECTION 23 05 10



SECTION 23 05 13 – ELECTRIC MOTORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The general provisions of the Contract, including the Conditions of the Contract (General, Supplementary, and other Conditions) and Division 00 and 01 as appropriate, apply to the Work specified in this Section.

B. Refer to all Sections, as well as the Specifications for the other various trades and materials and be thoroughly familiar with all provisions regarding all work.

1.2 SCOPE OF WORK

A. This Section includes basic requirements for all motors connected to mechanical equipment. It includes motors that are factory-installed as part of equipment and appliances as well as field-installed motors.

1.3 QUALITY ASSURANCE

A. As a minimum, comply with applicable local, state and federal codes.

B. As a minimum, comply with applicable requirements of recognized industry associations which promulgate standards for the various trades. (See individual Sections of Division 23).

C. Employ only qualified personnel for this work. Employ competent, qualified mechanics to supervise the work.

D. As a minimum, comply with ASHRAE Standard 90.1 - 1999 (or latest edition) for motors.

E. As a minimum, comply with NFPA 70, "National Electrical Code." (Latest Edition)

F. NRTL Listing: Provide NRTL listed motors.

G. Term "Listed": As defined in "National Electrical Code," Article 100.

H. Listing Agency Qualifications: "Nationally Recognized Testing Laboratory" (NRTL) as defined in OSHA Regulation 1910.7.

I. As a minimum, comply with NEMA Standard MG 1, "Motors and Generators."

J. As a minimum, comply with UL 1004, "Motors, Electric."

PART 2 - PRODUCTS

2.1 MOTORS, GENERAL

A. General: Requirements below apply to motors covered by this Section except as otherwise indicated, for motors classified as simple or common motors (Section 230510).

1. Motors 1.0 HP and Larger: Polyphase.
2. Motors Smaller Than 1.0 HP: Single-phase.
3. Frequency Rating: 60 Hz.
4. Voltage Rating: Determined by voltage of circuit to which motor is connected for the following motor voltage ratings (utilization voltages):
   a. 120 V Circuit: 115 V - motor rating.
   b. 208 V Circuit: 200 V - motor rating.
   c. 240 V Circuit: 230 V - motor rating.
   d. 480 V Circuit: 460 V - motor rating.
5. Service factors indicated for motors are minimum values and apply at frequency and utilization voltage at which motor is connected. Provide motors which will not operate in service factor range when supply voltage is within 10 percent of motor voltage rating.
6. Capacity: Sufficient to start and operate connected loads at designated speeds in indicated environment, and with indicated operating sequence, without exceeding nameplate ratings. Provide motors rated for continuous duty at 100 percent of rated capacity.
7. Temperature Rise: Based on 40 deg. C ambient except 50 deg. C when otherwise indicated in equipment specifications or on equipment schedules on Plans.
8. Enclosure: Open drip proof except where exposed to elements, weather, or where specifically called for on Drawings and/or equipment specifications.

B. Manufacturers

1. Acceptable Manufacturers: Subject to the following requirements, provide motors from one of the following manufacturers:
   a. Baldor
   b. Marathon
   c. U.S. Motors
   d. General Electric
   e. Reliance

2.2 POLYPHASE MOTORS

A. General: Squirrel-cage induction-type conforming to the following requirements except as otherwise indicated in equipment specifications.

1. NEMA Design Letter Designation: "B" with 1.15 Service Factor.
2. Multi-Speed Motors: Separate winding for each speed.
3. Energy Efficient Motors: Premium Efficiency.
4. Motors shall be complete with shaft grounding rings.

B. Variable Speed Motors for Use with Solid-State Drives:

1. NEMA Standard MG 1, Part 31, “Definite Purpose Inverter Fed Motors”, continuous duty, Design B, squirrel-cage induction units with ratings, characteristics, and features coordinated with and approved by the drive manufacturer. The motor shall include 1600-volt slot and phase paper insulation for protection against damage due to reflected waves.
2. Internal Thermal Overload Protection for Motors: Protection automatically opens control circuit arranged for external connection. Protection operates when winding temperature exceeds safe value calibrated to the temperature rating of the motor insulation.
3. Bearings: Double-shielded, pre-lubricated ball bearings suitable for radial and thrust loading of the application.

2.3 SINGLE-PHASE MOTORS

A. General: Conform to the following requirements except as otherwise indicated.

B. Energy Efficient Motors: One of the following types as selected to suit the starting torque and other requirements of the specific motor application.

1. Permanent Split Capacitor.
2. Split-Phase Start, Capacitor-Run.
3. Capacitor-Start, Capacitor-Run.

C. Shaded-Pole Motors: Use only for motors smaller than 1/20 hp.

D. Internal Thermal Overload Protection for Motors: For motors so indicated, protection automatically opens the power supply circuit to the motor, or a control circuit arranged for external connection. Protection operates when winding temperature exceeds a safe value calibrated to the temperature rating of the motor insulation. Provide device that automatically resets when motor temperature returns to normal range except as otherwise indicated.

E. Bearings, belt connected motors, and other motors with high radial forces on motor shaft shall be ball bearing type. Sealed, pre-lubricated sleeve bearings may be used for other single-phase motors.

2.4 MOTOR EFFICIENCIES

A. Premium Efficiency Motors:

1. All motors shall bear the NEMA "Premium" label and shall meet or exceed the following nominal energy efficiency levels prescribed below for Design A or B continuous rated:

(The remainder of this page intentionally left blank)

Table 1 Nominal Efficiencies For "NEMA Premium" Induction Motors
Rated 600 Volts or Less (Random Wound)

2.5 Open Drip Proof				Totally Enclosed Fan Cooled		
HP	6-Pole	4-Pole	2-Pole	6-Pole	4-Pole	2-Pole
1	82.5	85.5	77.0	82.5	85.5	77.0
1.5	86.5	86.5	84.0	87.5	86.5	84.0
2	87.5	86.5	85.5	88.5	86.5	85.5
3	88.5	89.5	85.5	89.5	89.5	86.5
5	89.5	89.5	86.5	89.5	89.5	88.5
7.5	90.2	91.0	88.5	91.0	91.7	89.5
10	91.7	91.7	89.5	91.0	91.7	90.2
15	91.7	93.0	90.2	91.7	92.4	91.0
20	92.4	93.0	91.0	91.7	93.0	91.0
25	93.0	93.6	91.7	93.0	93.6	91.7
30	93.6	94.1	91.7	93.0	93.6	91.7
40	94.1	94.1	92.4	94.1	94.1	92.4
50	94.1	94.5	93.0	94.1	94.5	93.0
60	94.5	95.0	93.6	94.5	95.0	93.6
75	94.5	95.0	93.6	94.5	95.4	93.6
100	95.0	95.4	93.6	95.0	95.4	94.1
125	95.0	95.4	94.1	95.0	95.4	95.0
150	95.4	95.8	94.1	95.8	95.8	95.0
200	95.4	95.8	95.0	95.8	96.2	95.4
250	95.4	95.8	95.0	95.8	96.2	95.8
300	95.4	95.8	95.4	95.8	96.2	95.8
350	95.4	95.8	95.4	95.8	96.2	95.8
400	95.8	95.8	95.8	95.8	96.2	95.8

450	96.2	96.2	95.8	95.8	96.2	95.8
500	96.2	96.2	95.8	95.8	96.2	95.8

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: The following requirements apply to field-installed motors.

B. Install motors in accordance with manufacturer's published instructions and the following:

1. Direct Connected Motors: Mount securely in accurate alignment.
2. Belt Drive Motors: Use adjustable motor mounting bases. Align pulleys and install belts. Use belts identified by the manufacturer and tension belts in accordance with manufacturer recommendations.

3.2 COMMISSIONING

A. Check operating motors, both factory and field-installed, for unusual conditions during normal operation. Coordinate with the commissioning of the equipment for which the motor is a part.

B. Report unusual conditions.

C. Correct deficiencies of field-installed units.

3.3 TRAINING AND DEMONSTRATION

A. Demonstration Services: Arrange and pay for a factory-authorized service representative to train Owner's maintenance personnel on the following:

1. Procedures and schedules related to start-up and shut down, troubleshooting, servicing, preventative maintenance, and how to obtain replacement parts.
2. Familiarization with contents of Operating and Maintenance Manuals specified in Division 01, for Closeout Submittals and Division 23, Section 230020 - "Basic Mechanical Requirements."
3. Provide Service Manuals for each motor specified.

B. Provide three (3) hours of factory authorized training to Owner’s operating personnel.

1. Schedule training with at least seven (7) days advanced notice to Owner’s Representative.
2. Refer to Section 230010 - “Mechanical General Provisions” for video taping requirements.

END OF SECTION 23 05 13



SECTION 23 05 29 – HANGERS AND SUPPORTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The general provisions of the Contract, including the Conditions of the Contract (General, Supplementary, and other Conditions) and Division 00 and 01 as appropriate, apply to the Work specified in this Section.

B. Refer to all Sections, as well as the Specifications for the other various trades and materials and be thoroughly familiar with all provisions regarding all work.

1.2 SCOPE OF WORK

A. This Section includes hangers and supports for mechanical systems piping and equipment.

1.3 SUBMITTALS

A. General: Submit the following according to the Conditions of the Contract and Division 01 Specification Sections.

B. Product data for each type of hanger and support.

C. Submit pipe hanger and support schedule showing manufacturer's Figure No., size, location, and features for each required pipe hanger and support.

D. Welder certificates signed by Contractor certifying that welders comply with requirements specified under the "Quality Assurance" Article.

E. Shop drawings for each type of hanger and support, indicating dimensions, weights, required clearances, and methods of component assembly.

1.4 QUALITY ASSURANCE

A. Qualify welding processes and welding operators according to AWS D1.1 "Structural Welding Code--Steel."

1. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

B. Qualify welding processes and welding operators according to ASME "Boiler and Pressure Vessel Code," Section IX, "Welding and Brazing Qualifications."

C. Listing and Labeling: Provide hangers and supports that are listed for their intended use.

1. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" (NRTL) as defined in OSHA Regulation 1910.7.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

A. Hangers, Supports, and Components: Factory-fabricated according to MSS SP-58.

1. Components include galvanized coatings where installed for piping and equipment that will not have a field-applied finish.
2. Pipe attachments include nonmetallic coating for electrolytic protection where attachments are in direct contact with copper tubing.

B. Thermal-Hanger Shield Inserts: 100-psi average compressive strength, waterproofed calcium silicate, encased with sheet metal shield. Insert and shield cover entire circumference of pipe and are of length indicated by manufacturer for pipe size and thickness of insulation.

C. Mechanical-Anchor Fasteners: Insert-type attachments with pull-out and shear capacities appropriate for supported loads and building materials where used. Fasteners for fire protection systems include UL listing and FM approval.

2.2 MISCELLANEOUS MATERIALS

A. Structural Steel: ASTM A 36, steel plates, shapes, and bars, black and galvanized.

B. Bolts and Nuts: ASME B18.10 or ASTM A 183, steel, hex-head, track bolts and nuts.

C. Washers: ASTM F 844, steel, plain, flat washers.

D. Grout: ASTM C 1107, Grade B, nonshrink, nonmetallic.

1. Characteristics include post-hardening, volume-adjusting, dry, hydraulic-cement-type grout that is nonstaining, noncorrosive, nongaseous and is recommended for both interior and exterior applications.

2. Design Mix: 5000-psi, 28-day compressive strength.
3. Water: Potable.
4. Packaging: Premixed and factory-packaged.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT APPLICATIONS

A. Specific hanger requirements are specified in the Section specifying the equipment and systems.

B. Comply with MSS SP-69 for pipe hanger selections and applications that are not specified in piping specification Sections.

3.2 HANGER AND SUPPORT INSTALLATION

A. General: Comply with MSS SP-69 and SP-89. Install hangers, supports, clamps, and attachments to properly support piping from building structure.

B. Arrange for grouping of parallel runs of horizontal piping supported together on field-fabricated, heavy-duty trapeze hangers where possible.

C. Install supports with maximum spacings complying with MSS SP-69.

D. Where pipes of various sizes are supported together by trapeze hangers, space hangers for smallest pipe size or install intermediate supports for smaller diameter pipes as specified above for individual pipe hangers.

E. Install building attachments within concrete or to structural steel. Space attachments within maximum piping span length indicated in MSS SP-69. Install additional attachments at concentrated loads, including valves, flanges, guides, strainers, expansion joints, and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten insert to forms. Install reinforcing bars through openings at top of inserts.

F. Install concrete inserts in new construction prior to placing concrete.

G. Install mechanical-anchor fasteners in concrete after concrete is placed and completely cured. Install according to fastener manufacturer's written instructions. Do not use in lightweight concrete slabs or in concrete slabs less than 4 inches thick.

H. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories.

I. Heavy-Duty Steel Trapezes: Field-fabricate from ASTM A 36 steel shapes selected for loads being supported. Weld steel according to AWS D-1.1.

J. Support fire protection systems piping independent of other piping.

K. Install hangers and supports to allow controlled movement of piping systems, permit freedom of movement between pipe anchors, and facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

L. Load Distribution: Install hangers and supports so that piping live and dead loading and stresses from movement will not be transmitted to connected equipment.

M. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and so that maximum pipe deflections allowed by ASME B31.9 "Building Services Piping" is not exceeded.

N. Insulated Piping: Comply with the following installation requirements.

1. Clamps: Attach clamps, including spacers (if any), to piping with clamps projecting through insulation; do not exceed pipe stresses allowed by ASME B31.9.
2. Saddles: Install protection saddles MSS Type 39 where insulation without vapor barrier is indicated. Fill interior voids with segments of insulation that match adjoining pipe insulation.
3. Shields: Install MSS Type 40, protective shields on cold piping with vapor barrier. Shields span an arc of 180 degrees and have dimensions in inches not less than the following:

THICKNESS	LENGTH	
NPS (Inches)	(Inches)	
1/4 to 3-1/2	12	0.048
4	12	0.060
5 and 6	18	0.060
8 to 14	24	0.075
16 to 24	24	0.105

4. Pipes 8 Inches and Larger: Include pressure treated wood inserts.

5. Insert Material: Length at least as long as the protective shield.

6. Thermal-Hanger Shields: Install with insulation of same thickness as piping.

3.3 EQUIPMENT SUPPORTS

A. Fabricate structural steel stands to suspend equipment from structure above or support equipment above floor.

B. Grouting: Place grout under supports for equipment and make a smooth bearing surface.

C. Provide housekeeping pads where indicated on plans.

3.4 METAL FABRICATION

A. Cut, drill, and fit miscellaneous metal fabrications for pipe and equipment supports.

B. Fit exposed connections together to form hairline joints. Field-weld connections that cannot be shop-welded because of shipping size limitations.

C. Field Welding: Comply with AWS D1.1 procedures for manual shielded metal-arc welding, appearance and quality of welds, methods used in correcting welding work, and the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. Finish welds at exposed connections so that no roughness shows after finishing, and so that contours of welded surfaces match adjacent contours.

3.5 ADJUSTING

A. Hanger Adjustment: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

3.6 ESCUTCHEONS, SLEEVES AND RISER CLAMPS

A. Contractor shall furnish and install all escutcheons, inserts, thimbles, hangers, etc. required for the proper support and installation of his equipment and piping and he shall cooperate with other trades in locating and placing these items.

B. Contractor shall furnish and install all piping sleeves required. Sleeves passing through structural members or concrete footings shall be of cast iron or

Schedule 40 steel pipe. Sleeves passing through nonstructural walls or floors shall be of 26-gauge galvanized iron. Joints between sleeves and pipes passing through floors shall be made weather tight with plastic materials. Where pipes pass through water proofing membrane, flashing sleeves shall be installed. Sleeves of structural members shall be as detailed on structural plans.

C. Provide malleable iron split ring hangers with rod supports as specified. Strap hangers or wire will not be accepted. Spacing of hangers shall be as required above by MSS Standards. Maximum spacing shall no case exceed the following: For cast iron pipes 5ft.; for other than soil pipes 10 ft.

D. Provide galvanized iron shields between hangers and pipe covering.

E. Provide heavy steel riser clamps on vertical risers at floors to support pipes.

F. Provide chrome plated brass escutcheons wherever pipes pass through floors, walls or ceilings in exposed or finished areas.

G. All piping projecting from chases shall be rigidly supported in the wall or chase. Loosely supported piping, fixtures or accessories will not be accepted.

3.7 PAINTING

A. Touching Up: Clean field welds and abraded areas of shop paint and paint exposed areas immediately after erection of hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

1. Apply by brush or spray to provide a minimum dry film thickness of 2.0 mils.

B. Touching Up: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal is specified in Division 09 Section "Paints and Coatings."

C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 23 05 29



SECTION 23 05 48 – VIBRATION ISOLATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The general provisions of the Contract, including the Conditions of the Contract (General, Supplementary, and other Conditions) and Division 00 and 01 as appropriate, apply to the Work specified in this Section.

B. Refer to all Sections, as well as the Specifications for the other various trades and materials and be thoroughly familiar with all provisions regarding all work.

1.2 SCOPE OF WORK

A. Work in this Section includes but is not limited to the following:

1. Vibration isolation for piping, ductwork, and equipment.
2. HVAC Equipment isolation bases.
3. Flexible piping connections.
4. Resilient pipe anchors and guides.

B. Provide vibration isolation on all mechanical equipment, piping, and ductwork as indicated on equipment installation details or where recommended by equipment manufacturer.

1. All equipment, piping and ductwork shall be mounted or suspended from vibration isolators to reduce the transmission of vibration and mechanically transmitted sound to the building structure.
2. Vibration isolators shall be selected in accordance with the weight distribution so as to produce reasonably uniform deflections.

C. All isolation materials and equipment shall be provided by the same manufacturer.

D. Any variance or non-compliance with this section shall be corrected by the contractor in a manner approved by the Owner's Representative.

E. Provide minimum static deflection of isolators for equipment in accordance with weight supported and associated seismic zone.

1.3 SECTION INCLUDES

A. Mountings:

1. Spring Mountings
2. Restrained:
    a. Spring

B. Hangers:

1. Spring & Neoprene
2. Spring Only

C. Bases:

1. Integral Steel
2. Saddle & Bracket
3. Concrete Forms
    a. Welded Base
    b. Bolted Base
4. Curb Mounted Aluminum Base
5. Rooftop Spring Curbs

D. Flexible Rubber Connectors

E. Flexible Metallic Hoses

F. Wall, Floor & Ceiling Seals

G. Pipe Anchors

H. Riser Guides

I. Horizontal Pipe Isolation

J. Pipe Riser Isolation

K. Duct Isolation

1.4 SUBMITTALS

A. Submit under provisions of Division 01, “Submittal Procedures”.

B. Shop Drawings: Indicate inertia bases and locate vibration isolators, with static and dynamic load on each.

1. Submit details of equipment bases including dimensions, structural member sizes, and support point locations.
2. Submit details of isolation hangers for ceiling hung equipment, piping, and ductwork.
3. Submit details of mountings for floor supported equipment, piping and ductwork.
4. All hanger, mounting or pad drawings shall indicate deflections and model numbers as well as any other requirements within the specifications.
5. Spring diameters, rated loads and deflections, heights at rated load and closed height shall be provided for all springs in tabular form.
6. Provide complete flexible connector details.

C. Product Data:

1. Provide schedule of vibration isolator type with location and load on each.
2. Provide schedules of flexibly mounted equipment, referenced by drawing number.
3. Provide catalog cuts or data sheets on vibration isolators.

D. Manufacturer's Installation Instructions: Indicate special procedures and setting dimensions.

E. Manufacturer's Certificate: Certify that isolators are properly installed and adjusted to meet or exceed specified requirements.

1.5 PROJECT RECORD DOCUMENTS

A. Submit under provisions of Division 01- “Closeout Procedures” and “Closeout Submittals”.

B. Record actual locations of isolation hangers including attachment points.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:

1. Peabody
2. Kinetics
3. Mason Industries, Inc.
4. Vibration Elimination Co., Inc.

B. Substitutions: Under provisions of Division 01- “Submittal Procedures”.

2.2 MOUNTINGS

A. Type “B” Isolation - Spring Isolators:

1. Design: Free standing, laterally stable without housing.
2. Construction: All metal surfaces shall be neoprene coated
   a. Provide molded neoprene cup or 1/4" neoprene acoustical friction pad between baseplate and support.
   b. Provide leveling bolts rigidly attached to the equipment being isolated.
   c. Installed and operating heights shall be the same.
3. Ratio of spring diameter divided by the compression spring height shall be no less than 0.8.
4. Springs shall have a minimum additional travel to solid equal to 50% of the rated deflection.
5. Submittals shall include spring diameters, deflection, compression spring height, and solid spring height.
6. Sufficiently rigid to prevent misalignment or undue stress on machine, and to transmit design loads to isolators and snubbers.
7. Mountings shall be Type “SLF” as manufactured by Mason Industries, Inc. or approved equal.

B. Type “D” Isolation - Restrained Mountings:

1. Design: Steel springs similar to Type “B” isolators described above but with neoprene acoustical pads within a rigid sided housing.
   a. When equipment is at full operating weight, springs shall be adjustable to assume the weight placed and the temporary spacers removed.
   b. Spacers shall be removable without changing the installed or operating weights.
   c. Restraining bolts shall have large rubber grommets to provide cushioning in the vertical and horizontal modes.
   d. The hole through the bushing shall be a minimum of 3/4" diameter larger than the restraining bolt.
   e. Horizontal clearances on the side of the isolator between the spring assembly and the housing itself shall be a minimum of ½" to avoid bumping and interference with the spring action.
   f. Provide vertical limit stop that are out of contact during normal operation.
2. Construction: Vertical stop limits to prevent spring extension when weight of equipment is removed

a. Temporary steel spacers shall be provided between the upper and lower housings.
b. Housing shall serve as blocking during erection.
c. Housing and springs shall be powder coated and hardware shall be electro-galvanized.

3. Mountings shall be Type “SLR” as manufactured by Mason Industries, Inc. or approved equal.

2.3 HANGERS

A. Type “F” Isolation - Spring & Neoprene Hangers:

1. Spring Isolators: Similar to Type “B” previously described except with rigid steel frames containing 1 1/4" thick neoprene elements at the top with spring seated in a steel washer reinforced neoprene cup at the bottom.
   a. For Exterior and Humid Areas: Provide hot dipped galvanized housings and neoprene coated springs.
   b. Code: Color code springs for load carrying capacity.
2. Spring hangers shall be Type “30N” as manufactured by Mason Industries, Inc. or approved equal.

B. Type “H” Isolation - Hangers:

1. Hangers shall be manufactured with minimum characteristics as in Specification Type “B”, but without the neoprene element.
2. Springs shall be seated in a steel washer reinforced neoprene cup that has a neoprene bushing projecting through the bottom hole to prevent rod to hanger contact.
3. Spring diameters and the lower hole sizes, shall be large enough to allow the hanger rod to swing through a 30-deg. arch from side to side before contacting the cup bushing.
4. If ducts are suspended by flat strap iron, the hanger assembly shall be modified by the manufacturer with an eye on top of the box and on the bottom of the spring hanger rod to allow for bolting to the hanger straps.
5. Submittals on either of the above hangers shall include a scale drawing of the hanger showing the 30-deg. capability.
6. Hangers for rods shall be Type “30" or for straps, Type “W30N” as manufactured by Mason Industries, Inc as basis of design.

2.4 HORIZONTAL TYPE THRUST RESTRAINTS

A. Type “I” Isolation - Restraints:

1. When total air thrust exceeds 10% of the isolated weight, floor mounted or suspended air handling equipment shall be protected against excessive displacement by the use of horizontal thrust restraints.
2. The restraints shall consist of a modified Specification B spring mounting.
3. Restraint springs shall have the same deflection as the isolator springs.
4. The assembly shall be preset at the factory and fine-tuned in the field to allow for a maximum of 1/4" movement from stop to maximum thrust.
5. The assemblies shall be furnished with rod and angle brackets for attachment to both the equipment and duct work or the equipment and the structure.
6. Restraints shall be attached at the center line of thrust and symmetrically on both side of the unit.
7. Horizontal thrust restraints shall be Type “WB” as manufactured by Mason Industries, Inc. or approved equal.

2.5 BASES

A. Type “J” Steel Beam Bases:

1. Vibration isolation manufacturer shall furnish integral structural steel bases.
2. Rectangular bases are preferred for all equipment.
3. Pump bases may be T or L shaped.
4. Pump bases for split case pumps shall be large enough to support suction and discharge elbows.
5. All perimeter members shall be steel beams with a minimum depth equal to 1/10 of the longest dimension of the base.
6. Base depth need not exceed 14" provided that the deflection and misalignment is kept within acceptable limits as determined by the manufacturer.
7. Height saving brackets shall be employed in all mounting locations to provide a base clearance of 1".
8. Bases shall be Type “WF” as manufactured by Mason Industries, Inc. as basis of design.

B. Type “K” Isolation - Bases:

1. Vibration isolation manufacturer shall provide steel members welded to height saving brackets to cradle equipment having legs or bases that do not require a complete supplementary base.

2. Members shall have sufficient rigidity to prevent distortion of equipment.
3. Inverted saddles shall be Type “ICS” as manufactured by Mason Industries, Inc. as basis of design.

C. Type “L” Isolation - Bases:

1. Vibration isolation manufacturer shall furnish rectangular steel concrete pouring forms for floating concrete bases.
   a. Bases for split case pumps shall be large enough to provide support for suction and discharge elbows.
   b. Bases shall be a minimum of 1/12 of the longest dimension of the base but not less than 6".
   c. The base depth need not exceed 12" unless specifically recommended by the base manufacturer for mass or rigidity.
   d. Forms shall include minimum concrete reinforcing consisting of ½" bars welded in place of 6" centers running both ways in a layer 1-1/2" above the bottom.
   e. Forms shall be furnished with steel templates to hold the anchor bolt sleeves and anchor mounting locations to maintain a 1" clearance below the base.
   f. Forms shall be factory painted with rust preventive prime coat suitable and ready for final finish coat.
   g. Wooden formed bases leaving a concrete rather than a steel finish are not acceptable.
   h. Base shall be Type “BMS” or Type “BMK” as manufactured by Mason Industries, Inc. or equal.

2.6 FLEXIBLE RUBBER CONNECTORS

A. Type “O” Isolation -Connectors:

1. Rubber expansion joints shall be peroxide cured EPDM throughout with Kevlar tire cord reinforcement.
   a. Substitutions must have certifiable equal or superior characteristics.
2. Raised face rubber flanges shall encase solid steel rings to prevent pull out. Flexible cable wire is not acceptable.
3. Size 1-1/2" through 14"shall have a ductile iron external ring between the two spheres.
   a. Sizes 16" through 24" may be single sphere.
   b. Sizes 3/4" through 2" may have one sphere, bolted threaded flange assemblies and cable retention.
4. Minimum ratings through 14" shall be 250 psi at 170 deg. F and 215

psi at 250 deg. F., 16" through 24", 180 psi at 170 deg. F and 150 psi at 250 deg. F.

a. Higher published rated connectors may be used where required.

5. Safety factors shall be a minimum of 3/1.
   a. All expansion joints must be factory tested to 150% of maximum pressure for 12 minutes before shipment.
6. The piping gap shall be equal to the length of the expansion joint under pressure.
   a. Control rods passing through ½" thick Neoprene washer bushings large enough to take the thrust at 100psi of surface area may be used on unanchored piping where the manufacturer determines the condition exceeds the expansion joint rating without them.
7. Submittals shall include two test reports by independent consultants showing minimum reductions of 20 DB in vibration accelerations and 10 DB in sound pressure levels at typical blade passage frequencies on this or a similar product by the same manufacturer.
8. All expansion joints shall be installed on the equipment side of the shut off valves.
9. Expansion joints shall be “SAFEFLEX”, Type “SFDEJ”, Type ”SFEJ”,Type“ SFDCR” or Type “SFU” and Control Rods “CR” as manufactured by Mason Industries, Inc. or approved equal.

2.7 FLEXIBLE METALLIC HOSES

A. Type “P” Isolation - Hoses:

1. Flexible stainless-steel hose shall have stainless steel braid and carbon steel fittings. Sizes 3” and larger shall be flanged. Smaller sizes may have male nipples. Minimum lengths shall be as tabulated below:

FLANGED CONNECTIONS		
3" x 14" (75 x 350mm)	6" x 20" (150 x 500mm)	12" x 28" (300 x 700mm)
4" x 15" (100 x 375mm)	8" x 22" (200 x 550mm)	14" x 30" (350 x 750mm)
5" x 19" (125 x 475mm)	10" x 26" (250 x 650mm)	16" x 32" (400 x 800mm)

MALE NIPPLES		
½" x 9" (12 x 225mm)	1-1/4" x 12" (32 x 300mm)	2" x 14" (50 x 350mm)
3/4" x 10" (19" x 250mm)	1-1/2" x 13" (38 x 325mm)	2-1/2" x 18" (64 x 450mm)
1" x 11" (25 x 275mm)	----------	----------

2. At equipment, hoses shall be installed on the equipment side of the shut-off valves horizontal and parallel to the equipment shafts wherever possible.
3. Hoses shall be Type “BSS”, Type “BSSRF”, or Type “BSSMN” as manufactured by Mason Industries, Inc.

2.8 WALL, FLOOR AND CEILING SEALS

A. Type “Q” Isolation - Seals:

1. Split seals consist of pipe halves with minimum 3/4" thick neoprene sponge cemented to the inner faces.
2. The seal shall be tightened around the pipe to eliminate clearance between the inner sponge face and the piping.
3. Concrete may be packed around the seal to make it integral with the floor, wall or ceiling if the seal is not in place prior to the construction of the building member.
4. Seals shall project a minimum of 1" past either face of the wall.
5. Where temperature exceeds 240 deg. F., 10 lb. density fiberglass may be used in lieu of the sponge.
6. Seals shall be Type “SWS” as manufactured by Mason Industries, Inc. or approved equal.

2.9 PIPE ANCHORS

A. Type “R” Isolation - Anchors:

1. All directional acoustical pipe anchors, consist of two sizes of steel tubing separated by minimum ½" thickness of 60 durometer or softer neoprene.
2. Vertical restraint shall be provided by similar material arranged to prevent up or down vertical travel.
3. Allowable loads on the isolation material shall not exceed 500 psi and the design shall be balanced for equal resistance in any direction.

4. All-directional anchors shall be Type “ADA” as manufactured by Mason Industries, Inc. or approved equal.

2.10 RISER GUIDES

A. Type “S” Isolation - Guides:

1. Pipe guides shall consist of a telescopic arrangement of two sizes of steel tubing separated by a minimum ½" thickness of 60 durometer or softer neoprene.
2. The height of the guides shall be preset with a shear pin to allow vertical motion due to pipe expansion or contraction.
3. Guides shall be capable of ± 1-5/8" motion or to meet location requirements.
4. Pipe guides shall be type “VSG” as manufactured by Mason Industries, Inc. or approved equal.

2.11 HORIZONTAL PIPE ISOLATION

A. Type “T” Isolation - Isolators:

1. The first four (4) pipe hangers in the main lines near the mechanical equipment shall be as described in specification Type “G”.
2. Hangers supporting piping 2" and larger in all other locations throughout the building shall be isolated by hangers as described in Specification Type “F”.
3. Floor supported piping shall rest on isolators as described in Specification Type “D”.
4. Heat exchangers and expansion tanks are considered part of the piping run. The first four isolators from the isolated equipment shall have the same static deflection as specified for the mountings under the connected equipment.
5. If piping is connected to equipment located in basements and hangs from ceilings under occupied spaces the first four hangers shall have 0.75” deflection for pipe sizes up to and including 3", 1-1/2" deflection for pipe sizes over 3" and up to and including 6", and 2-1/2" deflection thereafter.
6. Where piping connects to mechanical equipment install specification Type “O” expansion joints or Specification Type “P” stainless hoses if Type “O” is not suitable for the service.
7. All piping passing through the equipment walls, floors or ceilings shall be protected against sound leakage by means of an acoustical seal, as described in Specification Type “Q”.

2.12 PIPE RISER ISOLATION

A. Type “U” Isolation - Isolators:

1. All vertical risers shall be supported by spring isolators designed to support the riser filled with water.
2. Assigned loads must be within the building design load limits at the support points.
3. Neutral central resilient anchors close to the center of the run shall direct movement up and down.
4. Anchors shall be capable of holding an upward force equal to the water weight when the system is drained.
5. If one level cannot accommodate this force, anchors can be located on 2 or 3 adjacent floors.
6. Resilient guides shall be spaced and sized properly depending on the pipe diameter.
7. Submittals must include the initial load, initial deflection, change in deflection, final load and change in load at all spring and anchor support locations, as well as guide spacing.
8. The initial spring deflection shall be a minimum of 3/4" or four times the thermal movement at the isolator location whichever is greater.
9. Calculations shall include pipe stress at end conditions and branch off locations and the manufacturer must include installation instructions.
10. Calculations must be stamped and signed by a licensed registered professional engineer.
11. Proper provisions shall be made for seismic protection in seismic zones. Support spring isolators shall be of Type “B”, Anchors of Type “R” and telescoping guides of Type “S” equipment.
12. The isolation vendor shall provide and design all brackets and clamps and anchors at riser spring guide and anchor locations.
13. The contractor shall install and adjust all isolators under the supervision and/or direction of the isolation vendor or his appointed representative.

2.13 DUCT ISOLATION

A. Type “V” Isolation - Isolators:

1. All air ducts with a cross section of two (2) sq. ft. or greater shall be isolated from building structure by Type “H” hangers or Type “B” floor supports with a minimum deflection of 3/4".
2. Isolators shall continue for a minimum length of 50 ft. from the equipment being served.
3. If air velocity exceeds 1,000 fpm, hangers or supports shall continue

for an additional 50 ft. from the unit or as further defined on the drawings.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install all isolators in strict accordance with manufacturer's instructions.

B. Install isolation for motor driven equipment.

C. Horizontal pipe shall be installed in accordance with Type “T” Horizontal pipe isolators.

D. Piping risers shall be installed in accordance with Type “U” riser isolators.

E. All duct runs shall be installed in accordance with Type “V” duct isolators.

F. Installation of vibration isolators must not cause any change of position of equipment, piping, or ductwork resulting in stresses or misalignment.

1. No rigid connections between equipment and the building structure shall be made that degrades the noise and vibration control system herein specified.
2. The Contractor shall not install any equipment, piping, duct, or conduit which makes rigid connections with the building unless isolation is not specified. “Building” includes, but is not limited to, slabs, beams, columns, studs and walls.
3. Coordinate work with other trades to avoid rigid contact with building.
4. Rooftop equipment isolators shall be bolted to the equipment and structure. Mountings must be designed to withstand and resist 110 mph wind loads. Air handling equipment and centrifugal fans shall be protected against excessive displacement which results from high air thrust when thrust forces exceed 10% of the equipment weight. Horizontal thrust restraints shall be Type “I” restraints.
5. Where piping passes through walls, floors, or ceilings, the vibration isolation manufacturer shall provide Type “Q” seals.
6. Correct, at no additional cost, all installations which are deemed defective in workmanship and materials at the Contractor’s expense.
7. Any discrepancies between the specifications and the field conditions or changes required due to specific equipment selection shall be brought to the attention of the Owner’s Representative prior to installation.

8. Locate isolation hangers as near to the overhead support structure as possible.

G. Bases:

1. Set steel bases for one-inch clearance between housekeeping pad and base.
2. Set concrete inertia bases for 2-inch clearance between housekeeping pad and base.
3. Adjust equipment level.
4. Provide painting for final finish coat.

H. Install spring hangers without binding.

I. On closed spring isolators, adjust so side stabilizers are clear under normal operating conditions.

J. Prior to making piping connections to equipment with operating weights substantially different from installed weights, block up equipment with temporary shims to final height. When full load is applied, adjust isolators to load to allow shim removal.

K. Provide pairs of horizontal limit springs on fans with more than 6.0-inch 1.5 static pressure, and on hanger supported, horizontally mounted axial fans.

L. Provide resiliently mounted equipment, piping, and ductwork with seismic snubbers. Each inertia base shall have minimum of four seismic snubbers located close to isolators. Snub equipment designated for post disaster use to 0.05-inch maximum clearance. Other snubbers shall have clearance between 0.15 inch and 0.25 inch.

M. Support piping connections to isolated equipment resiliently for scheduled distance as follows:

1. Up to 4 Inch Diameter: First three points of support.
2. 5 to 8 Inch Diameter: First four points of support.
3. 10-inch Diameter and Over: First six points of support.
4. Select three hangers closest to vibration source for minimum 1.0-inch static deflection or static deflection of isolated equipment. Select remaining isolators for minimum 1.0-inch static deflection or ½ static deflection of isolated equipment.

N. Connect wiring to isolated equipment with flexible hanging loop.

3.2 TRAINING AND DEMONSTRATION

A. Demonstration Services: Arrange and pay for a factory-authorized service representative to train Owner's maintenance personnel on the following:

1. Procedures and schedules related to start-up and shut down, troubleshooting, servicing, preventative maintenance, and how to obtain replacement parts.
2. Familiarization with contents of Operating and Maintenance Manuals specified in Division 01, "Closeout Submittals".
3. Provide Service Manuals for each vibration isolator specified.

B. Provide three (3) hours of factory authorized training.

1. Schedule training with seven (7) days advanced notice.
2. Refer to “Mechanical General Provisions”.

3.3 MANUFACTURER’S FILED SERVICES

A. Examine systems under provisions of Division 01, “Closeout Procedures”.

B. Inspect isolated equipment after installation and submit report. Include static deflections.

3.4 HORIZONTAL PIPE ISOLATION SCHEDULE

Pipe Size (Inches)	Isolated Distance from Equipment
1" & Below	120 Diameters
2	90 Diameters
3	80 Diameters
4	75 Diameters
5	70 Diameters
6	60 Diameters
8	60 Diameters
10	54 Diameters
12	50 Diameters

14	45 Diameters
16	45 Diameters
24	38 Diameters
Over 24	38 Diameters

3.5 EQUIPMENT ISOLATION SCHEDULE

ISOLATED EQUIPMENT	ISOLATOR - Type/Base/Thickness	DEFLECTION * (inches)
Piping Risers	U (B-R-S)	0.75"
A/C Ductwork	V (H-B)	0.35"
Tubular & Axial Blowers	A-I	0.35"
Centrifugal Blowers	A-I	0.35"
Central Station Air Handling Units	A-I	0.35"

Note: All deflections are based upon slab on grade construction. For other applications, consult the isolation manufacturer and equipment schedules and adjust deflection accordingly.

Note: Seismic considerations shall be designed for the project in the area of earthquake zone location.

Equipment Types	Base Type	Isolator Type	Static Defl (in.)	Mason Ind. Type
Fans (including AHU, & FCU)				
Floor/Roof Supported	**Per Mfr (1)**	**Spring**		**SLF**
below - 300 rpm (or VFD)			**4**	
301 - 450 rpm			**3.5**	
451 - 600 rpm			**3**	
601 - 750 rpm			**2**	
751 - 850 rpm			**1.5**	
851 - greater			**1**	
Suspended		**Sprg/Neop**	**(above + 0.25)**	**30N**

(1) Vibration isolation scheme to consider fan operating force and provide thrust restraint and/or concrete inertia base in order to limit movement of fan to 1/4 inch at any operating point. Thrust restraints to have the same deflection as vibration isolation devices.

END OF SECTION 23 05 48



SECTION 23 05 53 – MECHANICAL IDENTIFICATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The general provisions of the Contract, including the Conditions of the Contract (General, Supplementary, and other Conditions) and Division 00 and 01 as appropriate, apply to the Work specified in this Section.

B. Refer to all Sections, as well as the Specifications for the other various trades and materials and be thoroughly familiar with all provisions regarding all work.

1.2 SCOPE OF WORK

A. Section Includes:

1. Equipment labels.
2. Warning signs and labels.
3. Pipe labels.
4. Valve tags.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples: For color, letter style, and graphic representation required for each identification material and device.

C. Equipment Label Schedule: Include a listing of all equipment to be labeled with the proposed content for each label.

D. Valve numbering scheme.

E. Valve Schedules: For each piping system to include in maintenance manuals.

1.4 COORDINATION

A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

B. Coordinate installation of identifying devices with locations of access panels and doors.

C. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 EQUIPMENT LABELS

A. Plastic Labels for Equipment:

1. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.
2. Letter Color: White.
3. Background Color: Black.
4. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
5. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
6. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
7. Fasteners: Stainless-steel rivets or self-tapping screws.
8. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

B. Label Content: Include equipment's Drawing designation or unique equipment number, Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified.

C. Equipment Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch bond paper. Tabulate equipment identification number and identify Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

2.2 WARNING SIGNS AND LABELS

A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.

B. Letter Color: White.

C. Background Color: Black.

D. Maximum Temperature: Able to withstand temperatures up to 160 deg F.

E. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.

F. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.

G. Fasteners: Stainless-steel rivets or self-tapping screws.

H. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

I. Label Content: Include caution and warning information, plus emergency notification instructions.

2.3 PIPE LABELS

A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.

B. Pretensioned Pipe Labels: Precoiled, semirigid plastic formed to partially cover circumference of pipe and to attach to pipe without fasteners or adhesive.

C. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.

D. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings, pipe size, and an arrow indicating flow direction.

1. Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions, or as separate unit on each pipe label to indicate flow direction.
2. Lettering Size: At least 1-1/2 inches high.

2.4 VALVE TAGS

A. Valve Tags: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch numbers.

1. Tag Material: Brass, 0.032-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
2. Fasteners: Brass wire-link or beaded chain; or S-hook.

B. Valve Schedules: For each piping system, on 8-1/2-by-11-inch bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.

1. Valve-tag schedule shall be included in operation and maintenance data.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

3.2 EQUIPMENT LABEL INSTALLATION

A. Install or permanently fasten labels on each major item of mechanical equipment.

B. Locate equipment labels where accessible and visible.

3.3 PIPE LABEL INSTALLATION

A. Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:

1. Near each valve and control device.
2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
3. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.
4. At access doors, manholes, and similar access points that permit view of concealed piping.

5. Near major equipment items and other points of origination and termination.
6. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.
7. On piping above removable acoustical ceilings. Omit intermediately spaced labels.

B. Pipe Label Color Schedule shall comply with OSHA and ANSI A13.1 Standards (Verify exact color prior to installation):

1. Chilled-Water Piping:
   a. Background Color: Green.
   b. Letter Color: White.
2. Heating-Water Piping:
   a. Background Color: Green.
   b. Letter Color: White.
3. Domestic Cold Water Piping:
   a. Background Color: Green.
   b. Letter Color: White.
4. Domestic Hot Water Piping:
   a. Background Color: Blue.
   b. Letter Color: White.
5. Steam Piping:
   a. Background Color: Yellow.
   b. Letter Color: Black.
6. Steam Condensate Piping:
   a. Background Color: Yellow.
   b. Letter Color: Black.
7. Natural Gas Piping:
   a. Background Color: Yellow.
   b. Letter Color: Black.
8. Plant Air and Compressed Air Piping:
   a. Background Color: Blue.
   b. Letter Color: White.
9. Vacuum Piping:
   a. Background Color: White.
   b. Letter Color: Black.
10. Nitrogen Piping:
    a. Background Color: Black.
    b. Letter Color: White.
11. Helium Piping:
    a. Background Color: Blue.
    b. Letter Color: White.
12. Carbon Dioxide Piping:
    a. Background Color: Grey.

b. Letter Color: White.

13. Hydrogen Piping:
    a. Background Color: yellow.
    b. Letter Color: Black.

3.4 VALVE-TAG INSTALLATION

A. Install tags on valves and control devices in piping systems, except check valves; valves within factory-fabricated equipment units; shutoff valves; faucets; convenience and lawn-watering hose connections; and HVAC terminal devices and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule.

B. Valve-Tag Application Schedule: Tag valves according to size, shape, color scheme and with piping system abbreviation.

END OF SECTION 23 05 53



SECTION 23 05 93 – TESTING, ADJUSTING, AND BALANCING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The general provisions of the Contract, including the Conditions of the Contract (General, Supplementary, and other Conditions) and Division 00 and 01 as appropriate, apply to the Work specified in this Section.

B. Refer to all Sections, as well as the Specifications for the other various trades and materials and be thoroughly familiar with all provisions regarding all work.

1.2 CERTIFICATIONS

A. The TAB Firm must be either a member of AABC or certified by the NEBB or the TABB and certified in all categories and functions where measurements or performance are specified on the plans and specifications.

B. TAB contractor shall be an independent third-party firm not associated with the Division 22 or 23 contractor.

1.3 SCOPE OF WORK

A. The balancing, testing, and adjusting of the air conditioning, heating and ventilating systems shall be performed by an independent balancing company possessing calibrated instruments, qualified engineers and skilled technicians to perform all tests. The balancing agency shall be responsible for inspecting, adjusting, balancing, and logging the data on the performance of fans, air handling units, low pressure supply and exhaust ductwork, and heat exchangers. The Mechanical Contractor and the suppliers of the equipment installed shall cooperate with the balancing agency to provide all necessary data on the design and proper application of the system components and shall furnish all labor and material required to calibrate any deficiencies in construction.

B. This Section specifies the requirements and procedures total mechanical systems testing, adjusting, and balancing. Requirements include measurement and establishment of the fluid quantities of the mechanical systems as required to meet design specifications and recording and reporting the results.

C. Test, adjust, and balance the following mechanical systems:

1. Supply air systems, all pressure range;
2. Fresh Air
3. Exhaust Air
4. Return air systems
5. AHUs
6. Fans
7. Hoods
8. Fire, smoke, and combination fire/smoke damper operation
9. Verify temperature control system operation;

D. Provide assistance to Division 23 and Division 26 Contractor and project Architect in system commissioning process. Identify all system variances of greater than 10% and make required measurements, adjustments, etc. to bring systems into compliance to satisfaction of project Architect.

E. THE TEST AND BALANCE CONTRACTOR SHALL BE RESPONSIBLE FOR CHECKING OUT AND REPORTING EACH SEQUENCE OF HEATING, COOLING AND CONTROL INTERLOCK OPERATION FOR THE EQUIPMENT REFERENCED ABOVE.

1.4 DEFINITIONS

A. Systems testing, adjusting, and balancing is the process of checking and adjusting all the building environmental systems to produce the design objectives. It includes:

1. The balance of air distribution;
2. Adjustment of total system to provide design quantities;
3. Electrical measurement;
4. Verification of performance of all equipment and automatic controls;

B. Test: To determine quantitative performance of equipment.

C. Adjust: To regulate the specified fluid flow rate and air patterns at the terminal equipment (e.g., reduce fan speed, throttling).

D. Balance: To proportion flows within the distribution system (submains, branches, and terminals) according to specified design quantities.

E. Procedure: Standardized approach and execution of sequence of work operations to yield reproducible results.

F. Report forms: Test data sheets arranged for collecting test data in logical order for submission and review. These data should also form the permanent record to be used as the basis for required future testing, adjusting, and balancing.

G. Terminal: The point where the controlled fluid enters or leaves the distribution system. These are supply inlets on water terminals, supply outlets on air terminals, return outlets on water terminals, and exhaust or return inlets on air terminals such as registers, grilles, diffusers, louvers, and hoods.

H. Main: Duct or pipe containing the system's major or entire fluid flow.

I. Submain: Duct or pipe containing part of the systems' capacity and serving two or more branch mains.

J. Branch main: Duct or pipe serving two or more terminals.

K. Branch: Duct or pipe serving a single terminal.

1.5 SUBMITTALS

A. Agency Data:

1. Submit proof that the proposed testing, adjusting, and balancing agency meets the qualifications specified below.

B. Engineer and Technicians Data:

1. Submit proof that the Test and Balance Engineer assigned to supervise the procedures, and the technicians proposed to perform the procedures meet the qualifications specified below.

C. Procedures and Agenda: Submit a synopsis of the testing, adjusting, and balancing procedures and agenda proposed to be used for this project.

D. Maintenance Data: Submit maintenance and operating data that include how to test, adjust, and balance the building systems. Include this information in maintenance data specified in Division 01 and Section 230020.

E. Sample Forms: Submit sample forms, if other than those standard forms prepared by the AABC or NEBB are proposed.

F. Certified Reports: Submit testing, adjusting, and balancing reports bearing the seal and signature of the Test and Balance Engineer. The reports shall be certified proof that the systems have been tested, adjusted, and balanced in

accordance with the referenced standards; are an accurate representation of how the systems have been installed; are a true representation of how the systems are operating at the completion of the testing, adjusting,
and balancing procedures; and are an accurate record of all final quantities measured, to establish normal operating values of the systems. Follow the procedures and format specified below:

1. Draft reports: Upon completion of testing, adjusting, and balancing procedures, prepare draft reports on the approved forms. Draft reports may be hand written, but must be complete, factual, accurate, and legible. Organize and format draft reports in the same manner specified for the final reports. Submit 2 complete sets of draft reports. Only 1 complete set of draft reports will be returned.
2. Final Report: Upon verification and approval of draft reports, prepare final reports, type written, and organized and formatted as specified below. Submit 2 complete sets of final reports.
3. Report Format: Report forms shall be those standard forms prepared by the referenced standard for each respective item and system to be tested, adjusted, and balanced. Bind report forms complete with schematic systems diagrams and other data in reinforced, vinyl, three-ring binders. Provide binding edge labels with the project identification and a title descriptive of the contents. Divide the contents of the binder into the below listed divisions, separated by divider tabs:
4. General Information and Summary
    a. Air Systems
    b. Hydronic Systems
    c. Temperature Control Systems
    d. Special Systems
5. Report Contents: Provide the following minimum information, forms and data:
    a. General Information and Summary: Inside cover sheet to identify testing, adjusting, and balancing agency, Contractor, Owner, Architect, Engineer, and Project. Include addresses and contact names and telephone numbers. Also include a certification sheet containing the seal and name address, telephone number, and signature of the Certified Test and Balance Engineer. Include in this division a listing of the instrumentations used for the procedures along with the proof of calibration.
    b. The remainder of the report shall contain the appropriate forms containing as a minimum, the information indicated on the standard report forms prepared by the AABC and NEBB, for each respective item and system. Prepare a schematic diagram for each item of equipment and system to accompany each respective report form.

6. Provide electronic (PDF) copies of all documentation included in the Final Report.

G. Calibration Reports: Submit proof that all required instrumentation has been calibrated to tolerances specified in the referenced standards, within a period of six months prior to starting the project.

H. At the front of the Report, the TAB Contractor shall provide a summary sheet identifying system operational variances problems, etc. recommended corrective measures that in the opinion of the TAB Contractor should be enacted by the Mechanical Contractor prior to retesting. Submit to project Architect as work progresses with resolution documented for inclusion in final report.

1.6 QUALITY ASSURANCE

A. Test and Balance Engineer's Qualifications: A Professional Engineer (independent consultant), registered in the State in which the services are to be performed, and having testing, adjusting, and balancing experience on projects with testing and balancing requirements similar to those required for this project.

B. Pre-Balancing Conference: Prior to beginning of the testing, adjusting, and balancing procedures, schedule and conduct a conference with the Architect and representatives of installers of the mechanical systems. The objective of the conference is final coordination and verification of system operation and readiness for testing, adjusting, and balancing.

1.7 PROJECT CONDITIONS

A. Systems Operation: Systems shall be fully operational prior to beginning procedures.

1.8 SEQUENCING AND SCHEDULING

A. Test, adjust and balance air conditioning systems during summer season and heating systems during winter season, including at least a period of operation at outside conditions within 5 deg F wet bulb temperature of maximum summer design condition, and within 10 deg F dry bulb temperature of minimum winter design condition. Take final temperature readings during seasonal operation.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.1 PRELIMINARY PROCEDURES FOR AIR SYSTEM BALANCING

A. Before operating the system, perform these steps:

1. Obtain design drawings and specifications and become thoroughly acquainted with the design intent.
2. Obtain copies of approved shop drawings of all air handling equipment, outlets (supply, return, and exhaust) and temperature control diagrams.
3. Compare design to installed equipment and field installations.
4. Walk the system from the system air handling equipment to terminal units to determine variations of installation from design.
5. Check filters for cleanliness.
6. Check dampers (both volume and fire) for correct and locked position, and temperature control for completeness of installation before starting fans.
7. Prepare report test sheets for both fans and outlets. Obtain manufacturer's outlet factors and recommended procedures for testing. Prepare a summation of required outlet volumes to permit a crosscheck with required fan volumes.
8. Determine best locations in main and branch ductwork for most accurate duct traverses.
9. Place outlet dampers in the full open position.
10. Prepare schematic diagrams of system "as-built" ductwork and piping layouts to facilitate reporting.
11. Lubricate all motors and bearings.
12. Check fan belt tension.
13. Check fan rotation.

3.2 PRELIMINARY PROCEDURES FOR HYDRONIC SYSTEM BALANCING

A. Before operating the system perform these steps:

1. Open valves to full open position. Close coil bypass valves.
2. Remove and clean all strainers.
3. Examine hydronic systems and determine if water has been treated and cleaned.
4. Check pump rotation.
5. Clean and set automatic fill valves for required system pressure.
6. Check expansion tanks to determine that they are not air bound and that the system is completely full of water.
7. Check air vents at high points of systems and determine if all are installed and operating freely (automatic type) or to bleed air completely (manual type).
8. Set temperature controls so all coils are calling for full flow.

9. Check operation of automatic bypass valves.
10. Check and set operating temperatures of chilled water heat exchangers to design requirements.
11. Lubricate all motors and bearings.
12. Test VAV boxes and hot water/electric heating coils.
13. Test sequencing of all motorized dampers, smoke dampers, etc.

3.3 MEASUREMENTS

A. Provide all required instrumentation to obtain proper measurements, calibrated to the tolerances specified in the referenced standards. Instruments shall be properly maintained and protected against damage.

B. Provide instruments meeting the specifications of the referenced standards.

C. Use only those instruments which have the maximum field measuring accuracy and are best suited to the function being measured.

D. Apply instrument as recommended by the manufacturer.

E. Use instruments with minimum scale and maximum subdivisions and with scale ranges proper for the value being measured.

F. When averaging values, take a sufficient quantity of readings which will result in a repeatability error of less than 5 percent. When measuring a single point, repeat readings until 2 consecutive identical values are obtained.

G. Take all reading with the eye at the level of the indicated value to prevent parallax.

H. Use pulsation dampeners where necessary to eliminate error involved in estimating average of rapidly fluctuation readings.

I. Take measurements in the system where best suited to the task.

3.4 PERFORMING TESTING, ADJUSTING, AND BALANCING

A. Perform testing and balancing procedures on each system identified, in accordance with the detailed procedures outlined in the referenced standards.

B. Cut insulation, ductwork, and piping for installation of test probes to the minimum extent necessary to allow adequate performance of procedures.

C. Patch insulation, ductwork, and housings, using materials identical to those removed.

D. Seal ducts and piping, and test for and repair leaks.

E. Seal insulation to re-establish integrity of the vapor barrier.

F. Mark equipment settings, including damper control positions, valve indicators, fan speed control levers, and similar controls and devices, to show final settings. Mark with paint or other suitable, permanent identification materials.

G. Retest, adjust, and balance systems subsequent to significant system modifications, and resubmit test results.

3.5 RECORD AND REPORT DATA

A. Record all data obtained during testing, adjusting, and balancing in accordance with, and on the forms recommended by the referenced standards, and as approved on the sample report forms.

B. Prepare report of recommendations for correcting unsatisfactory mechanical performances when system cannot be successfully balanced.

C. Prepare a summary sheet of noted variances in excess of ± 10% of design value. Include all such variances, recommended resolutions and ultimate result in Appendix “A” to TAB Final Report.

3.6 DEMONSTRATION

A. Training:

1. Train the Owner's maintenance personnel on troubleshooting procedures and testing, adjusting, and balancing procedures. Review with the Owner's personnel, the information contained in the Operating and Maintenance Data specified in Division 01 and 230020.
2. Schedule training with Owner through the Architect with at least 7 days prior notice.

END OF SECTION 23 05 93



SECTION 23 07 13 - INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The general provisions of the Contract, including the Conditions of the Contract (General, Supplementary, and other Conditions) and Division 00 and 01 as appropriate, apply to the Work specified in this Section.

B. Refer to all Sections, as well as the Specifications for the other various trades and materials and be thoroughly familiar with all provisions regarding all work.

1.2 SCOPE OF WORK

A. Extent of mechanical insulation required by this section is indicated on drawings and schedules, and by requirements of this section.

B. This Section includes:

1. Piping insulation including fittings and valves.
2. Duct insulation (internal lining and external wrapping)

C. Cover and insulate all valves, fittings, and similar items in each piping system with equivalent thickness and composition of insulation as applied to adjoining pipe run and piping system. Install factory molded, pre-cut or field cut and fabricated units (at installer's option) except where specifically noted otherwise.

D. Maintain the integrity of vapor jackets on all pipe insulation, duct insulation, equipment insulation and protect during construction to prevent puncture or other damage.

1.3 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 01 Specification Sections:

1. Product data for each type of mechanical insulation identifying k-value, thickness, and accessories.
2. Manufacturer's installation recommendations.

3. Material certificates, signed by the manufacturer, certifying that materials as a minimum, comply with specified requirements where laboratory test reports cannot be obtained.
4. Material test reports prepared by a qualified independent testing laboratory. Certify insulation meets specified requirements.

1.4 QUALITY ASSURANCE

A. Fire Performance Characteristics: Conform to the following characteristics for insulation including facings, cements, and adhesives, when tested according to ASTM E 84, by UL or other testing or inspecting organization acceptable to the authority having jurisdiction. Label insulation with appropriate markings of testing laboratory.

1. Interior Insulation: Flame spread rating of 25 or less and a smoke developed rating of 50 or less.
2. Exterior Insulation: Flame spread rating of 75 or less and a smoke developed rating of 150 or less.

1.5 SEQUENCING AND SCHEDULING

A. Schedule piping and duct insulation application only after the testing of piping and duct systems is complete and accepted.

B. Schedule insulation application after installation and testing of heat trace tape is complete and accepted.

C. Schedule insulation of walls and ceiling to correspond with installation of pipe hangers, supports and equipment.

PART 2 - PRODUCTS

2.1 GENERAL

A. Pipe insulation shall not begin until all work has been tested and found to be tight. All insulation adhesives, sealers, tapes and mastic shall meet the latest NFPA requirements and shall meet 25/50/50 flame spread and smoke developed ratings.

B. All insulation shall be installed in strict accordance with the manufacturer's recommendations.

C. All pipe insulation where recommended by the manufacturer shall be banded with aluminum bands, three to a section and with one band on each side of each fitting, valve, etc.

D. Insulation shall be continuous through walls and ceilings.

E. All valves, strainers, etc. shall be insulated the same as its adjacent piping and the covering shall extend all the way up to the equipment.

1. USE HIGH DENSITY INSULATION INSERTS AT HANGERS ON ALL PIPING 1-1/2" AND ABOVE TO PREVENT CRUSHING OF INSULATION.

2.2 THERMAL INSULATION

A. After all work has been tested and approved, insulate as follows:

1. INSULATION SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS AND INSTRUCTIONS.

2.3 CONDENSATE DRAIN PIPING

A. Insulate with 1/2" Aerotube or Armaflex pipe insulation applied in accordance with manufacturer's recommendations and instructions.

B. Condensate drain piping on roof is intended to protect PVC drain piping from UV. Cover condensate drain piping on roof with aluminum jacket.

C. Insulation shall be continuous through hangers, sleeves, and roof supports.

2.4 REFRIGERANT LINES

A. Insulate with 3/4" closed cell, tube insulation, Aerotube, Armaflex or equivalent. Apply two coats of weatherproof mastic on all piping below grade or exposed to weather. Contractor shall install refrigerant lines below grade in watertight PVC sleeve in accordance with manufacturer's recommendations.

B. All copper refrigerant lines shall be separated from dissimilar metals at all support points.

2.5 HVAC DUCTWORK INSULATION:

A. Supply, return, transfer, fresh air and exhaust ductwork shall be wrapped on outside with 2.33”, 3/4# density fiberglass insulation with aluminum foil

vapor barrier with a minimum R-Value of R-6 (unless stated otherwise on mechanical drawings). Insulation shall be taped at all joints and installed per the manufacturer's recommendations.

B. Refer to air distribution section of mechanical specifications for duct insulation supplied by the sheet metal sub-contractor.

C. Transfer ductwork across walls shall be internally lined with 1" thick acoustical insulation.

2.6 HVAC FLEX-CONNECTIONS:

A. Shall be wrapped on outside with 3/4 # density fiberglass insulation with aluminum foil vapor barrier with a minimum R-value of R-6. Insulation shall be taped at all joints and installed per the manufacturer's recommendations.

2.7 INSULATION THROUGH HANGERS AND SLEEVES

A. The insulation shall be continuous through pipe hangers and pipe sleeves. At hangers where the pipe is supported by insulation, provide a galvanized iron protection shield. Provide pipes 2-inch i.p.s. and larger in insulation inserts at points of hanger supports. The inserts shall be of calcium silicate, cellular glass, prestressed molded glass fiber of minimum 13-pound density, or other approval material of the same thickness as adjacent insulation and not less than 13-pound density. The inserts shall have sufficient compression strength to adequately support the pipe without compressing the inserts to a thickness less than the adjacent insulation. Inserts shall be 180 degrees and not less than the length of the protection shield. Vapor barrier facing of the insert shall be the same as the facing on the adjacent insulation. Where copper clad hangers are used on domestic copper pipe, insulation may cover pipe and hanger. Provide 18-gauge metal saddles between all hangers and insulation.

END OF SECTION 23 07 13



SECTION 23 08 00 - COMMISSIONING OF HVAC

PART 1 - GENERAL

1.1 COMMISSIONING PROCESS

A. Section includes commissioning process requirements for HVAC&R systems, assemblies, and equipment.

B. The commissioning agent (CxA) shall be a subcontractor directly to the general contractor for this project. The CxA has overall responsibility for planning and coordinating the commissioning process. However commissioning involves all parties to the design and construction process, including the contractor and their subcontractors.

1.2 RELATED DOCUMENTS

A. Drawings and general provisions of the contract, including general and supplementary conditions, general electrical provisions and applicable Divisions 21, 22, 26 and 28 Specification sections, apply to work of this section.

1.3 DEFINITIONS

1. Commissioning Plan: A document that outlines the organization, schedule, allocation of resources, and documentation requirements of the commissioning process
2. CxA: Commissioning Authority.
3. Systems, Subsystems, Equipment, and Components: Where these terms are used together or separately, they shall mean "As-Built" systems, subsystems, equipment, and components

1.4 DESCRIPTION OF WORK

A. The purpose of the commissioning process is to provide the owner/operator of the facility with assurance that the HVAC System has been installed according to the contract documents, and operate within the performance guidelines set out in the specifications. The CxA will provide the owner with an unbiased, objective view of the system's installation, operation, and performance. The commissioning process does not take away or reduce the responsibility of the installing contractors to provide a finished product, installed and fully functional in accordance with the contract documents.

B. Commissioning is intended to enhance the quality of system start-up and aid in the orderly completion and transfer of systems for beneficial use by the owner. The CxA will be the leader of the commissioning team, planning and coordinating all commissioning activities in conjunction with the design professionals, construction manager, subcontractors, manufacturers and equipment suppliers.

C. The General Contractor, Mechanical Contractor, and all Division 23 sub-contractors shall be responsible for cooperating, and coordinating their work, with the CxA. They shall also be responsible for carrying out all the physical activities required for installation of components and systems, and operating them during the commissioning process as required in this Section.

1.5 REFERENCES

A. ACG Building Systems Commissioning Guideline

B. ASHE Commissioning Guideline-2010

C. ASHRAE Guideline 0-2019 The HVAC Commissioning Process

D. ASHRAE Standard 202-2024 -- The Commissioning Process Requirements for New Buildings and New Systems

PART 2 - PRODUCTS

2.1 MECHANICAL - HVAC SYSTEMS TO BE COMMISSIONED

A. Mechanical - HVAC systems installed under this contract are to be inspected, tested, signed off as complete and operational, and operated for commissioning agency verification as described in Part 3 of this Section. This includes, but is not necessarily limited to the work listed for each system. The foregoing includes all the following:

1. Air Terminals (+/- 25%)
2. Air Handling Units
3. Exhaust system (+/- 25%)
4. Temperature Controls
5. Test & Balance Verification
6. Fire and Smoke Dampers (+/- 25%)
7. Split Systems

B. The contractor shall be responsible for carrying out all work required for commissioning these systems that is defined as a contractor responsibility in Part 3 of this Section.

2.2 PRE-FUNCTIONAL CHECKLISTS

A. The CxA will develop pre-functional checklists for every piece of equipment within the scope of the commissioning project, and those checklists shall include all items included in the specific design that require checking. Pre-functional testing of the systems is performed by the contractors.

2.3 FUNCTIONAL PERFORMANCE TEST CHECKLISTS

A. Commissioning authority will develop functional performance test checklists for every system included within the scope of the commissioning project. Start-up of major equipment will be performed by the contractor or manufactures representative and witnessed by the CxA.

2.4 MEMBERS OF THE COMMISSIONING TEAM

A. The commissioning team will be comprised of representatives from each discipline involved in the commissioning process. The core members of the team will be required to attend all meetings.

B. Team Members Appointed by Contractor(s):

1. Representatives of each contractor, including project superintendent and subcontractors, installers, vendor, suppliers, and specialists deemed appropriate by the CxA. The individuals shall each have authority to act on behalf of the entity he or she represents, explicitly organized to implement the commissioning process through coordinated actions.
2. The commissioning team will meet on a regular basis as defined by the CxA in the "kick-off" meeting. The frequency of the meetings will be determined by the activity of the construction and the nearness to completion of each specialty.
3. Non-core team members will be required to attend meetings as scheduled by the team in order to provide seamless continuity to the commissioning progress schedule.

PART 3 - EXECUTION

3.1 COMMISSIONING RESPONSIBILITIES - CONTRACTOR TEAM MEMBERS

A. Provide the following information to the CxA for inclusion in the commissioning process:

1. Deliver submittals, systems manuals, and other documents and reports as needed.

2. Identification of installed systems, assemblies, equipment, and components including design changes that occurred during the construction phase.
3. Process and schedule for completing construction checklists and manufacturer's prestart and startup checklists for HVAC&R systems, assemblies, equipment, and components to be verified and tested.
4. Certificate of readiness, signed by the Contractor, certifying that HVAC&R system, assemblies, equipment, components, and associated controls are ready for testing.
5. Test and inspection reports and certificates.
6. Corrective action documents.
7. Verification of testing, adjusting, and balancing reports.

3.2 CONTRACTOR/SUBCONTRACTOR RESPONSIBILITIES

A. This Section of the specifications defines the contractor's responsibilities with respect to the commissioning process. Each contractor and sub-contractor shall review this Section and carry out the work described, as it applies to each Division and Section of these specifications both individually and collectively.

B. Each Contractor and their subcontractors at a minimum shall assign representatives with expertise and authority to act on their behalf and shall schedule them to participate on the Commissioning Team and perform commissioning process activities including, but not limited to the following:

1. Evaluate performance deficiencies identified in test reports, and with approval of the design authority and the entity responsible for system and equipment installation, implement corrective action.
2. Cooperate with CxA for resolution of issues recorded in Issues Log
3. Attend and participate in commissioning team meetings.
4. Integrate and coordinate commissioning process activities into the construction schedule.
5. Review and accept construction checklists provided by the commissioning authority.
6. Complete manufacturer and commissioning checklists as work is completed and provide to the commissioning authority on a regular basis.
7. Review and accept commissioning process test procedures provided by the commissioning authority.
8. Complete commissioning process test procedures.

C. Construction manager

1. Participate in construction coordination.
2. Participate in the commission process and attend all meetings.

3. Develop the project schedule.
4. Work with the CxA to incorporate the commissioning schedule into the project schedule.
5. Ensure that subcontractors perform assigned responsibilities in a timely manner to meet the schedule.
6. Submit to CxA pre-functional test forms that meet the specifications and are typically used for the start-up of major equipment and systems.
7. Participate in maintenance orientation and inspection.
8. Participate in O&M training.
9. Certify work is complete and systems are operational.

D. Subcontractors

1. Participate in commissioning team meetings.
2. Cooperate with all commissioning team members and work in a cohesive manner to accomplish the commissioning process objectives.
3. Provide schedules for O&M data submittals and equipment start-up and testing to the CxA for incorporation into the commissioning plan. Update the schedule on a regular basis throughout the construction phase.
4. Provide information to the CxA for developing the construction phase commissioning plan.
5. Ensure participation of major equipment manufacturing in appropriate start-up, testing and training activities.
6. Provide sufficient personnel to assist the CxA as required during equipment start-up, system verification and functional performance testing.

3.3 PREFUNCTIONAL EQUIPMENT AND SYSTEMS STARTUP

A. Complete the pre-functional (PF) checklist and manufacturer checklists prior to scheduling functional testing.

B. Prior to start-up, inspect, check and confirm the correct and complete installation of all equipment and systems for which pre-functional checklists are included in the commissioning plan.

C. Document the results of all inspections and checks on the checklists and sign them. If deficient or incomplete work is discovered, ensure corrective action is taken and re-check until the results are satisfactory and the system is ready for safe startup.

D. Notify the CxA a minimum of two weeks in advance of scheduled equipment and system start-ups, so that the CxA may witness system verifications, and equipment and system start-ups.

E. Provide equipment and systems start-up resources as specified and required. If during an attempted equipment or system start-up, deficient or incomplete work is discovered that would preclude safe operation, the start-up shall be aborted until corrective action has been taken. Ensure such action is taken and verified before re-scheduling a new start-up.

3.4 FUNCTIONAL PERFORMANCE TESTING

A. Carry out performance checks to ensure that all equipment and systems fully functional and ready for the CxA to witness formal functional performance tests (FTs).

B. Operate equipment and systems for FTs in accordance with the commissioning plan and as directed by the commissioning agency. If improper functionality, incomplete work, or other deficiencies affecting system performance are discovered, the FTs will be stopped by the CxA.

C. Ensure that all corrections necessary for full and complete system operation as specified are completed; then with applicable sub-contractors, carry out functional performance checks to confirm correct operation before applying to the CxA to reschedule the FTs for the system in question.

D. Assign technicians who are familiar with the construction and operation of the installed systems to operate and participate in the testing of the systems, assemblies, equipment, and components.

E. Assure that all subordinate contractors (sub-sub contractors, etc) meet the requirements of this section

F. Assure that vendors and suppliers required for the commissioning process are properly coordinated, scheduled, and participate as required.

G. Certify that HVAC&R systems, subsystems, and equipment have been installed, calibrated, and started and are operating according to the Contract Documents.

H. Certify that HVAC&R instrumentation and control systems have been completed and calibrated, that they are operating according to the Contract Documents, and that pretest set points have been recorded.

I. Certify that testing, adjusting, and balancing procedures have been completed and that testing, adjusting, and balancing reports have been submitted, discrepancies corrected, and corrective work approved.

J. Set systems, subsystems, and equipment into operating mode to be tested (e.g., normal shutdown, normal auto position, normal manual position, unoccupied cycle, emergency power, and alarm conditions).

K. Inspect and verify the position of each device and interlock identified on checklists.

L. Check safety cutouts, alarms, and interlocks with smoke control and life-safety systems during each mode of operation.

3.5 TESTING AND BALANCING VERIFICATION

A. Prior to performance of testing and balancing work, provide copies of reports, sample forms, checklists, and certificates to the CxA.

B. Notify the CxA at least 10 days in advance of testing and balancing work, and provide access for the Cx to witness testing and balancing work

C. Provide technicians, instrumentation, and tools to verify testing and balancing of HVAC&R systems at the direction of the CxA.

D. The CxA will notify testing and balancing Contractor 10 days in advance of the date of field verification. Notice will not include data points to be verified.

E. The testing and balancing Contractor shall use the same instruments (by model and serial number) that were used when original data were collected.

F. Failure of an item includes a deviation of more than the criteria as set forth in project specifications. Failure of more than 10 percent of selected items shall result in rejection of final testing, adjusting, and balancing report.

1. Remedy the deficiency and notify the CxA so verification of failed portions can be performed.

3.6 GENERAL TESTING REQUIREMENTS

A. Provide technicians, instrumentation, and tools to perform commissioning test at the direction of the CxA.

B. Scope of HVAC&R testing shall include entire HVAC&R installation, from central equipment for heat generation and refrigeration through distribution systems to each conditioned space. Testing shall include measuring capacities and effectiveness of operational and control functions.

C. Test all operating modes, interlocks, control responses, and responses to abnormal or emergency conditions, and verify proper response of building automation system controllers and sensors.

D. The CxA shall prepare detailed testing plans, procedures, and checklists for HVAC&R systems, subsystems, and equipment.

E. Tests will be performed using design conditions whenever possible.

F. The CxA may direct that set points be altered when simulating conditions is not practical.

G. The CxA may direct that sensor values be altered with a signal generator when design or simulating conditions and altering set points are not practical.

H. If tests cannot be completed because of a deficiency outside the scope of the HVAC&R system, document the deficiency and report it to the Owner. After deficiencies are resolved, reschedule tests.

I. If the testing plan indicates specific seasonal testing, complete appropriate initial performance tests and documentation and schedule seasonal tests

J. Participate in specified training sessions for owner's O & M personnel.

K. Gather and submit O & M data, coordination drawings and as-built drawings to the CxA.

END OF SECTION 23 08 00



SECTION 23 309 00 - FACILITY MANAGEMENT SYSTEM

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. Furnish, install, program, and place into operations an extension of the Metasys® Facility Management System (FMS), including Direct Digital Temperature Controls (DDC) as specified herein and as shown on the drawings. All hardware, software, and firmware points provided with the direct digital control system provided as part of this scope of work shall be displayed and controlled from the Central Workstation. The controls system shall be an extension of the existing Johnson Controls Inc. Metasys Facility management System located throughout the school district.

B. Although such work is not specifically indicated, provide all supplementary or miscellaneous items, software, appurtenances, and devices necessary for a sound, secure, and complete system.

1.2 QUALITY ASSURANCE

A. The DDC controls shall be as furnished by Johnson Controls, Inc Lake Charles branch office. Contact Michael Guillory at 225-268-4406.

B. The system shall be installed by competent mechanics and checked out by trained, experienced technicians directly employed by the FMS equipment manufacturer.

C. Single source responsibility of the FMS contractor shall include installation, calibration,programming and check-out of the stand-alone subsystems, as well as the complete operation of the integrated system.

1.3 REFERENCED STANDARDS, CODES AND ORDINANCES

A. It is the responsibility of the FMS contractor to be familiar with all codes, rules, ordinances, and regulations of the Authority Having Jurisdiction and their interpretations which are in effect at the site of the work.

B. The latest issue of applicable standards and recommended practices of the following agencies in effect shall form a part of the specification to the extent each agency's relative standards or recommended practices apply to the Systems and its components as specified herein.

1. Federal Communications Commission (FCC)
2. American National Standards Institute (ANSI)
3. American Society of Mechanical Engineers (ASME)
4. Electronic Industries Association (EIA)

5. Institute of Electrical and Electronics Engineers (IEEE)
6. National Electrical Manufacturers Association (NEMA)
7. National Fire Protection Association (NFPA)
8. Underwriters Laboratories (UL)
9. Occupational Safety and Health Administration (OSHA)
10. American Society of Heating, Refrigeration and Air Conditioning Engineers

C. This contractor shall be solely responsible for compliance with all health and safety regulations, performing the work in a safe and competent manner, and the use industry accepted installation procedures required for the work as outlined in these documents.

D. All systems equipment, components, accessories, and installation hardware shall be new and free from defects and shall be UL listed where applicable. All components shall be in current production and shall be a standard product of the system or device manufacturer. Refurbished or reconditioned components are unacceptable. Each component shall bear the make, model number, device tag number (if any), and the UL label as applicable. All system components of a given type shall be the product of the same manufacturer.

1.4 SUBMITTALS

A. Provide eight (8) copies of submittal data.

B. Submittals shall consist of:

1. Data sheets of all products, including software and hardware.
2. Valve schedule, including sizing calculations and actuator information.
3. Damper schedule, including actuator information.
4. Wiring and piping interconnection diagrams including panel and device power, and sources.
5. List of materials of all proposed devices and equipment.
6. Software documentation:
    a. Sequence(s) of operation, in text form.
    b. Application programs
    c. Statement of compatibility with existing programs
    d. Hardware requirements
    e. Year 2000 compliance
7. Point schedules
8. Controls schematics and system diagrams

1.5 WORK BY OTHERS

A. Automatic control valves: Installed under applicable Mechanical section under supervision of the FMS Contractor. All reducers and fittings necessary to install smaller than pipe size valves shall be furnished and installed under applicable piping sections.

B. Piping penetrations; water pressure and differential taps, valve manifolds, flow switches, thermal

wells: Installed by Mechanical under supervision of FMS Contractor.

C. Power source wiring: It is the responsibility of this contractor to verify power wiring on the electrical drawings. If power is not shown where needed, this contractor is responsible.

PART 2 - PRODUCTS

2.1 CONTROL AND SENSING HARDWARE

A. ACTUATORS

1. Units for modulating service shall be analog electric (4-20mA or 0-10VDC) and shall be smooth and quiet in operation. Units for two-position service shall operate on 24 VAC. All actuators shall be of sufficient size and power to operate control devices to which they are connected with 20% spare capacity. Use an individual actuator on each automatic valve or damper.

B. INSTRUMENT CONTROL CABINETS

1. Furnish and install, for components other than room thermostats and unit controllers, cabinets to house control equipment. Cabinets shall consist of extruded frames with all corners securely riveted and supported by angle brackets. The cabinet is to have removable face and back panels and these panels are to be made of aluminum bonnet on both sides over a poly wood core. The cabinet door is to be supported by non-removable piano-type hinge which spans the entire height of the cabinet. All temperature and status indications and toggle switches are to be flush mounted on the face of the cabinet. Cabinets installed outdoors shall be rated NEMA 3R or better.

C. FMS SENSING/CONTROL (Provide the following devices as required by the monitoring and control functions)

1. TEMPERATURE SENSORS
   a. Room temperature:

1)	Local setpoint adjustment	None
2)	Local RJ-11 communications	Yes
3)	Temperature monitoring range	+32/+130F
4)	Output signal	Changing resistance
5)	Factory calibration point	70 degree F (21 C)
6)	Accuracy at calibration point	+/- 0.7% @ 70F

2. START/STOP AND CONTROL RELAYS

a.	Power requirements	24 VAC at .015 amps
b.	Relay contacts	SPDT – 10 amps at 120 VAC
c.	Data	UL listed, CSA approved
d.	Indication	LED – on when energized
e.	Override	built-in H-O-A switch

2.2 FACILITY MANAGEMENT SYSTEM (Existing)

A. The Facility Management System shall integrate multiple building functions including equipment supervision and control, energy management, information management, and historical data collection and archiving.

B. The facility management system shall consist of the following:

1. Network Control Modules
2. Application specific controllers (HVAC etc.)
3. Personal Computer Operator Workstation
4. Communication Network

C. The system shall be modular in nature, and shall permit expansion of both capacity and functionality through the addition of sensors, actuators, Network Control Modules, and operator devices. System architectural design shall eliminate dependence upon any single device for alarm reporting and control execution. Each Network Control Modules shall operate independently by performing its own specified control, alarm management, operator I/O, and historical data collection. The failure of any single component or network connection shall not interrupt the execution of control strategies at other operational devices.

2.3 OPERATOR INTERFACE

A. The new controls shall operate on the existing Johnson Controls workstation.

B. Text-Based Displays: The operator interface shall provide consistent text-based displays, on each graphic, for all system point and application data described in this specification. Point identification, engineering units, status indication, and application naming conventions shall be the same at all operator devices.

C. User Interface: System shall employ standard graphical user interface components (i.e. menu bar, tool bar, status bar, scroll bar, tool tips, etc.) for ease of use. The user interface shall also include the following features:
1. Simplistic point and click navigation between and within application components
2. Dockable alarm panel which may be temporarily hidden
3. Provides a tabbed workspace environment which is fully ActiveX compliant.
4. User can add additional ActiveX workspaces on line
5. Enhanced terminal workspace providing pass through VT-100 interface with mouse/keyboard navigation, user selectable display preferences and screen prints.

D. Operator Commands: The operator interface shall allow the operator to perform commands including, but not limited to, the following:

1. Start-up or shutdown selected equipment
2. Adjust setpoints

3. Add/Modify/Delete time programming
4. Enable/Disable process execution
5. Lock/Unlock alarm reporting for each point
6. Enable/Disable Totalization for each point
7. Enable/Disable Trending
8. Enter temporary override schedules
9. Define Holiday Schedules
10. Change time/date
11. Enter/Modify analog alarm limits
12. Enable/Disable demand limiting
13. Enable/Disable average/high/low signal select and reset

E. Logs and Summaries: Reports shall be generated manually, and directed to the displays. As a minimum, the system shall allow the user to easily obtain the following types of reports:

1. Trend
2. Change of State
3. Alarm Summary
4. Point Summary
5. System Summary
6. Schedule Summary

2.4 NETWORKING

A. Inherent in the system's design shall be the ability to expand or modify the network either via a local area network, or auto-dial telephone line modem connections, or via a combination of those two networking schemes.

B. Access to system data shall not be restricted by the hardware configuration of the facility management system or network. The hardware configuration of the system shall be transparent to the user when accessing data or developing control programs.

2.5 NETWORK CONTROL MODULES

A. General: The new main controller shall be installed in the field in a centralized location. Network Control Modules shall be microprocessor-based, multi-tasking, multi-user, digital control processors.

B. Each Network Control Panel shall have sufficient memory to support its own operating system and data bases including:
1. Control Processes
2. Energy Management Applications
3. Alarm Management
4. Trend Data
5. Maintenance Support Applications
6. Operator I/O

7. Dial-Up Communications

C. Expandability: The system shall be modular in nature, and shall permit easy expansion through the addition of field controllers, sensors, and actuators.

D. Serial Communication Ports: Network Control Modules shall provide at least two data communication ports for simultaneous operation of multiple operator I/O devices, such as laptop computers, Personal Computers, and Video Display terminals.

2.6 SYSTEM SOFTWARE FEATURES (Existing)

A. General: All necessary software to form a complete and single operating system, as described in this specification, shall be provided. The software programs specified in this section shall be provided as an integral part of the Network Control Module, and shall not be dependent upon any higher level computer for execution.

B. Control Software Description

1. Equipment Cycling Protection: Control software shall include a provision for limiting the number of times each piece of equipment may be cycled within any one-hour period.
2. Heavy Equipment Delays: The system shall provide protection against excessive demand situations during start-up periods by automatically introducing time delays between successive start commands to heavy electrical loads.
3. Powerfail Motor Restart: Upon the resumption of normal power, the Network Control Panels shall analyze the status of all controlled equipment, compare it with normal occupancy scheduling, and turn equipment on or off as necessary to resume normal operation.
4. Network Control Modules shall perform any and all of the following energy management routines:
    a. Time of Day Scheduling
    b. Calendar Based Scheduling
    c. Holiday Scheduling
    d. Optimal Start
    e. Optimal Stop
    f. Demand Limiting
    g. Load Rolling
    h. Heating/Cooling Interlock
    i. Average/High/Low Signal Select and Reset
5. All programs shall be executed automatically without the need for operator intervention, and shall be flexible enough to allow user customization. Programs shall be applied to building equipment described in the "Sequence of Operation" portion of this specification.

C. Programming Capability: Network Control Modules shall execute configured processes defined by the user to automatically perform calculations and control routines.

1. It shall be possible to use any of the following in a configured process

a. :Any system-measured point data or status
b. Any calculated data
c. Any results from other processes
d. Boolean logic operators (and, or)

2. Configured processes may be triggered based on any combination of the following:
a. Time of day
b. Calendar Date
c. Other process
d. Events (e.g., point alarms)

D. Data Access: A single process shall be able to incorporate measured or calculated data from any and all other ASCs. In addition, a single process shall be able to issue commands to points in any and all other ASCs on the local network.

E. Alarm Management: Alarm management shall be provided to monitor, buffer, and direct alarm reports to operator devices and memory files. Each Network Control Panel shall perform distributed, independent alarm analysis and filtering to minimize operator interruptions due to non-critical alarms, minimize network traffic, and prevent alarms from being lost. At no time shall the Digital Panel's ability to report alarms be affected by either operator activity at the local I/O device, or communications with other ASCs on the network.

1. Point Change Report Description: All alarm or point change reports shall include the point's English language description, and the time and date of occurrence.
2. Report Routing: Alarm reports and messages shall be directed to an operator device.
3. Alarm Messages: In addition to the point's descriptor and the time and date, the user shall be able to print, display or store a 60-character alarm message to more fully describe the alarm condition or direct operator response. Each Network Control Panel shall be capable of storing a library of at least 100 Alarm Messages. Each message may be assignable to any number of points in the panel.
4. Remote Alarm Horn: Each Network Control Panel shall be capable of triggering a binary output on an ASC when a critical or network alarm is received. The alarm horn feature shall be silenced when the critical alarm is acknowledged.

F. Runtime Totalization: Network Control Modules shall automatically accumulate and store runtime hours for binary input and output points specified in the "Sequence of Operation" portion of this specification.

1. The Totalization routine shall have a sampling resolution of one minute
2. The user shall have the ability to define a warning limit for Runtime Totalization.
3. Unique, user-specified messages shall be generated when the limit is reached.

2.7 APPLICATION SPECIFIC CONTROLLERS

A. Each Network Control Module shall be able to extend its performance and capacity through the use of remote Application Specific Controllers (ASCs).

B. Each ASC shall operate as a standalone controller capable of performing its specified control responsibilities independently of other controllers in the network. Each ASC shall be a microprocessor-based, multi-tasking, real-time digital control processor.

C. Each ASC shall have sufficient memory to support its own operating system and databases including:

1. Control Processes
2. Energy Management Applications
3. Operator I/O

D. The operator interface to any ASC point data or programs shall be through any Operator Workstation or portable operator's terminal connected to the Network Control Module.

E. Powerfail Protection: All system setpoints, proportional bands, control algorithms, and any other programmable parameters shall be stored such that a power failure of any duration does not necessitate reprogramming the controller.

F. Configuration and Download: The ASCs shall have the capability of receiving configuration and program loading by both of the following: 1) locally, via a direct connect portable laptop service tool, 2) over the network, from the portable laptop service tool, and; 3) from the Operator Workstation, via the communication networks.

G. Application Specific Controllers shall support, but not be limited to, the following configurations of systems to address current requirements described in the "Execution" portion of this specification, and for future expansion.

1. Boiler and/or chiller plants with control logic
2. Generic system interlocking through hardware or software
3. Complex air handling unit configurations

H. HVAC Application Specific Controller Configuration

1. The Application Specific Controllers shall be configured using an intuitive, easy-to-use configuration tool. Standard, pre-tested, HVAC applications will be "built-in" the tool. It is the intent that a non-programmer, fluent with HVAC systems, and not necessarily with computer programming, be capable of using the configuration tool with minimal training.
2. The tool will utilize a question and answer format to aid the user in configuration. The tool will automatically query the user for desired operational characteristics, along with desired fail-safe and fault condition configurations, in order to assure proper HVAC system operation and protection.
3. Systems that require free-form programming will not be acceptable.

PART 3 - EXECUTION

3.1 GENERAL

A. All work described in this section shall be mounted, terminated, circuit tested, programmed and calibrated by factory trained technicians and mechanics qualified for this work and in the regular employ of the system manufacturer.

B. All temperature control and interlock wiring and cable shall be installed in accordance with approved wiring diagrams. Power wiring (over 90 volts) shall be run in separate conduit from sensor and network wiring and cables.

3.2 INSTALLATION

A. All wiring, conduit and tubing shall be properly supported and run in a neat and workmanlike manner.

B. This contractor shall be responsible for all electrical installation which is necessary for a fully functional FMS and temperature control system. All wiring shall also be in accordance with applicable local and national codes.

1. All wiring and cabling installed shall be installed in conduit in mechanical rooms and where exposed. Conduit installed in dry indoor locations shall be EMT. Conduit installed exposed outdoors shall be rigid steel type with weather tight fittings. Plenum rated cable is acceptable above accessible ceilings and concealed spaces.
2. Electrical power for control panels and the Operator Workstation shall be provided via dedicated circuits at a power panel specifically for controls.

C. Control wiring:

1. Include all low voltage wiring (100 volts and less) required for the FMS and temperature control systems under this section.
2. Conductors for low voltage control signals: No. 18 AWG copper conductors or larger as required.
    a. Conductors may be assembled in cable with PVC insulation minimum of 0.016 IN thick.
    b. Cable outer sheathing as standard with manufacturer.
3. Line voltage (120VAC) wire for temperature control suitable for 600 volts, 168 deg. F temperature with Type THW plastic covering, minimum No. 12 AWG.
4. Supporting devices:
    a. Conduit supports
        1) Must conform to seismic restraint criteria established by governing authority.
        2) Single runs: Galvanized conduit straps or ring bolt type hangers with specialty spring clips. Do not use plumber's perforated straps.
        3) Multiple runs: Conduit rack with 25 percent spare capacity
        4) .Vertical runs: Channel support with conduit fittings.
    b. Anchor methods:
        1) Hollow masonry: Toggle bolts or spider type expansion anchors.

2) Solid masonry: Lead expansion anchors or present inserts.
3) Metal surfaces: Machine screws, bolts, or welded studs.
4) Wood surfaces: Wood screws.
5) Concrete surfaces: Self drilling anchors or power driver studs.

D. Equipment:

1. Temperature sensing wells: provide list of well locations with shop drawing(s) to mechanical contractor.
2. Mount local control panels or thermostats at convenient locations adjacent to equipment served.
   a. Mount all relays, transformers, controllers, pressure switches, etc., internal to the temperature control panels
3. Mounting of field microprocessors (ASC's) directly on air handling units shall not be allowed.

3.3 COMMISSIONING

A. Control system to be set up and checked out by Johnson Controls factory trained competent technicians skilled in the setting, programming, tuning and adjustment of FMS equipment used in this project. All technicians shall be experienced in the type of systems associated with this FMS.

3.4 TRAINING

A. Provide a minimum of 4 hours of instructions to Owner's personnel in the operation and maintenance of the control system. Provide training after the system has been installed and operations verified.

3.5 WARRANTY

A. At completion of final test of installation and acceptance by Owner, provide any service incidental to proper performance for a period of one year.

B. Equipment shall be warranted for one year (including defects in workmanship and material) under normal use and service. During warranty period supplier shall also replace or repair, free of charge, any equipment proven to be defective in workmanship or material.

3.6 SEQUENCES OF OPERATIONS

A. <u>Package Rooftop Unit:</u>

1. Supply fan start/stop: The supply fans will be started according to the schedule. After the supply fan has been started, the control sequence will be enabled. Outside air damper will open/close in conjunction with fan start/stop.
2. Zone control: The internal AHU controller will modulate/cycle dx cooling stages in

sequence to maintain the zone temperature at setpoint and modulate hot gas reheat for humidity control.

3. Night setback/night setup: When in "unoccupied" mode, the unit will cycle as necessary to maintain the night setback zone temperature at setpoint. A differential prevents the unit from cycling excessively.

4. SHUTDOWN:

a. When the unit is shutdown by either a stop command or system safety the unit will be set as follows:
   1) Supply fan will be off
   2) DX cooling will be off
   3) Fresh air damper will close.

B. EXHAUST FANS:

1. Fans shall be controlled by a ceiling-mounted occupancy sensor (Leviton ODC0S-I1W or approved equal) with a 5-minute timer setting, independent of the lighting circuit, 360° field-of-view, indicator light, and passive infrared detection. The mechanical contractor shall provide the occupancy sensor, and the electrical contractor shall install it (coordinate with the electrical contractor). The occupancy sensor shall be installed in an unobstructed location.

3.7 FMS POINT LIST:

A. DX PACKAGE AHU:

1.	A/C Unit Start/Stop	Binary Output
2.	Status	Binary Input
3.	Space Temperature	Analog Input
4.	Space Humidity	Analog Input
5.	Set-point Adjustment	Analog Input
6.	Motorized outside air damper	Binary Output
7.	Float switch	Binary Input
8.	Smoke Detector	Binary Input

B. DUCTLESS HEAT PUMPS:

1.	A/C Unit Start/Stop	Binary Output
2.	Status	Binary Input
3.	Space Temperature	Analog Input
4.	Set-point Adjustment	Analog Input'

Note: Provide heavy duty metal lock boxes for all thermostats and sensors in gymnasium. Provide standard lock boxes for all other spaces.

END OF SECTION 23 09 00



SECTION 23 13 21 – HYDRONIC PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The general provisions of the Contract, including the Conditions of the Contract (General, Supplementary, and other Conditions) and Division 00 and 01 as appropriate, apply to the Work specified in this Section.

B. Refer to all Sections, as well as the Specifications for the other various trades and materials and be thoroughly familiar with all provisions regarding all work.

1.2 SCOPE OF WORK

A. This Section includes piping systems for hot water heating, chilled water cooling, make-up water for these systems, blow-down drain lines, equipment drain lines, relief lines and condensate drain piping. Piping materials and equipment specified in this Section include:

1. Pipes, fittings, and specialties;
2. Special duty valves;
3. Hydronic specialties.

1.3 SYSTEM DESCRIPTION

A. General: The hydronic piping systems are the "water-side" of an air-and-water or all-water heating and air conditioning system. Hydronic piping system as specified in this Section include 4-pipe, hot water and chilled water piping system. These systems are classified by ASHRAE as High Water Temperature, Low Water Temperature, Forced, Recirculating systems.

1.4 SUBMITTALS

A. Product Data, including rated capacities of selected models, weights (shipping, installed, and operating), furnished specialties and accessories, and installation instructions for each hydronic specialty and special duty valve specified.

1. Furnish flow and pressure drop curves for diverting fittings and calibrated plug valves, based on manufacturer's testing.

B. Maintenance Data for hydronic specialties and special duty valves, for inclusion in operating and maintenance manual specified in Division 01 and Division-23 "Basic Mechanical Requirement."

C. Welders' certificates certifying that welders comply meet the quality requirements specified in Quality Assurance below.

D. Certification of compliance with ASTM and ANSI manufacturing requirements for pipe, fittings, and specialties.

E. Reports specified in Part 3 of this Section.

1.5 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with the provisions of the following:

1. ASME B 31.9 "Building Services Piping" for materials, products, and installation. Safety valves and pressure vessels shall bear the appropriate ASME label.
2. Fabricate and stamp air separators and compression tanks to comply with ASME Boiler and Pressure Vessel Code, Section VIII, Division 01.
3. ASME "Boiler and Pressure Vessel Code", Section IX, "Welding and Brazing Qualification" for qualifications for welding processes and operators.
4. IMC International Mechanical Code.
5. IBC International Building Code.

1.6 SEQUENCING AND SCHEDULING

A. Coordinate the size and location of concrete equipment pads. Cast anchor bolt inserts into pad. Concrete, reinforcement, and formwork requirements are specified in Division 03.

B. Coordinate the installation of pipe sleeves for foundation wall penetrations.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering hydronic piping system products which may be incorporated in the work include, but are not limited to, the following:

B. Manufacturer: Subject to compliance with requirements, provide hydronic piping system products from one of the following:

1. Calibrated Plug Valves:
   a. Bell & Gossett ITT; Fluid Handling Div.
   b. Taco, Inc.
2. Air Vents (manual and automatic):
   a. Armstrong Machine Works
   b. Bell & Gossett ITT; Fluid Handling Div.
   c. Hoffman Specialty ITT; Fluid Handling Div.
   d. Spirax Sarco
3. Dielectric Unions:
   a. Perfection Corp.
   b. Watts Regulator Co.
4. Y-Pattern Strainers:
   a. Armstrong Machine Works
   b. Hoffman Specialty ITT; Fluid Handling Div.
   c. Metraflex Co.
   d. Spirax Sarco
   e. Trane Co.
   f. Victaulic Co. of America
   g. Watts Regulator Co.
5. Basket Strainers:
   a. Crane Co.
   b. Metraflex Co.
   c. Spirax Sarco
   d. Victaulic Company of America

2.2 PIPE AND TUBING MATERIALS

A. PIPING APPLICATIONS

1. Heating Hot Water Piping (Above Slab):
   a. Shall be standard black steel, schedule 40. Fittings two inches and below shall be malleable screw fittings. Piping above two inches shall be electrically welded utilizing welded fittings. All elbows shall be long radius type. At Contractor's option, Victaulic grooved piping systems may be used.
   b. At contractor's option, branch lines to reheat coils and V.A.V. control box heating coils may be Type "L" hard copper. Utilize dielectric unions between steel and copper piping.
2. Heating Hot Water Piping (Below Slab):
   a. Shall be factory pre-insulated ductile iron piping as manufactured by Rovanco, Ricwell or prior approved equivalent. Carrier piping shall NOT contain inner seal coating which is not suitable for hot water temperatures up to 180 deg. F.
   b. Carrier pipe shall be insulated with 1" thick factory applied polyurethane foam with a K-factor of .13, density of 2 PCF, closed

cell content of 90 to 95%. Outer jacket shall be minimum 60 MIL PVC. Jacket shall have water tight heat shrink end seals to protect the edge of the insulation.

c. Carrier pipe shall be bell and spigot type with EPDM gaskets.
d. All 90 deg changes in direction shall be poured in concrete thrust blocks (4000 psi concrete).
e. All straight joints shall be insulated and sealed as per manufacturers standard procedures.
f. Complete installation shall be in accordance with manufacturers recommendations.

3. Condensate-Drain Piping: Type L, drawn-temper copper tubing, wrought-copper fittings, and soldered joints.
4. Safety-Valve-Inlet and -Outlet Piping for Hot-Water Piping: Same materials and joining methods as for piping specified for the service in which safety valve is installed with metal-to-plastic transition fittings for plastic piping systems according to the piping manufacturer's written instructions.
5. Drawn Temper Copper Tubing: ASTM B 88, Type L (ASTM B 88M, Type B).
6. Steel Pipe: ASTM A 120, Schedule 40, seamless, black steel pipe, plane ends.

2.3 FITTINGS

A. Cast-Iron Threaded Fittings: ANSI B16.4, Class 125, standard pattern, for threaded joints. Threads shall conform to ANSI B1.20.1.

B. Malleable-Iron Threaded Fittings: ANSI B16.3, Class 150, standard pattern, for threaded joints. Threads shall conform to ANSI B1.20.1.

C. Steel Fittings: ASTM A 234, seamless or welded, for welded joints.

D. Cast-Iron Threaded Flanges: ANSI B16.1, Class 125; raised ground face, bolt holes spot faced.

E. Steel Flanges and Flanged Fittings: ANSI B16.5, including bolts, nuts, and gaskets of the following material group, end connection and facing:

1. Material Group: 1.1.
2. End Connections: Butt Welding.
3. Facings: Raised face.

F. Unions: ANSI B16.39 malleable-iron, Class 150, hexagonal stock, with ball-and-socket joints, metal-to-metal bronze seating surfaces; female threaded ends. Threads shall conform to ANSI B1.20.1.

G. Dielectric Unions: Threaded or soldered end connections for the pipe materials in which installed; constructed to isolate dissimilar metals, prevent galvanic action, and prevent corrosion.

H. Flexible Connectors: Stainless steel bellows with woven flexible bronze wire reinforcing protective jacket; minimum 150 psig working pressure, maximum 250 deg F operating temperature. Connectors shall have flanged or threaded end connections to match equipment connected; and shall be capable of 3/4 - inch misalignment.

2.4 JOINING MATERIALS

A. Solder Filler Metals: ASTM B 32, 95-5 Tin-Antimony, for heating hot water.

1. Warning: Some filler metals contain compounds which produce highly toxic fumes when heated. Avoid breathing fumes. Provide adequate ventilation.

B. Welding Materials: Comply, with Section II, Part C. ASME Boiler and Pressure Vessel Code for welding materials appropriate for the wall thickness and chemical analysis of the pipe being welded.

C. Gasket Material: Thickness, material, and type suitable for fluid to be handled, and design temperatures and pressures.

PART 3 - EXECUTION

3.1 VALVE APPLICATIONS

A. Install shutoff-duty valves at each branch connection to supply mains, and at supply connection to each piece of equipment.

B. Install throttling-duty and/or calibrated-orifice, balancing valves at each branch connection to return main.

C. Install calibrated-orifice, balancing valves in the return pipe of each heating or cooling terminal.

3.2 PIPING INSTALLATIONS

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicate piping locations and arrangements if such 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.

B. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.

C. 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.

D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

E. Install piping to permit valve servicing.

F. Install piping at indicated slopes.

G. Install piping free of sags and bends.

H. Install fittings for changes in direction and branch connections.

I. Install piping to allow application of insulation.

J. Select system components with pressure rating equal to or greater than system operating pressure.

K. Install groups of pipes parallel to each other, spaced to permit applying insulation and servicing of valves.

L. Install drains, consisting of a tee fitting, NPS 3/4 ball valve, and short NPS 3/4 threaded nipple with cap, at low points in piping system mains and elsewhere as required for system drainage.

M. Install piping at a uniform grade of 0.2 percent upward in direction of flow.

N. Reduce pipe sizes using eccentric reducer fitting installed with level side up.

O. Install branch connections to mains using tee fittings in main pipe, with the branch connected to the bottom of the main pipe. For up-feed risers, connect the branch to the top of the main pipe.

P. Install valves according to Division 23 Section "HVAC Valves."

Q. Install unions in piping, NPS 2 and smaller, adjacent to valves, at final connections of equipment, and elsewhere as indicated.

R. Install flanges in piping, NPS 2-1/2 and larger, at final connections of equipment and elsewhere as indicated.

S. Install strainers on inlet side of each control valve, pressure-reducing valve, solenoid valve, in-line pump, and elsewhere as indicated. Install NPS 3/4 nipple and ball valve in blowdown connection of strainers NPS 2 and larger. Match size of strainer blowoff connection for strainers smaller than NPS 2.

T. Install expansion loops, expansion joints, anchors, and pipe alignment guides as specified in Division 23 Section "Pipe Expansion Joints."

U. Identify piping as specified in 23 Section "Mechanical Identification."

3.3 HANGERS AND SUPPORTS

A. Hanger, support, and anchor devices are specified in Division 23 Section "HVAC Hangers and Supports" Comply with the following requirements for maximum spacing of supports.

B. Seismic restraints are specified in Division 23 Section "Vibration Isolation."

C. Install the following pipe attachments:

1. Adjustable steel clevis hangers for individual horizontal piping less than 20 feet long.
2. Adjustable roller hangers and spring hangers for individual horizontal piping 20 feet or longer.
3. Pipe Roller: MSS SP-58, Type 44 for multiple horizontal piping 20 feet or longer, supported on a trapeze.
4. Spring hangers to support vertical runs.
5. Provide copper-clad hangers and supports for hangers and supports in direct contact with copper pipe.

D. Install hangers for steel piping and copper tubing with the following maximum spacing and minimum rod sizes as per section 305.4 of the 2009 IMC (or latest revision).

3.4 PIPE JOINT CONSTRUCTION

A. Join pipe and fittings according to the following requirements and Division 23 Sections specifying piping systems.

B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

D. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.

E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.

F. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

G. Welded Joints: Construct joints according to AWS D10.12/D10.12M, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.

H. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

I. Grooved Joints: Assemble joints with coupling and gasket, lubricant, and bolts. Cut or roll grooves in ends of pipe based on pipe and coupling manufacturer's written instructions for pipe wall thickness. Use grooved-end fittings and rigid, grooved-end-pipe couplings.

J. Mechanically Formed, Copper-Tube-Outlet Joints: Use manufacturer-recommended tool and procedure, and brazed joints.

K. Pressure-Sealed Joints: Use manufacturer-recommended tool and procedure. Leave insertion marks on pipe after assembly.

3.5 HYDRONIC SPECIALTIES INSTALLATION

A. Install manual air vents at high points in piping, at heat-transfer coils, and elsewhere as required for system air venting.

B. Install automatic air vents at high points of system piping in mechanical equipment rooms only.

3.6 TERMINAL EQUIPMENT CONNECTIONS

A. Sizes for supply and return piping connections shall be the same as or larger than equipment connections.

B. Install control valves in accessible locations close to connected equipment.

C. Install bypass piping with globe valve around control valve. If parallel control valves are installed, only one bypass is required.

D. Install ports for pressure gages and thermometers at coil inlet and outlet connections according to Division 23 Section "Meters and Gauges."

3.7 FIELD QUALITY CONTROL

A. Prepare hydronic piping according to ASME B31.9 and as follows:

1. Leave joints, including welds, uninsulated and exposed for examination during test.
2. Provide temporary restraints for expansion joints that cannot sustain reactions due to test pressure. If temporary restraints are impractical, isolate expansion joints from testing.
3. Flush hydronic piping systems with clean water; then remove and clean or replace strainer screens.
4. Isolate equipment from piping. If a valve is used to isolate equipment, its closure shall be capable of sealing against test pressure without damage to valve. Install blinds in flanged joints to isolate equipment.
5. Install safety valve, set at a pressure no more than one-third higher than test pressure, to protect against damage by expanding liquid or other source of overpressure during test.

B. Perform the following tests on hydronic piping:

1. Use ambient temperature water as a testing medium unless there is risk of damage due to freezing. Another liquid that is safe for workers and compatible with piping may be used.
2. While filling system, use vents installed at high points of system to release air. Use drains installed at low points for complete draining of test liquid.
3. Isolate expansion tanks and determine that hydronic system is full of water.
4. Subject piping system to hydrostatic test pressure at 1.5 times the system's maximum working pressure, but not less than 100 psi. Test pressure shall not exceed maximum pressure for any vessel, pump, valve, or other component in system under test. Verify that stress due to

pressure at bottom of vertical runs does not exceed 90 percent of specified minimum yield strength or 1.7 times "SE" value in Appendix A in ASME B31.9, "Building Services Piping." Duration of each test shall not be less than 15 minutes.

5. After hydrostatic test pressure has been applied for at least 15 minutes, examine piping, joints, and connections for leakage. Eliminate leaks by tightening, repairing, or replacing components, and repeat hydrostatic test until there are no leaks.
6. Prepare written report of testing.

C. Perform the following before operating the system:

1. Open manual valves fully.
2. Inspect pumps for proper rotation.
3. Set makeup pressure-reducing valves for required system pressure.
4. Inspect air vents at high points of system and determine if all are installed and operating freely (automatic type), or bleed air completely (manual type).
5. Set temperature controls so all coils are calling for full flow.
6. Inspect and set operating temperatures of hydronic equipment, such as boilers, chillers, cooling towers, to specified values.
7. Verify lubrication of motors and bearings.

END OF SECTION 23 13 21



SECTION 23 31 13 – METAL DUCTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The general provisions of the Contract, including the Conditions of the Contract (General, Supplementary, and other Conditions) and Division 00 and 01 as appropriate, apply to the Work specified in this Section.

B. Refer to all Sections, as well as the Specifications for the other various trades and materials and be thoroughly familiar with all provisions regarding all work.

1.2 SCOPE OF WORK

A. Section Includes:

1. Single-wall rectangular ducts and fittings.
2. Single-wall round ducts and fittings.
3. Double-wall round and flat-oval ducts and fittings.
4. Sheet metal materials.
5. Duct liner.
6. Sealants and gaskets.
7. Hangers and supports.
8. Seismic-restraint devices.

1.3 PERFORMANCE REQUIREMENTS

A. Delegated Duct Design: Duct construction, including sheet metal thicknesses, seam and joint construction, reinforcements, and hangers and supports, shall comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" and performance requirements and design criteria indicated in "Duct Schedule" Article.

B. Structural Performance: Duct hangers and supports and seismic restraints shall withstand the effects of gravity and seismic loads and stresses within limits and under conditions described in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible "SMACNA's "Seismic Restraint Manual: Guidelines for Mechanical System

C. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1-2004.

1.4 SUBMITTALS

A. Product Data: For each type of the following products:

1. Liners and adhesives.
2. Sealants and gaskets.
3. Seismic-restraint devices.

B. Shop Drawings:

1. Fabrication, assembly, and installation, including plans, elevations, sections, components, and attachments to other work.
2. Factory- and shop-fabricated ducts and fittings.
3. Duct layout indicating sizes, configuration, liner material, and static-pressure classes.
4. Elevation of top of ducts.
5. Dimensions of main duct runs from building grid lines.
6. Fittings.
7. Reinforcement and spacing.
8. Seam and joint construction.
9. Penetrations through fire-rated and other partitions.
10. Equipment installation based on equipment being used on Project.
11. Locations for duct accessories, including dampers, turning vanes, and access doors and panels.
12. Hangers and supports, including methods for duct and building attachment, seismic restraints, and vibration isolation.

C. Delegated-Design Submittal:

1. Sheet metal thicknesses.
2. Joint and seam construction and sealing.
3. Reinforcement details and spacing.
4. Materials, fabrication, assembly, and spacing of hangers and supports
5. Design Calculations: Calculations, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation for selecting hangers and supports and seismic restraints.

D. Coordination Drawings: Plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Duct installation in congested spaces, indicating coordination with general construction, building components, and other building services. Indicate proposed changes to duct layout.
2. Suspended ceiling components.

3. Structural members to which duct will be attached.
4. Size and location of initial access modules for acoustical tile.
5. Penetrations of smoke barriers and fire-rated construction.
6. Items penetrating finished ceiling including but are not limited to the following:
    a. Lighting fixtures.
    b. Air outlets and inlets.
    c. Speakers.
    d. Sprinklers.
    e. Access panels.
    f. Perimeter moldings.
    g. F/A devices, wi-fi antennas, etc.

E. Welding certificates.

F. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel," for hangers and supports.

B. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel," for hangers and supports.
2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum," for aluminum supports.
3. AWS D9.1M/D9.1, "Sheet Metal Welding Code," for duct joint and seam welding.

C. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1-2004, Section 5 - "Systems and Equipment" and Section 7 - "Construction and System Start-Up."

D. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1-2004, Section 6.4.4 - "HVAC System Construction and Insulation."

PART 2 - PRODUCTS

2.1 SINGLE-WALL RECTANGULAR DUCTS AND FITTINGS

A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" based on indicated static-pressure class unless otherwise indicated.

B. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 1-4, "Transverse (Girth) Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

C. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 1-5, "Longitudinal Seams - Rectangular Ducts," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

D. Elbows, Transitions, Offsets, Branch Connections, and Other Duct Construction: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 2, "Fittings and Other Construction," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.2 SINGLE-WALL ROUND DUCTS AND FITTINGS

A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 3, "Round, Oval, and Flexible Duct," based on indicated static-pressure class unless otherwise indicated.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    a. Lindab Inc.
    b. McGill AirFlow, LLC.
    c. SEMCO Incorporated.
    d. Sheet Metal Connectors, Inc.
    e. Eastern Sheet Metal, Inc.

B. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-2, "Transverse Joints - Round Duct," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other

provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

1. Transverse Joints in Ducts Larger Than 60 Inches in Diameter: Flanged.

C. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-1, "Seams - Round Duct and Fittings," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

1. Fabricate round ducts larger than 90 inches in diameter with butt-welded longitudinal seams.
2. Fabricate flat-oval ducts larger than 72 inches in width (major dimension) with butt-welded longitudinal seams.

D. Tees and Laterals: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-4, "90 Degree Tees and Laterals," and Figure 3-5, "Conical Tees," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.3 DOUBLE-WALL ROUND INSULATED DUCT & FITTINGS

A. Unless otherwise specified, all interior and outer shell duct and fittings shall be a minimum G-90 galvanized sheet metal in accordance with ASTM A525 and A527 specifications.

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include the following:
   a. Eastern Sheet Metal, Inc.
   b. Hamlin Sheetmetal, Inc.
   c. United McGill, Inc.
   d. Semco, Inc.
2. General: "Basic Round Diameter" as used in this article is the diameter of the size of round duct that has a circumference equal to the perimeter of a given sized of flat oval duct. Except where interrupted by fittings, provide round and flat oval ducts in lengths not greater than 12 feet.
3. Round Ducts: Fabricate round supply ducts with “spiral lock seam” construction, except where interior diameters exceed 72 inches. As a minimum, comply with SMACNA "HVAC Duct Construction

Standards," Second Edition - 1995 with addendums, Table 3-2A and 3-2B for galvanized steel gages.

a. Round & Oval Ducts - Low Pressure: Solid welded (continuous welded), 1-inch insulation, perforated inner liner and with metal thickness listed below for pressure classes from minus 2 inches to plus 1 inch:
   i. 3 to 26 inches: 24 gage.
   ii. 27 to 36 inches: 22 gage.
   iii. 37 to 50 inches: 20 gage.
   iv. 52 to 60 inches: 18 gage.

b. Round & Oval Ducts - Medium Pressure: Solid welded (continuous welded), 1-inch insulation, perforated inner liner and with metal thickness listed below for pressure classes from 2 inches to plus 6 inches:
   i. 3 to 14 inches: 24 gage.
   ii. 15 to 26 inches: 26 gage.
   iii. 28 to 36 inches: 20 gage.
   iv. 38 to 50 inches: 18 gage.
   v. 52 to 78 inches: 14 gage.

4. Double-Wall (Insulated) Fittings: Fabricate double-wall insulated fittings with an outer shell, insulation, and an inner liner as specified below. Dimensions indicated on internally insulated ducts are nominal inside dimensions.

a. Thermal Conductivity: 0.27 Btu/sq.ft./deg. F/inch thickness at 75 deg. F mean temperature.

b. Outer Shell: Base outer shell gage on actual outer shell dimensions. Gages for outer shell shall be same as for uninsulated fittings specified above.

c. Insulation: Unless otherwise indicated, provide 1-inch-thick fiber-glass insulation. Provide insulation ends where internally insulated duct connects to single-wall duct or non-insulated components. The insulation end shall terminate the insulation and reduce the outer shell diameter to the nominal single-wall size.

d. Perforated Inner Liner: Construct round and flat oval inner liners with perforated sheet metal of the gages listed below. Provide 3/32-inch-diameter perforations, with an overall open area of 23 percent. For flat oval ducts, the diameter indicated in the table below is the "basic round diameter."
   i. 3 to 34 inches: 24 gage.
   ii. 35 to 58 inches: 22 gage.
   iii. 60 to 88 inches: 20 gage.

e. Connectors: Maintain concentricity of liner to outer shell by mechanical means. A second “inner” factory installed flange shall be provided to keep the inner liner concentric and to

eliminate the need to make inner connections at the inner wall. Retain insulation from dislocation by mechanical means. Ductwork shall be provided with flanged connections (paint grip galvanized) at each fitting or coupling on all double wall ducts.

5. Exhibit Hall/General Assembly Exposed Ductwork: Drum louver taps are to be factory fabricated and installed double wall taps with factory installed air foil type extractors up to the first duct reducer. Extractors are to be field adjustable and provided with means of securing the extractor to the duct without the use of additional fasteners or attachments. The drum louver taps are to be of length suitable for the dimensions of the installed louver. Factory manifold taps shall be welded to the spiral duct. Tack or spot welds are not acceptable.

2.4 SHEET METAL MATERIALS

A. General Material Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

B. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.

1. Galvanized Coating Designation: G60.
2. Finishes for Surfaces Exposed to View: Mill phosphatized. (Paint Grip)

C. Reinforcement Shapes and Plates: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.

D. 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.

2.5 SEALANT AND GASKETS

A. General Sealant and Gasket Requirements: Surface-burning characteristics for sealants and gaskets shall be a maximum flame-spread index of 25 and a maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.

B. Rolled Mastic Sealant

1. Pressure-Sensitive rolled mastic sealant comprised of a foil facer with butyl adhesive
2. Rolled Mastic Sealant: 2-inch minimum width.

3. Rolled Mastic Sealant: 17-mil thickness; minimum
4. Water Resistant
5. Mold and Mildew Resistant
6. Maximum Pressure Class: 16-inch W.C., positive/negative
7. Service: Indoor and Outdoor
8. Service Temperature: Minus 20 F to 200 F
9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum
10. VOC: 0 g/l, EPA Standard Method 24
11. UL 181B-FX

C. Water-Based Joint and Seam Sealant:

1. Application Method: Brush on.
2. Solids Content: Minimum 65 percent.
3. Shore A Hardness: Minimum 20.
4. Water resistant.
5. Mold and mildew resistant.
6. VOC: Maximum 75 g/L (less water).
7. Maximum Static-Pressure Class: 16-inch wg, positive and negative.
8. Service: Indoor or outdoor.
9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.
10. Ul-181 Listed
11. UL 2818, Green Guard Compliance

D. Solvent-Based Joint and Seam Sealant:

1. Application Method: Brush on.
2. Base: Synthetic rubber resin.
3. Solvent: Toluene and heptane.
4. Solids Content: Minimum 60 percent.
5. Shore A Hardness: Minimum 60.
6. Water resistant.
7. Mold and mildew resistant.
8. For indoor applications, use sealant that has a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
9. VOC: Maximum 395 g/L.
10. Maximum Static-Pressure Class: 16-inch wg, positive or negative.
11. Service: Indoor or outdoor.
12. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.
13. UL-181 Listed

E. Flanged Joint Sealant: Comply with ASTM C 920.

1. General: Single-component, acid-curing, silicone, elastomeric.
2. Type: S.
3. Grade: NS.
4. Class: 25.
5. Use: O.
6. For indoor applications, use sealant that has a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

F. Flange Gaskets: Butyl rubber, neoprene, or EPDM polymer with polyisobutylene plasticizer.

G. Round Duct Joint O-Ring Seals:

1. Seal shall provide maximum leakage class of 3 cfm/100 sq. ft. at 1-inch wg and shall be rated for 10-inch wg static-pressure class, positive or negative.
2. EPDM O-ring to seal in concave bead in coupling or fitting spigot.
3. Double-lipped, EPDM O-ring seal, mechanically fastened to factory-fabricated couplings and fitting spigots.

PART 3 - EXECUTION

3.1 DUCT INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of duct system. Indicated duct locations, configurations, and arrangements were used to size ducts and calculate friction loss for air-handling equipment sizing and for other design considerations. Install duct systems as indicated unless deviations to layout are approved on Shop Drawings and Coordination Drawings.

B. Install ducts according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" unless otherwise indicated.

C. Install round ducts in maximum practical lengths.

D. Install ducts with fewest possible joints.

E. Install factory- or shop-fabricated fittings for changes in direction, size, and shape and for branch connections.

F. Unless otherwise indicated, install ducts vertically and horizontally, and parallel and perpendicular to building lines.

G. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.

H. Install ducts with a clearance of 1 inch, plus allowance for insulation thickness.

I. Route ducts to avoid passing through transformer vaults and electrical equipment rooms and enclosures.

J. Where ducts pass through non-fire-rated interior partitions and exterior walls and are exposed to view, cover the opening between the partition and duct or duct insulation with sheet metal flanges of same metal thickness as the duct. Overlap openings on four sides by at least 1-1/2 inches.

K. Where ducts pass through fire-rated interior partitions and exterior walls, install fire dampers. Comply with requirements in Division 23 Section "Duct Accessories" for fire and smoke dampers.

L. Protect duct interiors from moisture, construction debris and dust, and other foreign materials. Comply with SMACNA's "Duct Cleanliness for New Construction Guidelines."

3.2 INSTALLATION OF EXPOSED DUCTWORK

A. Protect ducts exposed in finished spaces from being dented, scratched, or damaged.

B. Trim duct sealants flush with metal. Create a smooth and uniform exposed bead. Do not use two-part tape sealing system.

C. Grind welds to provide smooth surface free of burrs, sharp edges, and weld splatter. When welding stainless steel with a No. 3 or 4 finish, grind the welds flush, polish the exposed welds, and treat the welds to remove discoloration caused by welding.

D. Maintain consistency, symmetry, and uniformity in the arrangement and fabrication of fittings, hangers and supports, duct accessories, and air outlets.

E. Repair or replace damaged sections and finished work that does not comply with these requirements.

3.3 DUCT SEALING

A. Seal ducts for duct static-pressure, seal classes, and leakage classes specified in "Duct Schedule" Article according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

B. Seal ducts to the following seal classes according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible":

1. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
2. Unconditioned Space, Supply-Air Ducts in Pressure Classes 2-Inch wg and Lower: Seal Class B.
3. Unconditioned Space, Supply-Air Ducts in Pressure Classes Higher Than 2-Inch wg: Seal Class A.
4. Unconditioned Space, Exhaust Ducts: Seal Class C.
5. Unconditioned Space, Return-Air Ducts: Seal Class B.
6. Conditioned Space, Supply-Air Ducts in Pressure Classes 2-Inch wg and Lower: Seal Class C.
7. Conditioned Space, Supply-Air Ducts in Pressure Classes Higher Than 2-Inch wg: Seal Class B.
8. Conditioned Space, Exhaust Ducts: Seal Class B.
9. Conditioned Space, Return-Air Ducts: Seal Class C.

C. Seal all duct penetrations through interior and exterior building walls per architectural specifications for a complete penetration seal.

3.4 HANGER AND SUPPORT INSTALLATION

A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 4, "Hangers and Supports."

B. Building Attachments: Concrete inserts or structural-steel fasteners appropriate for construction materials to which hangers are being attached.

1. Where practical, install concrete inserts before placing concrete.
2. Install powder-actuated concrete fasteners after concrete is placed and completely cured.
3. Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches thick.
4. Do not use powder-actuated concrete fasteners for seismic restraints.

C. Hanger Spacing: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 4-1, "Rectangular Duct Hangers Minimum Size," and Table 4-2, "Minimum Hanger Sizes for Round Duct," for maximum hanger spacing; install hangers and supports within 24 inches of each elbow and within 48 inches of each branch intersection.

D. Hangers Exposed to View: Threaded rod and angle or channel supports.

E. Support vertical ducts with steel angles or channel secured to the sides of the duct with welds, bolts, sheet metal screws, or blind rivets; support at each floor and at a maximum interval of 16 feet.

F. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

3.5 CONNECTIONS

A. Make connections to equipment with flexible connectors complying with Division 23 Section "Duct Accessories."

B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

3.6 PAINTING

A. Paint interior of metal ducts that are visible through registers and grilles and that do not have duct liner. Apply one coat of flat, black, latex paint over a compatible galvanized-steel primer. Paint materials and application requirements are specified in Division 09 painting Sections.

B. Painting contractor shall paint exterior of exposed spiral duct and fittings color as directed by architect.

3.7 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Leakage Tests:

1. Comply with SMACNA's "HVAC Air Duct Leakage Test Manual." Submit a test report for each test.
2. Test the following systems:
    a. Ducts with a Pressure Class Higher Than 3-Inch wg: Test representative duct sections, selected by Architect from sections installed, totaling no less than 25 percent of total installed duct area for each designated pressure class.
    b. Supply Ducts with a Pressure Class of 3-Inch wg or Higher: Test representative duct sections, selected by Architect from sections installed, totaling no less than 50 percent of total installed duct area for each designated pressure class.

c. Return Ducts with a Pressure Class of 2-Inch wg or Higher: Test representative duct sections, selected by Architect from sections installed, totaling no less than 50 percent of total installed duct area for each designated pressure class.
d. Exhaust Ducts with a Pressure Class of 2-Inch wg or Higher: Test representative duct sections, selected by Architect from sections installed, totaling no less than 50 percent of total installed duct area for each designated pressure class.
e. Outdoor Air Ducts with a Pressure Class of 2-Inch wg or Higher: Test representative duct sections, selected by Architect from sections installed, totaling no less than 50 percent of total installed duct area for each designated pressure class.

3. Disassemble, reassemble, and seal segments of systems to accommodate leakage testing and for compliance with test requirements.
4. Test for leaks before applying external insulation.
5. Conduct tests at static pressures equal to maximum design pressure of system or section being tested. If static-pressure classes are not indicated, test system at maximum system design pressure. Do not pressurize systems above maximum design operating pressure.
6. Give seven days' advance notice for testing.

C. Duct System Cleanliness Tests:

1. Visually inspect duct system to ensure that no visible contaminants are present.
2. Test sections of metal duct system, chosen randomly by Owner, for cleanliness according to "Vacuum Test" in NADCA ACR, "Assessment, Cleaning and Restoration of HVAC Systems."
   a. Acceptable Cleanliness Level: Net weight of debris collected on the filter media shall not exceed 0.75 mg/100 sq. cm.

D. Duct system will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

3.8 DUCT CLEANING

A. Clean new duct system(s) before testing, adjusting, and balancing.

B. Use service openings for entry and inspection.

1. Create new openings and install access panels appropriate for duct static-pressure class if required for cleaning access. Provide insulated panels for insulated or lined duct. Patch insulation and liner as recommended by duct liner manufacturer. Comply with Division 23 Section "Duct Accessories" for access panels and doors.
2. Disconnect and reconnect flexible ducts as needed for cleaning and inspection.
3. Remove and reinstall ceiling to gain access during the cleaning process.

C. Particulate Collection and Odor Control:

1. When venting vacuuming system inside the building, use HEPA filtration with 99.97 percent collection efficiency for 0.3-micron-size (or larger) particles.
2. When venting vacuuming system to outdoors, use filter to collect debris removed from HVAC system, and locate exhaust downwind and away from air intakes and other points of entry into building.

D. Clean the following components 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, actuators, and turning vanes except in ceiling plenums and mechanical equipment rooms.
6. Supply-air ducts, dampers, actuators, and turning vanes.
7. Dedicated exhaust and ventilation components and makeup air systems.

E. Mechanical Cleaning Methodology:

1. Clean metal duct systems using mechanical cleaning methods that extract contaminants from within new 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. Replace fibrous-glass duct liner that is damaged, deteriorated, or delaminated or that has friable material, mold, or fungus growth.
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.
6. Provide drainage and cleanup for wash-down procedures.
7. Antimicrobial Agents and Coatings: Apply EPA-registered antimicrobial agents if fungus is present. Apply antimicrobial agents according to manufacturer's written instructions after removal of surface deposits and debris.

3.9 START UP

A. Air Balance: Comply with requirements in Division 23 Section "Testing, Adjusting, and Balancing."

3.10 DUCT SCHEDULE

A. Supply Ducts:

1. Ducts Connected Downstream of Fan Coil Units, and Terminal Units:
   a. Pressure Class: Positive 2-inch wg.
   b. Minimum SMACNA Seal Class: A.
   c. SMACNA Leakage Class for Rectangular: 12.
   d. SMACNA Leakage Class for Round and Flat Oval: 12
2. Ducts Connected to Variable-Air-Volume Air-Handling Units and Inlets of Terminal Units:
   a. Pressure Class: Positive 4-inch wg
   b. Minimum SMACNA Seal Class: A.
   c. SMACNA Leakage Class for Rectangular: 3.
   d. SMACNA Leakage Class for Round and Flat Oval: 3
3. Ducts Connected to Equipment Not Listed Above:
   a. Pressure Class: Positive 2-inch wg.
   b. Minimum SMACNA Seal Class: A
   c. SMACNA Leakage Class for Rectangular: 3.
   d. SMACNA Leakage Class for Round and Flat Oval: 3.

B. Return Ducts:

1. Ducts Connected to Air-Handling Units

a. Pressure Class: Positive or negative 4-inch wg.
b. Minimum SMACNA Seal Class: A
c. SMACNA Leakage Class for Rectangular: 6
d. SMACNA Leakage Class for Round and Flat Oval: 6

2. Ducts Connected to Equipment Not Listed Above:
a. Pressure Class: Positive or negative 2-inch wg>.
b. Minimum SMACNA Seal Class: A.
c. SMACNA Leakage Class for Rectangular: 3.
d. SMACNA Leakage Class for Round and Flat Oval: 3.

C. Exhaust Ducts:

1. Ducts Connected to Fans Exhausting (ASHRAE 62.1, Class 1 and 2) Air:
a. Pressure Class: Negative 1-inch wg.
b. Minimum SMACNA Seal Class: A if negative pressure, and A if positive pressure.
c. SMACNA Leakage Class for Rectangular: 12.
d. SMACNA Leakage Class for Round and Flat Oval: 6.

2. Ducts Connected to Equipment Not Listed Above:
a. Pressure Class: Positive or negative 2-inch wg.
b. Minimum SMACNA Seal Class: A if negative pressure, and A if positive pressure.
c. SMACNA Leakage Class for Rectangular: 6.
d. SMACNA Leakage Class for Round and Flat Oval: 6.

D. Outdoor-Air (Not Filtered, Heated, or Cooled) Ducts:

1. Ducts Connected to Air-Handling Units:
a. Pressure Class: Positive or negative 2-inch wg.
b. Minimum SMACNA Seal Class: A.
c. SMACNA Leakage Class for Rectangular: 6
d. SMACNA Leakage Class for Round and Flat Oval: 6.

2. Ducts Connected to Equipment Not Listed Above:
a. Pressure Class: Positive or negative 2-inch wg.
b. Minimum SMACNA Seal Class: A
c. SMACNA Leakage Class for Rectangular: 6.
d. SMACNA Leakage Class for Round and Flat Oval: 6

E. Intermediate Reinforcement:

1. Galvanized-Steel Ducts: Galvanized steel

F. Elbow Configuration:

1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-2, "Rectangular Elbows."
    a. Velocity 700 fpm or Lower:
        i. Radius Type RE 1 with minimum 0.5 radius-to-diameter ratio.
        ii. Mitered Type RE 4 without vanes.
    b. Velocity 700 to 1500 fpm:
        i. Radius Type RE 1 with minimum 1.0 radius-to-diameter ratio.
        ii. Radius Type RE 3 with minimum 0.5 radius-to-diameter ratio and two vanes.
        iii. Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-3, "Vanes and Vane Runners," and Figure 2-4, "Vane Support in Elbows."
    c. Velocity 1500 fpm or Higher:
        i. Radius Type RE 1 with minimum 1.5 radius-to-diameter ratio.
        ii. Radius Type RE 3 with minimum 1.0 radius-to-diameter ratio and two vanes.
        iii. Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-3, "Vanes and Vane Runners," and Figure 2-4, "Vane Support in Elbows."
2. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-2, "Rectangular Elbows."
    a. Radius Type RE 1 with minimum 1.5 radius-to-diameter ratio.
    b. Radius Type RE 3 with minimum 1.0 radius-to-diameter ratio and two vanes.
    c. Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-3, "Vanes and Vane Runners," and Figure 2-4, "Vane Support in Elbows."
3. Round Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-3, "Round Duct Elbows."
    a. Minimum Radius-to-Diameter Ratio and Elbow Segments: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 3-1, "Mitered Elbows." Elbows with less than 90-degree change of direction have proportionately fewer segments.
        i. Velocity 1000 fpm or Lower: 0.5 radius-to-diameter ratio and three segments for 90-degree elbow.
        ii. Velocity 1000 to 1500 fpm: 1.0 radius-to-diameter ratio and four segments for 90-degree elbow.

iii. Velocity 1500 fpm or Higher: 1.5 radius-to-diameter ratio and five segments for 90-degree elbow.
iv. Radius-to Diameter Ratio: 1.5.

b. Round Elbows, 12 Inches and Smaller in Diameter: Stamped or pleated.
c. Round Elbows, 14 Inches and Larger in Diameter: Standing seam.

J. Branch Configuration:

1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-6, "Branch Connections."
   a. Rectangular Main to Rectangular Branch: 45-degree entry.
   b. Rectangular Main to Round Branch: Spin in.
2. Round and Flat Oval: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-4, "90 Degree Tees and Laterals," and Figure 3-5, "Conical Tees." Saddle taps are permitted in existing duct.
   a. Velocity 1000 fpm or Lower: 90-degree tap.
   b. Velocity 1000 to 1500 fpm: Conical tap.
   c. Velocity 1500 fpm or Higher: 45-degree lateral.

END OF SECTION 23 31 13



SECTION 23 33 00 – DUCT ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The general provisions of the Contract, including the Conditions of the Contract (General, Supplementary, and other Conditions) and Division 00 and 01 as appropriate, apply to the Work specified in this Section.

B. Refer to all Sections, as well as the Specifications for the other various trades and materials and be thoroughly familiar with all provisions regarding all work.

1.2 SCOPE OF WORK

A. This Section includes the following:

1. Backdraft dampers.
2. Manual volume control dampers.
3. Motorized Dampers.
4. Spin Collars.
5. Fire Dampers.
6. Smoke Dampers.
7. Turning vanes.
8. Duct-mounted access doors and panels.
9. Flexible connectors.
10. Flexible ducts.
11. Accessories hardware.

1.3 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 01 Specification Sections.

B. Product data including details for materials, dimensions of individual components, profiles, and finishes for the following items:

1. Backdraft dampers.
2. Manual volume control dampers.
3. Fire and smoke dampers.
4. Duct-mounted access panels and doors.
5. Flexible ducts.

C. Shop drawings from manufacturer detailing assemblies. Include dimensions, weights, loadings, required clearances, method of field assembly, components, and location and size of each field connection. Detail the following:

1. Special fittings, volume control damper installation (both manual and automatic), and transformers details.
2. Fire and smoke damper installations, including sleeves and duct-mounted access door and panel installations.

D. Product Certification: Submit certified test data on dynamic insertion loss; self-noise power levels; and airflow performance data, static pressure loss, and dimensions and weights.

1.4 QUALITY ASSURANCE

A. NFPA Compliance: Comply with the following NFPA Standards:

1. NFPA 90A, "Standard for the Installation of Air Conditioning and Ventilating Systems."
2. NFPA 90B, "Standard for the Installation of Warm Air Heating and Air Conditioning Systems."

1.5 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

2.1 BACKDRAFT DAMPERS

A. Description: Suitable for horizontal or vertical installation.

B. Frame: 0.063-inch-thick 6063T extruded aluminum.

C. Blades: 0.025-inch-thick roll-formed aluminum.

D. Blades: 0.050-inch-thick 6063T extruded aluminum.

E. Blade Seals: Vinyl.

F. Blade Axles: Nonferrous.

G. Tie Bars and Brackets: Aluminum.

H. Return Spring: Adjustable tension.

I. Wing-Nut Operator: Galvanized steel, with 1/4-inch galvanized-steel rod.

J. Adjustable Pressure Controls.

K. Dampers to be Greenheck EM-30, Ruskin BD6, Pottorff BD-150, or approved equal.

2.2 MANUAL VOLUME CONTROL DAMPERS

A. General: Provide factory-fabricated volume-control dampers, complete with required hardware and accessories. Stiffen damper blades to provide stability under operating conditions. Provide 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. Provide end bearings or other seals for ducts with pressure classifications of 3 inches or higher. Extend axles full length of damper blades. Provide bearings at both ends of operating shaft.

B. Standard Volume Control Dampers: Multiple or single-blade, parallel or opposed-blade design as indicated, standard-leakage rating, with linkage outside of air stream, and suitable for horizontal or vertical applications. Greenheck MDB-15, Ruskin MD-15, Pottorff CD-10 & MD-41, or approved equal.

2.3 MOTORIZED DAMPERS

A. Mechanical Contractor shall furnish and install motorized dampers as indicated on mechanical and architectural drawings. Damper shall be opposed blade motorized type equivalent to Greenheck Model VCD-23, Ruskin CD36/OB, Pottorff CD-41, or equal. Motorized dampers shall be operated by 120/1/60 electric actuator as indicated on plans. Damper shall be complete with outboard support bearing, blade, and jamb seals. Dampers shall be low - leakage type. Dampers shall go to closed position when units are off unless otherwise noted.

2.4 SPIN COLLARS

A. All round take-offs to round branch duct shall be made with 26-gauge spin-type collars with 26-gauge balancing dampers. These spin-collars shall be as manufactured by Flexmaster Model FLD, Dace MSD, or approved equivalent.

B. The mounting groove shall be die-formed to assure constant fit control. Balancing dampers shall be factory-installed with spring loaded, retractable bearings and a positive locking wing-nut for easy adjustment.

2.5 FIRE DAMPERS

A. General: UL labeled according to UL Standard 555 "Standard for Fire Dampers."

B. Fire Rating: 1-1/2 or 3 hours, as indicated on Contract Drawings.

C. Frame: Type B; fabricated with roll-formed, 22-gage, galvanized-steel; with mitered and interlocking corners.

D. Mounting Sleeve: Factory-installed or field-installed galvanized steel.

1. Minimum Thickness: 16 ga thick as indicated, and length to suit application.
2. Factory installed sleeve shall be constructed of gauges as dictated by the manufacturers UL Listing.
3. Exceptions: Omit sleeve where damper frame width permits direct attachment of perimeter mounting angles on each side of the wall or floor, and thickness of damper frame meets sleeve requirements.

E. Mounting Orientation: Vertical or horizontal as indicated.

F. Blades: Roll-formed, interlocking, 22-gage galvanized steel (or as required by UL Listing). In place of interlocking blades, provide full-length, 21-gage, galvanized-steel blade connectors.

G. Horizontal Dampers: Include a blade lock and stainless steel negator closure spring.

H. Fusible Link: Replaceable, 212 deg F rated.

I. Dampers shall be Greenheck FD-150-B, Ruskin IBD-20-B, Pottorff VFD-10B, or equal.

2.6 SMOKE DAMPERS

A. General: UL-labeled according to UL Standard 555S, "Standard for Leakage Rated Dampers for Use in Smoke Control Systems." Combination fire and smoke dampers shall also be UL-labeled for 1-1/2-hour rating according to UL Standard 555 "Standard for Fire Dampers." Refer to Section 230900 “Building Automation System” for additional requirements.

B. Damper shall bear a Class 1 Leakage rating.

C. Fusible Link: Replaceable, 212 deg F rated.

D. Frame and Blades: 16-gage galvanized steel (or as required by UL listing).

E. Mounting Sleeve: Factory-installed, 18-gage galvanized steel (or as required by UL listing), length to suit wall or floor application.

F. Actuators are to be 120 volt and provided by the damper manufacturer and be UL tested with the damper.

G. Step-Down Transformers: Refer to electrical plans for transformer required to transform to 120V, single phase which comply with UL, FM NFPA Requirements for smoke control systems.

H. Smoke Dampers shall include factory supplied and mounted damper test switch.

I. Dampers shall be Ruskin SD37 or Greenheck SMD-20, Pottorff SD-141, or approved equal.

2.7 TURNING VANES

A. Fabricate turning vanes according to SMACNA HVAC Duct Construction Standards, Figures 2-2 through 2-7.

B. Manufactured Turning Vanes: Fabricate of 1-1/2-inch-wide, curved blades set at 3/4 inch) on center, support with bars perpendicular to blades set at 2 inches on center, and set into side strips suitable for mounting in ducts.

C. Acoustic Turning Vanes: Fabricate of airfoil-shaped aluminum extrusions with perforated faces and fiber glass fill.

2.8 DUCT-MOUNTED ACCESS DOORS AND PANELS

A. General: Provide construction and airtightness suitable for duct pressure class.

B. Frame: Galvanized sheet steel. Provide with bend-over tabs and foam gaskets.

C. Door: Double-wall, galvanized sheet metal construction with insulation fill and thickness, number of hinges and locks as indicated for duct pressure class. Provide vision panel where indicated. Provide 1-inch by 1-inch butt hinge or piano hinge and cam latches.

D. Seal around frame attachment to duct and door to frame with neoprene or foam rubber seals.

E. Insulation: 1-inch- thick fiber glass or polystyrene foam board.

F. Access doors shall be Ruskin Model ADH-22, Kees ADH, Pottorff HAD, or approved equal.

2.9 FLEXIBLE CONNECTORS

A. General: Flame-retarded or noncombustible fabrics, coatings, and adhesives complying with UL Standard 181, Class 1.

B. Standard Metal-Edged Connectors: Factory-fabricated with a strip of fabric 3-1/2 inches wide attached to 2 strips of 2-3/4-inch-wide, 24-gage, galvanized sheet steel or 0.032-inch (0.8-mm) aluminum sheets. Select metal compatible with connected duct system. Fold and crimp metal edge strips onto fabric as illustrated in SMACNA HVAC Duct Standard, 1st Edition, Figure 2-19.

2.10 FLEXIBLE DUCTS

A. General: Comply with UL 181, Class 1.

B. Flexible Ducts – Insulated (2.33”, R-6): Factory-fabricated, insulated, round duct, with an outer aluminum jacket, glass fiber insulation around a continuous inner liner.

1. Reinforcement: Steel-wire helix encapsulated in the inner liner.
2. Outer Jacket: Glass-reinforced, silver mylar with a continuous hanging tab, integral fiber glass tape, and nylon hanging cord.
3. Outer Jacket: Polyethylene film.
4. Inner Liner: Polyethylene film for low pressure, woven glass fiber for high pressure.
5. Low pressure duct rated at 6" static pressure.
6. Manufacturer: Thermaflex or approved equivalent.

2.11 ACCESSORIES HARDWARE

A. Instrument Test Holes: Cast iron or cast aluminum to suit duct material, including screw cap and gasket and a flat mounting gasket. Size to allow insertion of pilot tube and other testing instruments and provide in length to suit duct insulation thickness.

B. Splitter Damper Accessories: Zinc-plated damper blade bracket, 1/4-inch, zinc-plated operating rod, and a duct-mounted, ball-joint bracket with flat rubber gasket and square-head set screw.

C. Flexible Duct Clamps: Stainless steel band with cadmium-plated hex screw to tighten band with a worm-gear action. Provide in sizes from 3 to 18 inches to suit duct size.

D. Adhesives: High strength, quick setting, neoprene based, waterproof and resistant to gasoline and grease.

E. Provide all necessary transformers, electrical components suitable for each system installation including duct damper controllers, fire dampers and smoke dampers.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of duct accessories. Do not proceed with installation until unsatisfactory conditions are corrected.

3.2 INSTALLATION

A. Install duct accessories according to manufacturer's installation instructions and applicable portions of details of construction as shown in SMACNA standards.

B. Install volume control dampers in lined duct with methods to avoid damage to liner and to avoid erosion of duct liner.

C. Provide test holes at fan inlet and outlet and elsewhere as indicated.

D. Install fire and smoke dampers according to the manufacturer's UL-approved printed instructions.

E. Install fusible links in fire dampers.

F. Label access doors according to Division 23 for "Mechanical Identification."

3.3 ADJUSTING

A. Adjust duct accessories for proper settings.

B. Adjust fire and smoke dampers for proper action.

C. Final positioning of manual dampers is specified in Division 23 Section "Testing, Adjusting, and Balancing."

END OF SECTION 23 33 00



SECTION 23 34 23 - HVAC POWER VENTILATORS

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. Ceiling-mounted fans.
2. In-line cabinet fans.
3. Centrifugal inline fans.
4. Centrifugal roof downblast fans.
5. Centrifugal roof upblast fans.
6. Centrifugal roof kitchen hood ventilator.
7. Centrifugal sidewall fans.
8. Sidewall propeller fans.
9. Upblast propeller roof exhaust fans.
10. Axial roof fans.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Construction details, material descriptions, dimensions of individual components and profiles, and finishes for fans.
2. Rated capacities, operating characteristics, and furnished specialties and accessories.
3. Certified fan performance curves with system operating conditions indicated.
4. Certified fan sound-power ratings.
5. Motor ratings and electrical characteristics, plus motor and electrical accessories.
6. Material thickness and finishes, including color charts.
7. Dampers, including housings, linkages, and operators.
8. Prefabricated roof curbs.
9. Fan speed controllers.

B. Shop Drawings:

1. Include plans, elevations, sections, and attachment details.
2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Include diagrams for power, signal, and control wiring.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For HVAC power ventilators to include in normal and emergency operation, and maintenance manuals.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with requirements, provide products by one of the following:

1. Loren Cook.
2. GREENHECK.
3. ACME
4. Loren Cook Company.
5. PennBarry.
6. Twin City.

2.2 CEILING-MOUNTED FANS

A. Housing: Steel, lined with acoustical insulation.

B. Fan Wheel: Centrifugal wheels directly mounted on motor shaft. Fan shrouds, motor, and fan wheel removable for service.

C. Back-draft damper: Integral.

D. Grille: Painted aluminum, louvered grille with flange on intake and thumbscrew or spring retainer attachment to fan housing.

E. Electrical Requirements: Junction box for electrical connection on housing and receptacle for motor plug-in.

F. Accessories:

1. Variable-Frequency Motor Controller: Solid-state control to reduce

speed from 100 to less than 50 percent.

2. Manual Starter Switch: Single-pole rocker switch assembly with cover and pilot light.
3. Time-Delay Switch: Assembly with single-pole rocker switch, timer, and cover plate.
4. Motion Sensor: Motion detector with adjustable shutoff timer.
5. Ceiling Radiation Damper: Fire-rated assembly with ceramic blanket, stainless steel springs, and fusible link.
6. Filter: Washable aluminum to fit between fan and grille.
7. Isolation: Rubber-in-shear vibration isolators.
8. Manufacturer's standard roof jack or wall cap, and transition fittings.

2.3 MOTORS

A. Comply with NEMA designation, temperature rating, service factor, and efficiency requirements for motors specified in Section 23 05 13 "Common Motor Requirements for HVAC Equipment."

1. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.

2.4 SOURCE QUALITY CONTROL

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and application.

B. AMCA Certification: Fans shall comply with AMCA 11 and bear the AMCA-Certified Ratings Seal.

C. Fan Sound Ratings: Comply with AMCA 311, and label fans with the AMCA-Certified Ratings Seal. Sound ratings shall comply with AMCA 301. The fans shall be tested according to AMCA 300.

D. Fan Performance Ratings: Comply with AMCA 211 and label fans with AMCA-Certified Rating Seal. The fans shall be tested for air performance - flow rate, fan pressure, power, fan efficiency, air density, speed of rotation, and fan efficiency - according to AMCA 210/ASHRAE 51.

E. Operating Limits: Classify according to AMCA 99.

F. UL Standards: Power ventilators shall comply with UL 705. Power ventilators for use for restaurant kitchen exhaust shall also comply with UL 762.

PART 3 - EXECUTION

3.1 INSTALLATION OF HVAC POWER VENTILATORS

A. Install power ventilators level and plumb.

B. Secure roof-mounted fans to roof curbs with zinc-plated hardware.

C. Ceiling Units: Suspend units from structure; use steel wire or metal straps.

D. Support suspended units from structure using threaded steel rods and spring hangers with vertical-limit stops having a static deflection of 1 inch.

E. Install units with clearances for service and maintenance.

F. Label units with engraved aluminum nameplate. Nameplate shall include the make, model, date of installation, design CFM and static pressure.

G. For fans installed on metal roofs, coordinate roof curb with the shape profiles of the roof panels. Provide custom color prefinished galvalume exterior cladding on the exterior or the roof curb. Coordinate color of the custom-colored cladding with the Architect.

3.2 DUCTWORK CONNECTIONS

A. Drawings indicate general arrangement of ducts and duct accessories. Make final duct connections with flexible connectors.

3.3 ELECTRICAL CONNECTIONS

A. Install electrical devices furnished by manufacturer, but not factory mounted, according to NFPA 70 and NECA 1.

3.4 CONTROL CONNECTIONS

A. Install control and electrical power wiring to field-mounted control devices.

3.5 ADJUSTING

A. Adjust damper linkages for proper damper operation.

B. Adjust belt tension.

C. Comply with requirements in Section 23 05 93 "Testing, Adjusting, and Balancing for HVAC" for testing, adjusting, and balancing procedures.

D. Replace fan and motor pulleys as required to achieve design airflow.

E. Lubricate bearings.

3.6 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain ventilator fans.

END OF SECTION 23 34 23



SECTION 23 37 13 – DIFFUSERS, REGISTERS, AND GRILLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The general provisions of the Contract, including the Conditions of the Contract (General, Supplementary, and other Conditions) and Division 00 and 01 as appropriate, apply to the Work specified in this Section.

B. Refer to all Sections, as well as the Specifications for the other various trades and materials and be thoroughly familiar with all provisions regarding all work.

1.2 SCOPE OF WORK

A. Section Includes:

1. Rectangular and square ceiling diffusers.
2. Louver face diffusers.
3. Linear bar diffusers.
4. Linear slot diffusers.
5. Adjustable bar, registers and grilles
6. Eggcrate Grille with Filter Frames

1.3 SUBMITTALS

A. Product Data: For each type of product indicated, include the following:

1. Data Sheet: Indicate materials of construction, finish, and mounting details; and performance data including throw and drop, static-pressure drop, and noise ratings.
2. Diffuser, Register, and Grille Schedule: Indicate drawing designation, room location, quantity, model number, size, and accessories furnished.

B. Samples for Initial Selection: For diffusers, registers, and grilles with factory-applied color finishes.

C. Samples for Verification: For diffusers, registers, and grilles, in manufacturer's standard sizes to verify color selected.

D. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from Installers of the items involved:

1. Ceiling suspension assembly members.
2. Method of attaching hangers to building structure.
3. Size and location of initial access modules for acoustical tile.
4. Ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.
5. Duct access panels.
    a. Source quality-control reports.

PART 2 - PRODUCTS

2.1 CEILING DIFFUSERS

A. Rectangular and Square Ceiling Diffusers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    a. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
        i. Anemostat Products; a Mestek company.
        ii. Krueger.
        iii. METALAIRE, Inc.
        iv. Nailor Industries Inc.
        v. Price Industries.
        vi. Titus.
2. Devices shall be specifically designed for variable-air-volume flows.
3. Material: Aluminum.
4. Finish: White baked enamel, unless noted otherwise.
5. Face Size: See Plans.
6. Face Style: Three cone.
7. Mounting: Surface T-bar
8. Pattern: Fixed
9. Dampers: Radial opposed blade.

B. Louver Face Diffuser

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
   i. Anemostat Products; a Mestek company.
   ii. METALAIRE, Inc.
   iii. Nailor Industries Inc.
   iv. Price Industries.
   v. Titus.

2. Devices shall be specifically designed for variable-air-volume flows.
3. Material: Aluminum.
4. Finish: Custom color selected by Architect.
5. Face Size: See Plans.
6. Mounting: Surface and T-bar.
7. Pattern: Four-way core style.
8. Dampers: Radial opposed blade.
9. Accessories:
   a. Square to round neck adaptor.
   b. Adjustable pattern vanes.
   c. Throw reducing vanes.

2.2 REGISTERS AND GRILLES

A. Eggcrate Grille with Filter Frames:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
      i. Anemostat Products
      ii. Krueger
      iii. METALAIRE, Inc.
      iv. Nailor Industries Inc.
      v. Price Industries
      vi. Titus
2. Material: Aluminum Grid and border with filter frame
3. Finish: White baked enamel, unless noted otherwise. Finish shall be an anodic acrylic paint, baked at 315°F for 30 minutes.
4. Mounting: Countersunk screw
5. Return grilles must provide a free area of at least 90%.
6. Outer borders shall be constructed of heavy extruded aluminum with a thickness of 0.040-0.050 inch and shall have countersunk screw holes for a neat appearance.

7. Border width shall be 1¼ inches on all sides and shall be interlocked at the four corners and mechanically staked to form a rigid frame.
8. Aluminum grid shall be ½ x ½ x ½ inch. Grille shall be provided with a filter frame for a standard 1-inch filter to fit the specified duct size.
9. The manufacturer shall provide published performance data for the grille.
10. The grille shall be tested in accordance with ANSI/ASHRAE Standard 70-1991.

2.3 SOURCE QUALITY CONTROL

A. Verification of Performance: Rate diffusers, registers, and grilles according to ASHRAE 70, "Method of Testing for Rating the Performance of Air Outlets and Inlets."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas where diffusers, registers, and grilles are to be installed for compliance with requirements for installation tolerances and other conditions affecting performance of equipment.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install diffusers, registers, and grilles level and plumb.

B. Ceiling-Mounted Outlets and Inlets: Drawings indicate general arrangement of ducts, fittings, and accessories. Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw, and pressure drop. Make
final locations where indicated, as much as practical. For units installed in lay-in ceiling panels, locate units in the center of panel. Where architectural features or other items conflict with installation, notify Architect for a determination of final location.

C. Install diffusers, registers, and grilles with airtight connections to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.

3.3 ADJUSTING

A. After installation, adjust diffusers, registers, and grilles to air patterns indicated, or as directed, before starting air balancing.

END OF SECTION 23 37 13



SECTION 23 43 16 - AIR IONIZATION SYSTEMS

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

1.2 DESCRIPTION OF WORK

A. Work Included: Provide labor, materials, and equipment necessary to complete the work of this Section, including but not limited to the following:

1. Performance and design criteria for air ionization systems.

1.3 DEFINITIONS

A. NPBI - Needlepoint bipolar ionization system

1.4 ACTION SUBMITTALS

A. Product Data: For each product. Include dimensions; operating characteristics; required clearances and access; rated capacity; fire classification; furnished specialties; and accessories as indicated.

B. Product Data: Manufacturer's technical product data for ionization systems.

1. Schedule of ionization systems indicating unit designation, number of each type required for each unit/application.
2. Data sheet for each ionization system type, and accessories furnished. Indicate construction, sizes, and mounting details.
3. Ion performance data for each type of ionization device furnished.
4. Product drawings detailing physical, electrical and control requirements.
5. Proof of Compliance with UL-2998: Environmental Claim Validation Procedure for Zero Ozone Emissions from Air Cleaners
    a. Certificates must be listed on either of the following websites.
        i. https://spot.ul.com/.
        ii. https://sustainabilitydirectory.intertek.com/home.

C. Operating and Maintenance Data:

1. Submit O&M data and recommended spare parts lists. Include 10 years of operations and energy costs.

1.5 INFORMATIONAL SUBMITTALS

A. Product Test Reports: Ion performance for each type of Needlepoint Bipolar Ionization (NPBI™) system as detailed in this specification.

B. Field Quality-Control Reports.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For each type of Needlepoint Bipolar Ionization (NPBI™) system.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company who specializes in manufacturing products specified in this section. Documented Experience: 10 years.

1. A qualified representative of the manufacturer shall be available to inspect the installation of the air ionization system to ensure installation in accordance with manufacturer's recommendation.

1.8 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Delivery: In factory fabricated shipping containers.

1. Identify on outside of container type of product and location to be installed.
2. Avoid crushing or bending.

B. Storage: In original cartons and protect from weather and construction work traffic.

1. Store indoors and in accordance with the manufacturers' recommendation for storage.

1.9 WARRANTY

A. Equipment is warranted by the manufacturer against defects in material and workmanship for a period of one year after shipment.

1. Warranty will be for full replacement within one-year period and not prorated.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Provide Products manufactured by the following:

1. Global Plasma Solutions.

B. Substitutions:

1. It is the responsibility of manufactures to confirm non-infringement on intellectual property.

2.2 PERFORMANCE AND DESIGN CRITERIA FOR AIR IONIZATION SYSTEMS

A. Each piece of air handling equipment, so designated on the plans, details, equipment schedules and/or specifications shall contain a Needlepoint Bipolar Ionization (NPBI™) system with output as described here within.

B. Project Design:

1. If using ASHRAE Standard 62.1 - IAQP: IAQ Procedure requires a qualified Designer or Engineer to provide Indoor Air Quality calculations using formulas within ASHRAE Standard 62.1 to validate acceptable indoor air quality at the quantity of outside air scheduled with the technology submitted.
2. Unacceptable Technologies:
   a. Powered particulate filters.
   b. Polarized media filter.
   c. Uni-polar ion generators.
   d. “Plasma” particulate filters.
   e. High-powered ionization devices.
   f. Ozone generators.
   g. Photocatalytic Oxidation (PCO) products.
   h. Dry hydrogen peroxide products.

C. Maximum Ozone Emissions per UL 2998:

1. Not Acceptable: Products not certified to UL2998 - Environmental Claim Validation Procedure for Zero Ozone Emissions.

D. All devices shall be listed on the UL SPOT environmental claim validation website, or the Intertek Sustainability Certification Directory website, proving compliance to UL 2998.

1. Test result reports must be available from Manufacturer upon request.
2. Not Acceptable: Products not listed on either of these websites are not acceptable.

E. Humidity: Ionization devices do not require preheat protection when relative humidity of entering air exceeds 85 percent. Relative humidity from 0 to 100 percent, condensing, will not cause damage, deterioration, or dangerous conditions within the air ionization system.

F. Ionization Requirements: Installed as indicated on the Drawings or as specified.

1. Ionization Output: Positive and negative ions shall be produced. Unipolar ionization devices are not acceptable. Output varies from product to product. See specific product specification information for total ion output.
   a. Ion Output: Ions per cubic centimeter when tested at 1 inch (25 mm) from the ionization system.
      i. Manufacturers showing ion output in ions/cc/sec must convert to ions/cc as measured 1 inch (25 mm) from the electrodes without airflow and provide that data during the submittal process. Ion meters measure in ions/cc not ions/cc/sec and these values are required for field verification during commissioning.

G. NPBI™ Components:

1. Tested by UL or Intertek proving conformance to UL 2998 Third Edition (2020) ozone standard when tested using UL 867 Fifth Edition (2011) methodology. Testing must be large chamber environment testing and peak ozone test for electronic devices in accordance with the standard.
   a. Submit independent UL 867 test data with ozone results to Engineer of Record during submittal process.
   b. Components achieving UL 867 prior to December 21, 2007, were not tested with the ozone amendment and are not acceptable for consideration.
   c. Increasing interior ion concentration levels, both positive and negative collectively, to a minimum of 2000 ions/cc measured 5 ft (1524 mm) from floor where air is delivered from the duct system.
   d. Produce positive and negative ions.
      i. Not Acceptable: Uni-polar ion devices.
   e. Air exchange rates may vary through the full operating range of a constant volume or variable air volume (VAV) system. The quantity of air exchange must not be increased due to requirements of the air ionization system.

f. Velocity Profile: Maintain minimum air velocity of 300 feet per minute (FPM). Air ionization devices do not have maximum velocity profiles.

H. Ion Systems: General.

1. Ionization Devices Enclosures: Non-metallic materials for corrosion prevention and thermal bridging.
2. UL 2998 Environmental Claim Validation Procedure for Zero Ozone Emissions from Air Cleaners certification is required. No exceptions.
3. Integral Alarm Dry Contacts: For connection to BAS to prove ionization system is receiving adequate input power.
4. Capable of operating in 100 percent relative humidity conditions, without damage.
5. No maximum velocity limitation.
6. Mounting: Magnets or self-tapping sheet metal screws.

I. Design Requirements for Non-Coil Cleaning Installations:

1. Installations must include the required number of electrodes and power generators sized to the air handling equipment capacity.
2. NPBI™ Electrodes: Made from carbon fiber to prevent oxidation over time. Carbon fiber clusters must contain a minimum of 45,000 needles.
   a. Not Acceptable: titanium, stainless or any other metal.
   b. Not Acceptable: Bipolar ionization tubes manufactured of glass, composite, mica, or similar dielectric materials.
   c. Energize when main unit disconnect is turned on and fan is operating.
      i. Not Acceptable: Ionization systems requiring mechanical air pressure switches to cycle electrodes when fan is operating.
   d. Electrode Pair: Provide electrodes to generate both positive and negative ions.
   e. Mechanical friction auto-cleaning systems to ensure needle tips are properly cleaned.
      i. Not Acceptable: Systems using vibration, high frequency or plunging action as a means of auto-cleaning

3. Multi-Voltage Input: [**24V to 240V AC or DC**]
4. Magnets for mounting to fan inlet.
5. Auto-Cleaning Mechanisms: Mechanical friction auto-cleaning systems to ensure needle tips are properly cleaned.
   a. Not Acceptable: Systems using vibration, high frequency or plunging action as a means of auto-cleaning.

J. Design Requirements: GPS-iMOD®

1. NPBI™ Electrodes: Made from carbon fiber to prevent oxidation over time. Not Acceptable: titanium, stainless or any other metal.
   a. Provided in 6 inch (152 mm) sections for field assembly by installer. Assemble such that entire finned width of the coil is covered.
   b. One modular ionization bar for every 5 ft (1524 mm) of coil height.
   c. Electrode Spacing: 0.5 inch (13 mm) apart.
      i. Not Acceptable: Ionization Bars with ion output spaced greater than 1 inch (25 mm) apart.
   d. Output: A minimum of 140M ions/cc per inch of bar measured 1 inch (25 mm) from carbon fiber brushes.
   e. Ionization Bars: Provided with separate power supply capable of powering up to 4 ionization bars requiring no more than 20 watts of power up to a total connected bar length of 48 ft (14.63 m). Single bar length limit is 12 feet.
      i. The ionization bars and power supply to be alternating current output.
      ii. Provided with an on/off switch with LED light.
      iii. BAS interface capable using dry alarm contacts.
   f. AC Output Power Supply: Accept 24 VAC, 110 VAC or 208 to 240VAC input.
2. NEMA 4 Enclosure: For external power mounts.

K. Electrical Requirements: Wiring, conduit, and junction boxes.

1. Installed within housing plenums in accordance with NEC NFPA 70.
2. NPBI™ Units: Accept electrical service of 24 VAC to 240 VAC, universal 2 wire input, 1 phase, 50/60 Hz.
3. Coordinate electrical requirements with air ionization device manufacturer during submittals.

L. Control Requirements:

1. NPBI™ Devices:
   a. Internal short circuit protection.
   b. Overload protection.
   c. Automatic fault reset circuit breakers.
   d. Capable of interfacing with the BAS system.
      i. Provide dry contacts to prove the unit is receiving adequate input power.
   e. Not Acceptable: Manual fuses.
2. Ionization output: Varies as airflow velocity changes.

3. Mount and wire NPBI™ devices within air handling units specified or as shown or the Drawings. Follow manufacturer IOM instructions during installation.

2.3 NON-AUTO-CLEANING - AC VOLTAGE OUTPUT

A. Product: GPS-iMOD®. Modular Bipolar Ionization Device. Made of composite and carbon fiber. Handles 50 to 250 CFM per inch of bar. Voltage selector switch, illuminated On/Off switch, operation status LED, six HV output ports, integral Building Automation System (BAS) alarm contacts, auxiliary terminals for connection of an optional GPS-iDETECT-P™ Ion Sensor. GPS-iMOD® Bar: 6 inch (152 mm) Sections, nine brushes per section, up to 144 inch (3658 mm) total length, with rare earth magnets for easy spacing and mounting.

1. Electrical Listings: UL, cUL.
2. Standards Compliance: UL 2998, UL 867, IAQP, OSHPD Seismic (OSP), CE, CARB.
3. Input Voltage: 24/120/208-240 VAC.
4. Amps: 0.500 A/0.120 A/0.065 A.
5. Frequency: 50/60 Hz.
6. Output Voltage: 5 kV RMS.
7. Output Frequency: 50/60 Hz.
8. Total Ion Output: Greater than 140M ions/cc per inch of bar.
9. Temperature Range: -40 to 140 degrees F (-40 to 60 degrees C).
10. Relative Humidity Range: 0 to 100 percent.
11. Power Entry: UL Listed, line cord with 3-prong plug.
12. Power Unit Dimensions (LxWxH): 9.00 x 3.25 x 4.75 inches (229 x 83 x 121 mm).
13. Ionizer Bar Dimensions (HxW): 1.6 x 0.75 inches (41 x 19 mm).
    a. Length per Section: 6.0 inches (152 mm). Plus 1.2 inches (30.5 mm).
    b. Maximum Length: 144 inches (3658 mm)
14. Power Unit Weight: 4.63 lbs (2.1 kg).
15. Ionizer Bar Weight: 0.24 lbs (113 grams) per 6.0 inch (152 mm) section.
16. Install locations: Duct work, in the air flow, between evaporator coil and filter.
17. Power Requirements: Operate from 24 VAC to 240 VAC without the use of an external power supply or transformer.
    a. Primary voltage may vary in range of 24 to 240 VAC.

2.4 NON-AUTO-CLEANING - DC VOLTAGE OUTPUT

A. Product: GPS-iRIB®-18, Flexible needlepoint bipolar ionization strip. Made from flexible chemical, heat, and cold resistant inert polyimide material. Contains a circuit with carbon fiber ion emitters soldered into the circuit traces. Designed for up to 3,200 CFM or 8 tons. Fixed lengths of 18 inches (457 mm), for use up to 36 inch applications, operation status LED, integral Building Automation System (BAS) alarm contacts, hook and loop tape for easy installation, and voltage input range of 110 to 240 VAC.

1. Electrical Listings: UL, cUL.
2. Compliance and Certifications: UL 2998, UL 867, IAQP, CE, CARB.
3. Input Voltage: 110 to 240 VAC.
4. Power Consumption: 5 Watts.
5. Frequency: 50/60 Hz.
6. Output Voltage: 2 kV.
7. Total Ion Output: Greater than 35 M ions/cc per ft.
8. Airflow Capacity: 0 to 3,200 CFM or 8 tons.
9. Alarm Contact Rating: 250 VAC / 1A, N.O. “dry” contact.
10. Temperature Range: -40 to 140 degrees F (-40 to 60 degrees C).
11. Relative Humidity Range: 0 to 100 percent.
12. Power Unit Dimensions (WxLxH): 1.75 x 3.75 x 1.00 inches (44 x 95 x 25 mm).
13. Ionizer Strip Dimensions (WxLxH): 1.50 x 18.00 x 0.05 inches (38 x 457 x 1.3 mm).
14. Combined Weight: 0.50 lbs (227 grams).
15. Install locations: In the air flow.
16. Power Requirements: Operate from 24 VAC to 240 VAC without the use of an external power supply or transformer.
    a. Primary voltage may vary in range of 24 to 240 VAC.
    b. The high voltage output to be regulated to less than 1 percent variance.

B. Product: GPS-iRIB®-36, Flexible needlepoint bipolar ionization strip. Made from flexible chemical, heat, and cold resistant inert polyimide material. Contains a circuit with carbon fiber ion emitters soldered into the circuit traces. Designed for up to 3,200 CFM or 8 tons. Fixed lengths of 36 inches (914 mm), for applications over 36 inches, operation status LED, integral Building Automation System (BAS) alarm contacts, hook and loop tape for easy installation, and voltage input range of 110 to 240 VAC.

1. Electrical Listings: UL, cUL.
2. Compliance and Certifications: UL 2998, UL 867, IAQP, CE, CARB.
3. Input Voltage: 110 to 240 VAC.
4. Power Consumption: 5 Watts.
5. Frequency: 50/60 Hz.
6. Output Voltage: 2 kV.

7. Total Ion Output: Greater than 35 M ions/cc per ft.
8. Airflow Capacity: 0 to 3,200 CFM or 8 tons.
9. Alarm Contact Rating: 250 VAC / 1A, N.O. “dry” contact.
10. Temperature Range: -40 to 140 degrees F (-40 to 60 degrees C).
11. Relative Humidity Range: 0 to 100 percent.
12. Power Unit Dimensions (WxLxH): 1.75 x 3.75 x 1.00 inches (44 x 95 x 25 mm).
13. Ionizer Strip Dimensions (WxLxH): 1.50 x 36.00 x 0.05 inches (38 x 914 x 1.3 mm).
14. Combined Weight: 0.50 lbs (227 grams).
15. Install locations: In the air flow.
16. Power Requirements: Operate from 24 VAC to 240 VAC without the use of an external power supply or transformer.
    a. Primary voltage may vary in range of 24 to 240 VAC.
    b. The high voltage output to be regulated to less than 1 percent variance.

C. Product: [**GPS-FC-3-BAS, 24 VAC**] [**GPS-FC-3T-BAS, 110 to 240 VAC**] NPBI™ bipolar ionization device with BAS alarm contacts. Designed for up to 3,200 CFM or 8 tons. Carbon fiber brush emitters, operation status LED, integral Building Automation System (BAS) alarm contacts, mounting tabs, positive and negative ion output.

1. Electrical Listings: UL.
2. Standards Compliance: UL 2998, IAQP, CE, CARB.
3. Input Voltage: [**24 VAC**] [**110 to 240 VAC]**.
4. Power Consumption: 1.2 Watts.
5. Frequency: 50/60 HZ.
6. Total Ion Output: Greater than 350 M ions/cc.
7. Airflow Capacity: 0 - 3,200 CFM or 8 tons.
8. Temperature Range: -20 to 140 degrees F (-28.9 to 60 degrees C).
9. Relative Humidity Range: 0-100 percent.
10. Unit Dimensions (LxHxD): 2.6 x 1.9 x 1.3 inches (66 x 48 x 33 mm).
11. Unit Weight: 0.23 lbs (104 grams).
12. Alarm Contact Rating: 24 VAC, 0.1 A, N.O. “dry” contacts.
13. Install locations: Fan Inlet, in the air flow, zoner diffuser.
14. Power Requirements: Operate from 24 VAC to 240 VAC without the use of an external power supply or transformer.
    a. Primary voltage may vary in range of 24 to 240 VAC.
    b. The high voltage output to be regulated to less than 1 percent variance.

2.5 AUTO-CLEANING – DC VOLTAGE OUTPUT

A. Product: GPS-FC24™-AC, Auto-Cleaning Needlepoint Bipolar Ionization System. Handles up to 2,400 CFM or 6 tons. Composite construction allows for mounting in corrosive environments. Universal voltage input, in line On/Off switch, programmable autocleaning cycle, operation status LED, integral Building Automation System (BAS) alarm contacts, magnets for ease of installation and replaceable carbon fiber brush emitters.

1. Electrical Listings: UL, cUL.
2. Compliance and Certifications: UL 2998, UL 867, IAQP, CE, CARB.
3. Input Voltage: 24 to 240 VAC.
4. Amps: Operating: 0.170 to 0.017 A. Cleaning Cycle: 0.33 to 0.03 A.
5. Power: Operating: 4 watts. Cleaning Cycle: 8 watts.
6. Frequency: 50/60 Hz.
7. Total Ion Output: Greater than 300M ions/cc.
8. Airflow Capacity: 0 to 2,400 CFM or up to 6 tons.
9. Temperature Range: -20 to 140 degrees F (-29 to 60 degrees C).
10. Relative Humidity Range: 0 to 100 percent.
11. Ionizer Unit Dimensions (LxWxH): 7.9 x 1.1 x 5.0 inches (200 x 28 x 127 mm).
12. Ionizer Unit Weight: 1.25 lbs. (567 grams).
13. Alarm Contact Rating: 250 VAC, 1A, N.O. “dry” contact.
14. Install locations: Fan inlet, In the air flow, zone diffuser.
15. Power Requirements: Operate from 24 VAC to 240 VAC without the use of an external power supply or transformer.
    a. Primary voltage may vary in range of 24 to 240 VAC.
    b. The high voltage output to be regulated to less than 1 percent variance.

B. Product: GPS-FC48™-AC, Auto-Cleaning Needlepoint Bipolar Ionization System. Handles up to 4,800 CFM or 12 tons. Composite construction allows for mounting in corrosive environments. Universal voltage input, in-line On/Off switch, programmable autocleaning cycle, operation status LED, integral Building Automation System (BAS) alarm contacts, magnets for ease of installation and replaceable carbon fiber brush emitters.

1. Electrical Listings: UL, cUL.
2. Compliance and Certifications: UL 867, UL 2998, IAQP, CE, CARB.
3. Input Voltage: 24 to 240V AC/DC.
4. Amps: 0.41 to 0.041 A.
5. Power Consumption: 10 Watts.
6. Frequency: 50/60 HZ.
7. Total Ion Output: Greater than 400 million ions/cc.
8. Airflow Capacity: 0 to 4,800 CFM or up to 12 tons
9. Temperature Range: -20 to 140 degrees F (-29 to 60 degrees C).
10. Relative Humidity Range: 0 to 100 percent.

11. Unit Dimensions (LxWXH): 11.1 x 1.84 x 3.52 inches (282 x 47 x 89 mm).
12. Weight: 1.32 lbs (600 grams).
13. Alarm Contact Rating: 250VAC, 1A, N.O. “dry” contact.
14. Install locations: Fan inlet, in the air flow, zone diffuser.
15. Power Requirements: Operate from 24 VAC to 240 VAC without the use of an external power supply or transformer.
    a. Primary voltage may vary in range of 24 to 240 VAC.
    b. The high voltage output to be regulated to less than 1 percent variance.

C. Product: GPS-DM48™-AC. Auto-Cleaning, Duct Mounted, needlepoint bipolar ionization system. Handles up to 4,800 CFM or 12 tons. Universal voltage input, integral display, programmable auto-cleaning cycle, operation status display, integral Building Automation System (BAS) alarm contacts, 3/4 quick turn duct adapter, 6 ft of watertight flexible conduit, and carbon fiber brush emitters.

1. Electric Approvals: UL, cUL.
2. Compliance and Certifications: UL 867, UL 2998, IAQP, CE, CARB.
3. Input Voltage: 24 to 240 V AC/DC.
4. Power Consumption: 12 Watts.
5. Frequency: 50/60HZ.
6. Total Ion Output: Greater than 400M ions/cc.
7. Airflow Capacity: 0 to 4,800 CFM or up to 12 tons.
8. Temperature Range: -20 to 140 degrees F (-29 to 60 degrees C).
9. Relative Humidity Range: 0 to 100 percent.
10. Unit Dimensions: 3.75 inches (95 mm) diameter. Length: 7 inches (178 mm).
11. Weight: 2.31 lbs (1.048 kg).
12. Alarm Contact Rating: 250 VAC, 1A, N.O. “dry” contact.
13. Install locations: In duct work, in the air flow.
14. Includes weathertight seals for external duct mounting.
15. Power Requirements: Operate from 24 VAC to 240 VAC without the use of an external power supply or transformer.
    a. Primary voltage may vary in range of 24 to 240 VAC.

PART 3 - EXECUTION

3.1 GENERAL

A. Contractor is responsible for maintaining air systems until owner accepts the building (Owner Acceptance).

3.2 INSTALLATION, GENERAL

A. Needlepoint Bipolar Ionization (NPBI™) Systems:

1. Assemble and install equipment in a workman like manner to the satisfaction of the Engineer of Record, and Owner's representative.
2. Damaged or faulty components must be replaced, at no cost additional cost to the owner.
3. Protect components from dust and damage daily throughout construction.

3.3 INSTALLATION, GPS-iMOD® - AC VOLTAGE OUTPUT

A. Product: GPS-iMOD®, Modular Air Ionization System.
   1. Installation Location: Downstream of a MERV 6, or higher, 30 percent particulate filter to prevent unnecessary build-up of particulate on the carbon fiber needle tips.
      a. Mounting Location:
         i. Between the particulate filter and cooling coil.
   2. Mechanical Installation:
      a. A quantity of 1 GPS-iMOD® bar assembly on each coil up to 60 inches (1524 mm) in height. The bars should be spaced a maximum of 60 inches (1524 mm) apart to get optimal ionization coverage on coils.
         i. Install such that the GPS-iMOD® bar covers the entire finned-width of the coil to the nearest 6 inches (152 mm) without exceeding the finned-width of the coil.
         ii. Follow manufacturers published installation instructions.

3.4 INSTALLATION - NON-AUTO-CLEANING - DC VOLTAGE OUTPUT

A. Product: GPS-iRIB®-18, Flexible Needlepoint Bipolar Ionization Strip; 18 inches (457 mm) long.

1. Installation Location: Ductless Mini-Split and PTAC Mounting and Wiring.
2. Mechanical Installation: Follow manufacturers published installation instructions

B. Product: GPS-iRIB®-36, Flexible Needlepoint Bipolar Ionization Strip; 36 inches (914 mm) long.

1. Installation Location: Ductless Mini-Split and PTAC Mounting and Wiring.

2. Mechanical Installation: Follow manufacturers published installation instructions

C. Product: [**GPS-FC-3-BAS**] [**GPS-FC-3T-BAS**], NPBI™ Air Ionization System.

1. Installation Location: Downstream from filter to prevent build-up of particulates on the ion emitters.
   a. Locations to mount in preferred order.
      i. Downstream from filter and blower, prior to cooling coil.
      ii. Downstream from filter, blower, and coil.
      iii. Prior to filter is not recommended. Particulate build up will be greater prior to filter. Cleaning will need to be done more frequently.
2. Mechanical Installation: Select a location for installation. Unit needs to be perpendicular to air flow. Mount so ion emitters are exposed to airstream. Air should flow past ion emitters like a football through goal posts.
   a. Ideal Locations:
      i. Typical Split Systems: Blower inlet on blower housing, the side opposite the blower motor. Housings should be so ion emitters extend slightly above side of blower housing.
      ii. Ceiling Cassette Units: On fan side of protective screen / grille.
      iii. Mini Split Systems: After filter and behind coil. Typically mounted to wall plate.
      iv. Ducted Modules: On intake side after filter between the blower housings.
   b. Follow manufacturers published installation instructions.

3.5 INSTALLATION, AUTO-CLEANING - DC VOLTAGE OUTPUT

A. Product: GPS-FC48™-AC, NPBI™ Auto-Cleaning Air Ionization System.

1. Installation Locations to mount in preferred order.
   a. Downstream from filter.
   b. Blower inlet on blower housing, the side opposite the blower motor.
   c. Downstream from filter and blower, prior to cooling coil.
   d. Downstream from filter, blower, and coil.
   e. Prior to filter is not recommended. Particulate build up will be greater prior to filter. Cleaning will need to be done more frequently.
2. Alternate Mounting Locations: Supply or return air duct after system filter.

3. Mechanical Installation:
    a. Follow manufacturers published installation instructions.

B. Product: GPS-FC24™-AC, NPBI™, Auto-Cleaning Air Ionization System.

1. Installation Locations to mount in preferred order.
    a. Downstream from filter.
    b. Blower inlet on blower housing, the side opposite the blower motor.
    c. Downstream from filter and blower, prior to cooling coil.
    d. Downstream from filter, blower, and coil.
    e. Prior to filter is not recommended. Particulate build up will be greater prior to filter. Cleaning will need to be done more frequently.
    f. Ductless Mini-Split Ceiling Cassette Applications: Mount unit to fan inlet. The emitter brushes should be no closer than 2 inches (51 mm) from any wiring or metal objects.
2. Mechanical Installation:
    a. Follow manufacturers published installation instructions

C. Product: GPS-DM48™-AC, NPBI™ Auto-Cleaning Air Ionization System.

1. Installation Location: Supply air duct.
    a. Alternate Mounting Location: Return air duct after the filter.
        i. The duct must have a depth greater than 8 inches (203 mm) for unit to operate properly.
        ii. Weatherproof housing allows mounting indoors or outdoors.
2. Mechanical Installation:
    a. Follow manufacturers published installation instructions

3.6 CONTROL WIRE, CABLE AND RACEWAYS INSTALLATION

A. Comply with NECA 1.

B. Field Inspection: Coordinate field inspection in accordance with the “Quality Assurance” Article in PART 1 of this specification and appropriate sections in Division 01.

3.7 TESTING

A. Provide the manufacturers recommended high voltage verification electrical test.

3.8 PROTECTION

A. Protect installed products and accessories from damage during construction.

END OF SECTION 23 43 16



SECTION 23 74 13 - PACKAGED ROOFTOP AIR CONDITIONING UNITS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Package roof top unit.

B. Heat exchanger.

C. Refrigeration components.

D. Unit operating controls.

E. Roof curb.

F. Electrical power connections.

G. Operation and maintenance service.

1.2 RELATED SECTIONS

A. Section 15170 - Motors.

B. Section 15242 - Vibration Isolation.

C. Section 15290 - Ductwork Insulation.

D. Section 15885 - Air Cleaning.

E. Section 15952 - Controls and Instrumentation.

F. Section 16180 - Equipment Wiring Systems.

1.3 REFERENCES

A. NFPA 90 A & B - Installation of Air Conditioning and Ventilation Systems and Installation of Warm Air Heating and Air Conditioning Systems. (all)

B. ANSI/ASHRAE 15 - Safety Code for Mechanical Refrigeration. (all)

C. AHRI 360 - Commercial and Industrial Unitary Air Conditioning Equipment testing and rating standard. (g/e, c/e above 135,000 btuh)

D. AHRI 340 - Commercial and Industrial Unitary Heat pump Equipment.(hp above 135,000 btuh)

E. ANSI/ASHRAE 37 - Testing Unitary Air Conditioning and Heat Pump Equipment. (al

F. ANSI/ASHRAE/IESNA 90.1-1999 - Energy Standard for New Buildings Except Low-Rise Residential Buildings.

G. ANSI Z21.47/UL1995 - Unitary Air Conditioning Standard for safety requirements.

H. California Energy Commission Administrative Code - Title 20/24 - Establishes the minimum efficiency requirements for HVAC equipment installed in new buildings in the State of California. (all)

I. AHRI 210/240 - Unitary Air-Conditioning Equipment and Air- Source Heat Pump Equipment. (all under 135,000 btuh)

J. AHRI 270 - Sound Rating of Outdoor Unitary Equipment. (all below 135,000)

K. AHRI 370 - Sound Rating of Large Outdoor Refrigerating and Air Conditioning Equipment.(all above 135,000 Btuh)

L. ANSI/NFPA 70-1995 - National Electric Code. (all)

1.4 SUBMITTALS

A. Submit unit performance data including: capacity, nominal and operating performance.

B. Submit Mechanical Specifications for unit and accessories describing construction, components and options.

C. Submit shop drawings indicating overall dimensions as well as installation, operation and services clearances. Indicate lift points and recommendations and center of gravity. Indicate unit shipping, installation and operating weights including dimensions.

D. Submit data on electrical requirements and connection points. Include recommended wire and fuse sizes or MCA, sequence of operation, safety and start-up instructions.

E. Shop drawings submitted for approval shall be accompanied by a copy of the

purchase agreement between the Contractor and an authorized service representative of the manufacturer for check, test and start up and first year service.

1.5 DELIVERY, STORAGE and HANDLING

A. Comply with manufacturer's installation instructions for rigging, unloading, and transporting units.

B. Protect units from physical damage. Leave factory-shipping covers in place until installation.

1.6 WARRANTY

A. Provide parts warranty (excluding refrigerant) for one year from start-up or 18 months from shipment, whichever occurs first.

B. Provide five-year extended warranty for compressors.

C. Provide five-year heat exchanger limited warranty.

1.7 REGULATORY REQUIREMENTS

A. Unit shall conform to ANSI Z21.47/UL1995 for construction of packaged air conditioner ANSI_Z21.47/UL_1995_REQUIREMENTS.

1. In the event the unit is not UL approved, the manufacturer must, at his expense, provide for a field inspection by a UL representative to verify conformance to UL standards. If necessary, contractor shall perform modifications to the unit to comply with UL, as directed by the UL representative, at no additional expense to the Owner.

PART 2 - PRODUCTS

2.1 SUMMARY

A. The contractor shall furnish and install package rooftop unit(s) as shown and scheduled on the contract documents. The unit(s) shall be installed in accordance with this specification and perform at the specified conditions as scheduled.

B. APPROVED MANUFACTURERS

1. Trane or approved equal

2.2 GENERAL UNIT DESCRIPTION

A. Unit(s) furnished and installed shall be packaged rooftop (s) as scheduled on contract documents and these specifications. Cooling capacity ratings shall be based on AHRI Standard. Unit(s) shall consist of insulated weather-tight casing with compressor(s), air-cooled condenser coil, condenser fans, evaporator coil, return-air filters, supply motors and unit controls

B. Unit(s) shall be 100% factory run tested and fully charged with R-410A

C. Unit(s) shall have labels, decals, and/or tags to aid in the service of the unit and indicate caution areas.

D. Units shall be convertible airflow design as manufactured.

E. Wiring internal to the unit shall be colored and numbered for identification.

2.3 UNIT CASING

A. Cabinet: Galvanized steel, phosphatized, and finished with a pre-applied baked polyurethane enamel. Structural members with access doors and removable panels shall be a minimum 22 gauge.

B. Unit's cabinet surface shall be tested 672 hours in salt spray test in compliance with ASTM B117.

C. Cabinet construction shall allow for all service/ maintenance from one side of the unit.

D. Cabinet top cover shall be one piece construction or where seams exits, it shall be double-hemmed and gasket-sealed.

E. Access Panels: Water- and air-tight panels with handles and hinges shall provide access to filters, heating section, return air fan section, supply air fan section, evaporator coil section, and unit control section.

F. Unit's base pan shall have a raised 1 1/8 inch high lip around the supply and return openings for water integrity.

G. Provide ½ inch foil faced, fire retardant permanent, odorless glass fiber material. All edges must be captured so that there is no insulation exposed in the air stream.

H. The base pan shall have no penetrations within the perimeter of the curb other that the raised 1 1/8 inch high down flow supply/return openings to provide and added water integrity precaution.

I. Provide openings either on side of unit or through the base for power, control, condensate, and gas connections.

J. The base of the unit shall have 3 sides for forklift provisions. The base of the units shall have rigging/lifting holes for crane maneuvering.

2.4 AIR FILTERS

A. Air Filters: Factory installed filters shall mount integral within the unit and shall be accessible through access panels. Two-inch thick glass fiber disposable media filters shall be provided.

B. Two inch MERV 8 and MERV 13 media filters shall be available option.

2.5 FANS AND MOTORS

A. Provide evaporator fan section with forward curved, double width, double inlet, centrifugal type fan.

B. Provide self-aligning, grease lubricated, ball or sleeve bearings with permanent lubrication fittings.

C. Units shall be equipped with a direct drive plenum fan design Plenum fan design shall include a backward-curved fan wheel along with an external rotor direct drive variable speed indoor motor. All plenum fan designs will have a variable speed adjustment potentiometer located in the control box. All motors shall be thermally protected. All indoor fan motors meet the U.S. Energy Policy Act of 1992 (EPACT).

D. Outdoor and Indoor Fan motors shall be permanently lubricated and have internal thermal overload protection.

E. Outdoor fans shall be direct drive, statically and dynamically balanced, draw through in the vertical discharge position.

F. Provide shafts constructed of solid hot rolled steel, ground and polished, with key-way, and protectively coated with lubricating oil.

2.6 ELECTRIC HEATING SECTION

A. Provide heavy duty nickel chromium heating elements internally Delta connected for 240V, wye connection for 480V and 600V. Each heater package shall have automatically reset high limit control operating through heating element contactors. Backup protection is also provided via non-resettable single operation limits connected directly to high voltage. All heaters shall be individually fused from the factory, where required, and shall meet all NEC and CEC requirements when properly installed. Power assemblies shall provide single point connection. Electrical heat modules shall be cULus listed.

B. Heater shall be installed internal to unit cabinet.

C. Heater shall be UL and CSA listed and approved and provide single point power connection.

2.7 EVAPORATOR COIL & SECTION

A. Provide configured aluminum fin surface mechanically bonded to copper tubing coil.

B. Microchannel evaporators provide streamlined tubes with small ports, and metallurgical tube-to-fin bond. The Microchannel coil has better heat transfer performance. Compact all-aluminum microchannel coils also help to reduce the unit weight. These all aluminum coils are recyclable, galvanic corrosion is also minimized due to all aluminum construction. Strong aluminum brazed structure provides better fin protection. In addition, flat streamlined tubes also make microchannel coils more dust resistant and easier to clean.

C. Provide an independent expansion device for each refrigeration circuit. Factory pressure tested at 600 psig and leak tested at 465 psig.

D. Provide a removable, reversible, cleanable double sloped drain pan for base of evaporator coil constructed of PVC.

E. Provide a removable, reversible, cleanable double sloped drain pan for base of evaporator coil constructed of Stainless Steel.

2.8 CONDENSER SECTION

A. Provide vertical discharge, direct drive fans with aluminum blades. Fans shall be statically balanced. Motors shall be permanently lubricated, with integral thermal overload protection in a weather tight casing.

B. Micro channel coil has flat streamlined tubes with small ports, and metallurgical tube to fin bond. Microchannel coil has better heat transfer

performance. Microchannel condenser coil can reduce system refrigerant charge by up to 50% because of smaller internal volume, which reduces the unit weight. These all aluminum coils are recyclable. Galvanic corrosion is also minimized due to all aluminum construction. Strong aluminum brazed structure provides better fin protection and quality. In addition, flat streamlined tubes also make Microchannel coils more dust resistant and easier to clean.

2.9 REFRIGERATION SYSTEM

A. All units shall have direct drive hermetic, scroll type compressors with centrifugal type oil pumps. Motor shall be suction gas cooled and shall have a voltage utilization range of plus or minus 10 percent of unit nameplate.

B. Provide with thermostatic temperature motor winding control for protection against excessive temperatures caused by over/under voltage operation or loss of charge. Also provide high and low pressure switches.

C. Thermal Expansion valves are standard for all models.

D. Units shall have cooling capabilities down to 0 degree F as standard with microprocessor controls (40 degrees F with electromechanical controls. For field-installed low ambient accessory, the manufacturer shall provide a factory-authorized service technician that will assure proper installation and operation.

E. Provide each unit with refrigerant circuit(s) factory-supplied completely piped with liquid line filter-drier, suction and liquid line pressure ports.

F. Provide hot gas reheate with humidity control where scheduled on the plans.

2.10 OUTDOOR AIR SECTION

A. Motorized outside air damper 0-50%

2.11 OPERATING CONTROLS

A. Provide factory-wired roof top units with 24-volt electro-mechanical control circuit with control transformers, contactors pressure lugs or terminal block for power wiring. Contractor to provide DISCONNECT DEVICE. Units shall have single point power connection as standard. Field wiring of zone controls to be NEC Class II.

2.12 STAGING CONTROLS

A. Provide NEC Class II, electronic, adjustable zone control to maintain zone temperature setting

B. Provide programmable electronic microcomputer based zone control.

1. Zone control shall incorporate:
   a. Automatic changeover from heating to cooling.
   b. Set-up for at least 2 - sets of separate heating and cooling temperatures per day.
   c. Instant override of setpoint for continuous or timed period from one hour to 31 days.
   d. Switch selection features including Fahrenheit display, 12 or 24-hour clock, keyboard disable, remote sensor, fan on-auto.
   e. Smart Fan Operation: Allows the unit fan operation to default to the Auto Mode during unoccupied periods, regardless of the Fan switch position.
   f. Economizer Minimum Position Override: Allows the unit controller to override and close the minimum position setting on the economizer damper during unoccupied time periods.
2. Zone sensor display shall be capable of:
   a. Time of day.
   b. Actual room temperature.
   c. Programmed temperature.
   d. Programmed time.
   e. Duration of timed override.
   f. Day of week.
   g. System mode indication: heating, cooling, low battery, and fan on.

2.13 ROOF CURB

A. Contractor shall provide factory supplied **insulated** roof curb, **minimum 12" high**, 16 gauge perimeter made of zinc coated steel with supply and return air gasketing and wood nailer strips. Ship knocked down and provided with instructions for easy assembly.

B. Curb shall be manufactured in accordance with the National Roofing Contractors Association guidelines.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Contractor shall verify that roof is ready to receive work and opening dimensions are as specified.

B. Contractor shall verify that proper power supply is available.

3.2 INSTALLATION

A. Contractor shall install in accordance with manufacturer's instructions.

B. Mount units on factory built roof mounting frame providing watertight enclosure to protect ductwork and utility services. Install roof mounting curb level.

END OF SECTION 23 74 13



SECTION 23 80 00 - AIR CONDITIONING, HEATING AND VENTILATING

1.1 GENERAL

A. The air conditioning system, in general, shall be for the entire building, providing cooling and dehumidification in summer and heating in winter. A constant amount of outside air shall be taken into the system and all air shall be filtered.

1.2 TESTING REFRIGERANT PIPING SYSTEMS

A. Refrigerant lines shall be tested under 200 psi carbon dioxide pressure for 5 hours using soap suds at joints to test for leaks. Evacuate system and charge with refrigerant.

1.3 LABELING A/C UNITS:

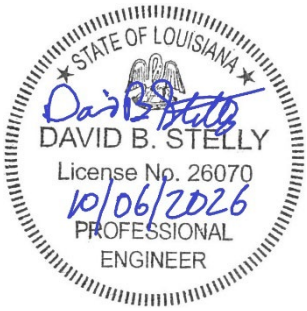
A. All indoor and outdoor a/c units shall be labeled with permanent laminated plate riveted to unit. Units shall be labeled as indicated in schedules. Plate shall be black with white unit numbers. Height of unit number shall be minimum of one (1) inch. Label shall also indicate area serviced by unit as noted in schedules. Height of letters shall be minimum of one-half (½) inch. Submit sample to Engineer for approval.

1.4 VENTILATING SYSTEM

A. This Contractor shall furnish and install all exhaust fans shown and scheduled on Plans. Fans shall be of the type indicated and shall be Cook, Greenheck, Acme, PennBarry, Broan, Twin City, ILG/American coolair, or approved equivalent.

B. Ceiling mounted fans shall be complete with white ceiling mounted grille. Grille shall be removable to provide service access to fan, motor, etc.

END OF SECTION 23 80 00



SECTION 26 00 01 - ELECTRICAL GENERAL PROVISIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The general provisions of the Contract, including the Conditions of the Contract (General, Supplementary, and other Conditions as appropriate, apply to the Work specified in this Section.

B. Refer to all Electrical Divisions of the Specifications as well as the Specifications for the other various trades and materials and be thoroughly familiar with all provisions regarding electrical work.

1.2 BIDDING REQUIREMENTS AND RESPONSIBILITIES

A. Prime bidder is responsible for all work, of all trades and sub-contractors bidding this project. It is the prime bidder's responsibility, prior to submitting a bid to ensure that sub-contractors coordinate all aspects of the work between trades, sub-contractors, etc. to the fullest extent possible.

B. Prime bidder shall ensure that all sub-contractors, suppliers, equipment vendors, etc., obtain all necessary and pertinent contract document information pertaining to their work prior to the submission of a bid. Contractor shall realize that different sub-contractors may furnish equipment, accessories, devices, etc. necessary for a complete and working installation, that require provision of services by another sub-contractor or trade.

C. Bidders of all or any portions of this section or division are required to review all contract documents including but not limited to Architectural drawings, Structural drawings, Mechanical drawings, Plumbing drawings, Electrical drawings, etc. to coordinate requirements and responsibilities with and through prime bidder.

D. Bidders of all or any portions of this section or division, by furnishing a bid on a portion of the prime contract are indicating that they have received all contract documents and coordinated services provided under their portion of the work with the prime bidder; they are indicating that they have expressed any pertinent questions (which would result from a detailed, thorough review of the entire set of contract documents) to the prime bidder in accordance with the general provisions of the Specifications requirements, prior to bidding.

E. All timely, pertinent, questions provided in writing prior to bids, in accordance with the general provisions of the Specifications requirements, will be clarified, defined, or otherwise explained in a written addendum and/or addendums prior to bids, in accordance with the general provisions of the Specifications requirements.

F. It is not the intention of these contract documents to leave any issue relating to coordination between trades or sub-contractors vaguely defined. The intention is to

define all issues, coordination matters, equipment requirements, sizes, routing, etc. to the satisfaction of the prime bidder, prior to receipt of bids.

G. Bidders of all or any portions of this section or division, by virtue of the submission of a bid to the prime bidder, are indicating that they have reviewed the entire set of contract documents with due diligence and regard for the Owner's desire for a comprehensive and complete bid proposal; that they have expressed all concerns or questions requiring clarification on matters of coordination between trades and/or sub-contractors; that they have expressed any such concerns or questions in writing in accordance with contract document's General Provisions requirements.

H. Prime bidders, by submission of a comprehensive bid on the project are indicating that the subcontractors selected in their bid have complied with all contract document's General Provisions requirements, that they have indicated in writing, prior to bidding, all questions or concerns requiring clarification and/or explanation and have documented any and all specific exclusions involving work that would generally be considered to be work of their trade. The prime bidder shall coordinate all work so that anything excluded by the bidder of all or any portions of this section or division, have been addressed prior to bids in one of the following manners:

1. The work has been confirmed, by the prime bidder, to be work of another trade or subcontractor whose proposal is also being accepted.
2. Clarification of the matter has been made through the prime design professional via written addendum and is clearly and mutually understood by the prime bidder and the party raising the issue/question or seeking clarification.
3. The work has been accepted as the responsibility of the prime contractor directly.

1.3 MATERIAL AND EQUIPMENT

A. The term "provide" when used in the Contract Documents includes all items necessary for the proper execution and completion of the work.

B. Specific reference in the Specifications to any article, device, product, material, fixture, form or type of construction by name, make or catalog number, shall be interpreted as establishing a standard of quality and shall not be construed as limiting competition; and the Contractor, in such cases, may at his option use any article, device, product, material, fixture, form or type of construction which in the judgement of the Architect expressed in writing is equivalent to that specified.

C. Coordinate and properly relate all work of this Division to building structure and work of all other trades.

D. Visit premises and become thoroughly familiar with existing conditions; verify all dimensions in field. Advise Architect of any discrepancies prior to Bid Date in accordance with contract document's General Provisions.

E. Do not rough-in for any item or equipment furnished by others or noted "Not in Contract" (NIC), without first receiving rough-in information or determining rough-in requirements from other trades and/or Architect.

F. Provide storage and protection for all equipment and materials in accordance with requirements of contract document's General Provisions. Replace any equipment and materials damaged by improper handling, storage, or protection, at no additional cost to the Owner.

G. Keep premises clean in accordance with requirements of contract document's General Provisions.

1.4 SUBSTITUTIONS

A. Substitutions are allowed under La. R.S. 38:2291 and La R.S. 38:2292. Any requests for prior approval (as provided for under La. R.S. 38:2295) including any re-submitted data, shall be received by the Architect/Engineer a minimum of ten (10) working days prior to bid date. Submittals sent via facsimile and/or electronic mail will not be accepted. The Contractor shall recognize that it may be necessary to submit certain requests for prior approval sooner than the final date listed in the Instructions to Bidders, depending upon the complexity and completeness of the submittal. If, in the opinion of the Architect/Engineer, there is neither sufficient time available nor adequate descriptive data attached to the submittal, the submittal will not be considered. Except as otherwise specified, materials and equipment shall be new and bear the approval label of the Underwriters Laboratories, Inc. for the type of installation required.

B. Basis of design of systems is based on specific equipment for performance, size, shape, color, construction material, etc... If the use of other manufacturer's equipment, even though approved by Architect, involves additional cost due to space requirements, foundation requirements, increased mechanical or electrical services, the cost of such extra work shall be borne by the contractor. Even though a manufacturer's name appears in the Contract Documents as having acceptable equipment, his equipment shall be classified as being a substitute to the equipment originally designed for and named in the Contract Documents. Substitute equipment, materials, etc., will not be allowed to deviate from basis of design requirements.

C. All requests for prior approval shall identify where proposed material matches or exceeds the performance of the equipment specified. In addition, such submittal shall also clearly identify all deficiencies compared to specified product. Submittal of general cut sheets will be returned rejected.

D. Submit all prior approval requests to: Connor Martin, cmartin@adginc.org

E. The following items shall be submitted for prior approval:

1. Lighting Fixtures and Poles
2. Electrical Gear (Panelboards, Safety Switches, Circuit Breakers, Contactors/Relays). This includes Short-Circuit Study and Arc-Flash Study.

3. Dimmer Switches
4. Fire Detection and Alarm System
5. Intercom System
6. Receptacles
7. Toggle Switches
8. Wiring Device Box Support Brackets
9. Photocells
10. Tele/Data Systems
11. Cover Plates
12. Pull Boxes
13. Wire
14. Occupancy/Motion Sensors
15. Dimming Systems/Lighting Control Systems
16. Floor Boxes
17. Surface Metal Raceway Systems(s).
18. Surface Mounted Multi-Outlet Assemblies
19. Transient Voltage Surge Suppressors (TVSS)/Surge Protective Devices (SPDs)
20. Lighting Emergency Battery Packs

1.5 DRAWINGS AND SPECIFICATIONS

A. The specific intent of these Contract Documents is to provide the various systems, equipment, etc. to the Owner complete and in a thoroughly calibrated and functional condition.

B. The Drawings shall not be construed as shop drawings. In the event of a possible interference with piping or equipment of another trade, items requiring set grade and elevations shall have precedence over other items. Should any major interference develop, immediately notify the Architect.

C. In laying out Work, refer to mechanical, electrical, structural, and architectural drawings at all times in order to avoid interference and undue delays in the progress of the Work.

1.6 CODES AND REGULATIONS

A. Work shall be in full accord with the LA Sanitary Code, 2026 N.E.C. (NFPA 70), local ordinances, building codes, and other applicable national, state, and local regulations.

B. Equipment shall conform to requirements and recommendations of the National Bureau of Fire Underwriters and National Fire Protection Association (NFPA).

C. Items provided under this Division shall comply with the American National Standards Institute (ANSI) "Specifications for Making Buildings and Facilities Accessible to and Usable by Physically Handicapped People," ANSI A 117.1, and the Americans with Disabilities Act (A.D.A.).

D. Work called for in these Plans and Specifications shall be executed by competent workmen.

E. In the possible event of conflict between codes or regulations and Contract Documents, notify the Architect/Engineer immediately.

F. The drawings show approximate locations only of feeders, branch circuits, outlets, etc., except where specific routing or dimensions are indicated. The Architect reserves the right to make reasonable changes in locations indicated, before roughing-in, without additional cost to the Owner.

G. Because of the small scale of the drawings, it is not possible to indicate all of the offsets, fittings, and accessories required. The Contractor shall investigate the structural and finish conditions affecting his work and shall arrange such work accordingly, fittings, bends, junction boxes, pull boxes, access panels, and accessories required to meet such conditions at no additional costs to the Owner.

1.7 FEES, PERMITS, AND TAXES

A. Obtain and pay for permits required for the Work of this Division. Pay fees in connection therewith, including necessary inspection fees.

B. Pay any and all taxes levied for Work of this Division, including municipal and/or state sales tax where applicable.

1.8 MANUFACTURER'S DIRECTIONS

A. Install and operate equipment and material in strict accord with manufacturer's installation and operating instructions. The manufacturer's instructions shall become part of the Contract Documents and shall supplement Drawings and Specifications.

1.9 SUBMITTAL DATA

A. Submit shop drawings, project data, and samples in accordance with requirements of the General Provisions of the contract documents. Submittals shall be received no later than thirty (30) consecutive calendar days from effective date of “Notice to Proceed”.

B. Shop drawings shall consist of published ratings or capacity data, detailed construction drawings for fabricated items, wiring and control diagrams, performance curves, installation instructions, manufacturer's installation drawings, and other pertinent data. Submit drawings showing revisions to equipment layouts due to use of alternate or substitute equipment.

C. Where manufacturers and suppliers of equipment, materials, etc. are unable to fully comply with Contract Document basis of design requirements, specifically call such deviations to attention of Architect/Engineer on submittals. Typed deviations on a separate sheet; underlined statements or notations on standard brochures, equipment fly sheets, etc. will not be accepted. Submittals shall clearly indicate where

material submitted meets and/or exceeds the performance criteria of the equipment used as the basis of design of the project. Failure to note compliance with the basis of design material/equipment shall result in rejection of submittals.

D. Approval of submittals shall not relieve Contractor from furnishing required quantities and verifying dimensions. In addition, approval shall not waive original intent of Contract Documents.

E. Failure to obtain written approval of equipment shall be considered sufficient grounds for rejection of said equipment regardless of the stage of completion of the project.

F. Contractor shall submit Submittals/Shop Drawings on all equipment listed below. In addition, contractor shall refer to subsequent sections of the Electrical portion of the specifications for additional shop drawing submittal requirements.

1. Lighting Fixtures and Poles
2. Electrical Gear (Panelboards, Safety Switches, Circuit Breakers, Contactors/Relays). This includes Short-Circuit Study and Arc-Flash Study.
3. Dimmer Switches
4. Fire Detection and Alarm System
5. Intercom System
6. Receptacles
7. Toggle Switches
8. Wiring Device Box Support Brackets
9. Photocells
10. Tele/Data Systems
11. Cover Plates
12. Pull Boxes
13. Wire
14. Occupancy/Motion Sensors
15. Dimming Systems/Lighting Control Systems
16. Floor Boxes
17. Surface Metal Raceway Systems(s).
18. Surface Mounted Multi-Outlet Assemblies
19. Transient Voltage Surge Suppressors (TVSS)/Surge Protective Devices (SPDs)
20. Lighting Emergency Battery Packs

G. Shop drawings may be submitted electronically as described below.

1. Must be in a portable document format (PDF).
2. Must be submitted to the prime designer and the prime designer will forward to ADG Engineering for distribution/processing.
3. If using an electronic document management system such as Procore, submit to prime designer and ADG's electrical project manager: Connor Martin, cmartin@adginc.org

H. Shop Drawings/submittals shall be submitted as grouped together and stated below and shall be submitted simultaneously. Electrical gear shop drawings shall not be submitted until approval is obtained for all HVAC and plumbing equipment. Prior to submission of electrical gear shop drawings, contractor shall obtain a copy of the approved mechanical and plumbing submittals. Any modifications required to be made to the electrical gear due to changes in electrical requirements (increases and/or decreases) of the mechanical and plumbing equipment shall be clearly notated in the electrical gear submittals.

1. Light Fixtures, Occupancy/Motion Sensors, Poles, Photocells, Dimming Systems/Lighting Control systems, Emergency Battery Packs
2. Electrical Gear, Overcurrent Protective Device Studies
3. Tele/Data Systems
4. Intercom System
5. Fire Detection and Alarm System
6. Dimmer Switches, Receptacles, Toggle Switches, Cover Plates, Device Box Support Brackets, Pull Boxes, Floor Boxes, Surface Metal Raceway System(s), Surface Mounted Multi-Outlet Assemblies and Wire
7. Transient Voltage Surge Suppressors (TVSS)/Surge Protective Devices (SPDs)

1.10 PROJECT COORDINATION

A. Refer to applicable Electrical Specification Sections for products work of this Division.

B. Refer to all plumbing, mechanical and fire protections specifications sections for related products affecting work of these electrical sections.

C. Coordinate handling of all products, materials, etc., through the Contractor. Coordinate space, access, clearances, etc., through the Contractor prior to preparation of shop drawing submittal.

D. The Contractor is herein cautioned to note that the work involved is a complicated renovation project requiring continuous owner occupancy. The Contractor should review the phasing plans/descriptions and visit the project site to determine existing conditions. The Contractor will be held responsible for allowing for these conditions in his bid.

1.11 SERVICE CONTINUITY

A. At all times during the construction of the project, electric service shall be maintained to all portions of the site and existing facility, except with prior written approval from the Architect/Engineer of interruptions. It shall be the responsibility of the contractor to provide, install and maintain (fuel included) any required rental generators to accomplish said task. Any required interruptions of electric service due to work being performed under this Contract shall be scheduled in writing a minimum of forty-eight (48) hours in advance after consultation with the Architect/Engineer and the Owner and shall occur when permitted by the

Architect/Engineer. The Contractor shall be responsible for any overtime pay required to meet these requirements, at no additional cost to the Owner.

1.12 VALUE ENGINEERING (V/E):

A. While it may be in the Owner's interest to consider the first cost money saving that may be generated via alternatives and options generated via participation in Value Engineering, contractor shall realize that substantive offers of Value Engineering (V/E), if accepted by the Owner, constitute a design-build agreement (offer and acceptance) with the owner, and drastically change the design concept of the project, as developed by the Professional of Record identified on the Contract Documents.

B. Should contractor offer, and the owner accept value engineering options that alter aspects of the system design, equipment, performance and/or performance verification or monitoring of respective systems, the contractor shall provide duly licensed professional engineering consultants working on behalf of the contractor (including sub-contractors and equipment vendors/manufacturers) to review, approve and take professional responsibility for performance and suitability of V/E hybrid systems, materials or operational changes related to respective V/E items. The contractor's licensed professional engineering consultants and the contractor assume any and all responsibility for the design and suitability in terms of performance, of hybrid systems installed, as contractor's Professional of Record, absolving the original project Professional of Record (identified on the original Contract Documents, released for the original project Bid/Negotiation) from responsibility for the V/E hybrid systems portion of the work.

C. The contractor, via the offer and acceptance of value engineering items on the project agrees to provide professional engineering design services and take full and complete responsibility for the hybrid design. Further, the contractor's (V/E Items) professional of record (either employees, or independent consultants to the contractor) through the offer and acceptance of V/E items, agree to indemnify and hold harmless the project owner, the owner's original A/E team (Professional of Record on behalf of the owner for the original Contract Documents) their heirs and assigns in regard to the V/E changes and their impact on the systems altered, affected or modified, in whole or in part. The Professional of Record shown on the original Contract Documents in regard to the systems altered, adjusted, revised, modified or otherwise affected by the value engineering items implemented, shall be absolved of design responsibility as a result of implementation of V/E items, and their original use of Engineering Seals used for original Contract Documents, shall not apply.

D. Contractor shall refer to subsequent specification sections for additional requirements for submission and approval of VE items.

1.13 PROJECT RECORD DOCUMENTS

A. Keep Project Record Documents in accordance with general provision requirements of the specifications.

B. During construction period, keep accurate records of installations paying particular attention to major interior and exterior underground and concealed piping, ductwork, etc.

C. The Contractor shall obtain a minimum of one (1) set of the contract documents including all addenda and change orders (including CAD/Revit files) as prepared by the Architect/Engineer.

D. If the Contractor elects to vary from the Contract Documents and secures prior approval from the Architect/Engineer for any phase of the work, he shall record in a neat and readable manner all such variances on the contract documents in red ink. Prior to requesting substantial completion, the marked-up set of contract documents shall be returned to the Architect/Engineer for approval.

E. All deviations from sizes, locations and from all other features of the installation shown in the Contract Documents shall be recorded.

F. In addition, it shall be possible using these drawings to correctly and easily locate, identify and establish sizes of all piping, directions, and the like, as well as other features of work which will be concealed underground and/or in the finished building.

G. Locations of underground work shall be established by dimensions to columns, lines or walls, locating all turns, etc. and by properly referenced centerline or invert elevations and rates of fall.

H. For work concealed in the building, sufficient information shall be given so it can be located with reasonable accuracy and ease. In some cases, this may be by dimension. In others, it may be sufficient to illustrate the work on the drawings in relation to the spaces in the building near which it was actually installed. The decision of the Architect/Engineer in this matter will be final.

I. The following requirements apply to all Record Drawings:

1. They shall be maintained at the Contractor's expense.
2. All such drawings shall be done carefully and neatly.
3. Additional drawings shall be obtained at the Contractor's expense.
4. They shall be kept up-to-date during the entire course of the work and shall be available upon request for examination by the Architect/ Engineer and when necessary, by other trades, to establish clearances for other parts of the work.
5. Record Drawings shall be returned to the Architect/Engineer upon completion of the work and are subject to approval of the Architect/ Engineer.
6. CAD files can be provided upon request (proper release forms must be completed). Contractor shall update CAD files to reflect As-Built conditions and shall submit revised file back to Architect/Engineer as part of the close-out documents.

1.14 OPERATION AND MAINTENANCE DATA

A. Refer to the specification Sections related to PROJECT CLOSEOUT or OPERATION AND MAINTENANCE DATA for procedures and requirements for preparation and submittal of maintenance manuals.

B. Provide the Owner with three (3) copies of printed instructions indicating various pieces of equipment by name and model number, complete with parts lists, maintenance and repair instructions and test and balance report.

C. COPIES OF SHOP DRAWINGS WILL NOT BE ACCEPTABLE AS OPERATION AND MAINTENANCE INSTRUCTIONS.

D. This information shall be bound in plastic hardbound notebooks with the job name, Architect and Engineer names permanently embossed on the cover. Rigid board dividers with labeled tabs shall be provided for different pieces of equipment. Submit manuals to the Architect for approval.

E. In addition to the operation and maintenance brochure, the Contractor shall provide a separate brochure which shall include registered warranty certificates on all equipment, especially any pieces of equipment which carry warranties exceeding one (1) year.

F. As part of the O & M binders, contractor shall include copies of all studies and test reports performed as part of this project, including but not limited to, the following:

1. Acceptance Testing Reports
    a. Grounding Tests
    b. Thermographic Tests
    c. Torque Values
    d. Rotation Tests
2. Fire Alarm System 100% Test Report
3. Short Circuit Study Report – Updated to Reflect Installed Conditions
4. Tele/Data system testing report(s)
5. All specified photos of installations including open trenches, grounding terminations, pole foundation rough-ins, etc…

G. The operation and maintenance brochure shall be furnished with a detailed list of all equipment furnished to the project, including the serial number and all pertinent nameplate data such as voltage, amperage draw, recommended fuse size, rpm, etc. The Contractor shall include this data on each piece of equipment furnished under this contract including but not limited to those items listed below.

1. Lighting Fixtures and Poles
2. Electrical Gear (Panelboards, Safety Switches, Circuit Breakers, Contactors/Relays). This includes Short-Circuit Study and Arc-Flash Study.
3. Dimmer Switches
4. Fire Detection and Alarm System
5. Intercom System

6. Receptacles
7. Toggle Switches
8. Wiring Device Box Support Brackets
9. Photocells
10. Tele/Data Systems
11. Cover Plates
12. Pull Boxes
13. Wire
14. Occupancy/Motion Sensors
15. Dimming Systems/Lighting Control Systems
16. Floor Boxes
17. Surface Metal Raceway Systems(s).
18. Surface Mounted Multi-Outlet Assemblies
19. Transient Voltage Surge Suppressors (TVSS)/Surge Protective Devices (SPDs)
20. Lighting Emergency Battery Packs

1.15 EXCAVATING AND BACKFILLING

A. Provide excavating and backfilling necessary for Work of this Division. Comply with provisions of specification section pertaining to Site Work, if applicable.

B. Trenches shall be inspected by Code Authorities and/or Owner's Representative before and after piping is laid. Give Owner's Representative 24-hour notice for each inspection. If any trenches are filled without Owner's Representative and/or authority having jurisdiction inspection and as subsequently found to be deficient, the trenches shall be uncovered, inspected, and then re-filled, if requested by Owner's Representative. Prior to covering any and all underground facilities, including but not limited to conduit, ground rods, terminations, etc., Contractor shall take clear and concise digital photos and shall forward said photos to Engineer prior to covering said utilities.

C. Provide minimum 24 inches of cover to finish grades or paving at raceways.

D. Protect and maintain trenches in dry condition until piping has been inspected and approved. Immediately after approval, backfill trenches in tamped layers. Repeat backfill and tamping 6 months after initial coverage has been accomplished to avoid swale development from sinking soils.

E. Compact fill to satisfaction of Architect and/or Owner's Representative.

F. Prior to any excavating, Contractor shall be responsible for having all utilities in the area of excavation located and marked by an approved company with a minimum of five (5) years' experience locating underground facilities. This includes all owner owned utilities on their site.

G. Approximate locations shown on the drawings shall not be used. Any facility damaged by the Contractor's underground work shall be repaired and/or replaced at no additional cost to the Owner

1.16 CUTTING AND PATCHING

A. Comply with requirements of the Specifications regarding cutting and patching. Locate and timely install sleeves as required to minimize cutting and patching.

B. Cutting, fitting, repairing, patching, and finishing of Work shall be done by craftsmen skilled in their respective trades. Where cutting is required, cut in such a manner as not to weaken structure, partitions, or floors. Holes required to be cut must be cut or drilled without breaking out around the holes. Where patching is necessary in finished areas of the building, the Architect will determine the extent of such patching and refinishing.

C. Repairing Roadways and Walks: Where this contractor cuts or breaks roadways or walks to lay the piping, he shall repair or replace these sections to match existing, unless specifically identified as the responsibility of others.

1.17 PAINTING

A. Painting shall be provided under the Specification section regarding painting, unless specified otherwise. Leave exposed piping, materials, and equipment clean and free of rust, grease, dirt, etc. before and after painting.

B. Factory finished equipment, fixtures, and materials which are marred, chipped, scratched, or otherwise unacceptable shall be repaired or replaced under this Division to Architect satisfaction, at no additional cost to Owner.

C. Coordinate all painting requirements with prime bidder prior to bids.

D. All exposed conduit, materials, hangers, anchors, etc., are to be primed and painted. Color shall match adjacent surfaces where not specifically designated otherwise. All galvanized materials shall be suitably treated prior to painting to ensure adhesion.

E. All exterior electrical gear (panels, meter cans, CT can, switchboards, safety switches, etc.) shall be painted to match adjacent wall surface(s). All interior panels (flush mount) shall have their covers painted to match adjacent wall surface(s).

F. All exterior receptacles, junction boxes, speakers, trumpets, shall be painted to match adjacent wall surface(s).

1.18 EXISTING CONDITIONS

A. The Electrical Contractor shall visit the building site to determine existing conditions and will be held responsible for allowing for these conditions in his bid.

B. Note that this area of work will have storm drainage, mechanical and electrical utilities located underground and within and under the buildings. It is part of this work for the Contractor to determine the scope and location of all utilities to be installed with this project and arrange his work around others. There will be no extra consideration for work discovered as being hidden after the bid, and no change

orders for extra cost that may be caused by unknown after bid conditions. The drawings show approximate locations only of feeders, branch circuits, outlets, etc., except where specific routing or dimensions are indicated. The Architect reserves the right to make reasonable changes in locations indicated, before roughing-in, without additional cost to the Owner.

1.19 PROTECTION OF APPARATUS

A. The Contractor shall take precautions necessary at all times to properly protect his apparatus from damage. Failure on the part of the Contractor to comply with the above to the Architect's satisfaction shall be sufficient cause for the rejection of the particular piece of apparatus in question.

1.20 MINOR DEVIATIONS

A. The Contractor shall realize that the drawings cannot delve into every step, sequence, or operation necessary for the completion of the project without drawing on the Contractor's experience. Only typical details are shown on the plans. In cases where the Contractor is not certain about the method of installation of his work, he shall ask for details. Lack of details will not be an excuse for improper installation.

1.21 SALVAGED MATERIALS

A. The Owner shall have priority for the selection of salvaged material and equipment. Any equipment, light fixtures, devices, ballasts, materials, etc. selected to remain property of the Owner shall be removed and delivered to a location on the site as designated by the Owner. Material and equipment not retained by the Owner shall become the property of this Contractor and shall be removed from the site by him.

B. The Contractor shall obtain written approval of all material and equipment determined not to be salvaged by the Owner.

1.22 SAFETY PRECAUTIONS

A. Work methods and project safety are the Contractor's sole responsibility.

B. Contractor shall furnish and place proper guards for prevention of accidents. He should provide and maintain any other necessary construction required to secure safety of life or property, including maintenance of sufficient lights during all day and night hours as required to secure such protection.

C. Temporary electrical services during construction should be maintained in perfect condition. Frayed, lose or opened connections should not be used for temporary services. The Contractor should use only equipment in first class working condition for construction services.

1.23 TEMPORARY CONSTRUCTION LIGHTING

A. The Contractor should provide and install construction lighting as required by General Contractor and other trades. The installation shall conform to requirements of the National Electrical Code.

1.24 SUPERVISION

A. Contractor shall personally, or through an authorized and competent representative, constantly supervise the work done from beginning to completion and final acceptance. To the best of his ability, he shall keep the same foreman and workmen throughout the project duration. Foreman shall be present at project site at all times while work under this section of the contract documents is being performed. Foreman shall be accessible by cellular phone at all times. Respective telephone numbers shall be forwarded to Architect/Engineer prior to commencement of work on this project.

1.25 CAD/REVIT FILES

A. ADG will provide, upon request, CAD/Revit files to the contractors for use in preparing submittals and record drawings. Plans will be provided at a cost of $10.00 per drawings sheet requested. By submitting request for CAD/Revit files, contractors automatically consent to the verbiage contained in the CAD/Revit release form contained in the plans. This includes any all limitations, restrictions, indemnifications, etc… contained therein.

PART 2 - PRODUCTS

2.1 EQUIPMENT LABELS

A. Panelboards, safety switches, equipment cabinets, motor starters and other equipment shown on the drawings and furnished and/or installed under this section of the Specifications shall be labeled with laminated plastic nameplates inscribed to identify equipment with description shown on the drawings for panels, the name of the equipment controlled for motor starters, or the system or function involved for other equipment. Provide typewritten panelboard directories indicating the equipment served and its location using final approved room numbers, etc., as directed by the Architect. Refer to specification section – Electrical Distribution System and details(s) for additional requirements.

PART 3 - EXECUTION

3.1 COORDINATION OF TRADES

A. Where work is in close proximity to the work of other contractors, the Contractor shall review plans of other contractors and coordinate his work with theirs. The Electrical Contractor shall verify the location of lighting fixtures, beams, structural members, conduit, ductwork, pipes or other obstructions before beginning his work

in the area. Notify the Architect where proper clearances do not occur or where the work of others would interfere with the safe and/or proper operation of this work.

3.2 SUPPORTS AND FOUNDATIONS

A. Support all items covered by this Specification directly from building structural members independent of any ceilings or any other installed item. Panelboards and switches may be attached to suitably reinforced walls. Ground or slab mounted equipment shall be mounted on a separate four-inch-high concrete slab. Extending 6" beyond equipment footprint on all sides.

B. Do not attach items of this Specification to HVAC ductwork, ceiling grids and ceiling support members, piping or other equipment unless specifically shown otherwise. Where applicable, all equipment including conduit shall be supported from overhead wall, floor or roof structures using galvanized channel or angle members for a rigid support. Position supports and equipment such that access through lay-in ceilings or panels is not impaired and all Code required clearances are maintained.

C. Where applicable, under no circumstances is the Contractor to attach to or support from any bar joist bridging. Any supports to the bar joists or any structural systems shall be approved by the Architect. All supplemental angle or channel iron required to support equipment of this Specification shall be furnished by the Electrical Contractor.

3.3 EQUIPMENT LAYOUT

A. The physical location and arrangements of electrical equipment is shown on the Plans and is to be used by the Contractor as a guideline in construction. It is the responsibility of the Contractor to review the Plans with the proposed equipment and equipment of other contractors that are affected, and to ensure that all Code required clearances, wiring distances and maintenance accesses, including equipment heights, of all items are maintained. Alternate arrangements to accomplish the above due to field conditions or changes in physical size of the equipment proposed for the project are to be submitted to the Architect for review before any work is begun or equipment ordered.

B. All electrical gear arrangements shall be presented in a 1/4-inch scaled drawing showing all equipment, including those of other contractors. This includes all electrical rooms, mechanical rooms, mechanical yards, electrical yards, service platforms, boiler rooms, etc… Include shop drawing cut sheets and applicable information. Indicate on the drawing by dimension all required Code clearances, wiring distances and maintenance access requirements. Where equipment heights are required to be coordinated with architectural or other items, indicate revised heights. Refer to "MOUNTING HEIGHTS."

3.4 GUARANTEE

A. The Contractor shall guarantee all materials, equipment and workmanship for a period of one (1) year from the date of final acceptance of the project. This guarantee

shall include furnishing of all labor and material necessary to make any repairs, adjustments or replacement of any equipment, parts, etc. necessary to restore the project to first class condition. This guarantee shall include the replacement of lamps. Warranties exceeding one (1) year are hereinafter specified with individual pieces of equipment.

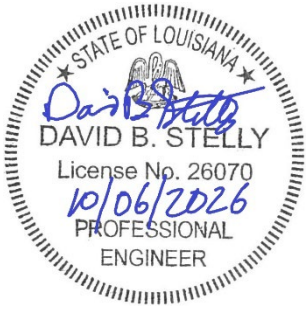
B. If the Contractor's office is in excess of a fifty (50) mile radius of the project, he shall appoint a local qualified contractor to perform any emergency repairs or adjustments required during the guarantee period. The name of the contractor appointed to provide emergency services shall be submitted to the Architect/Engineer for approval.

3.5 CLEANING

A. Refer to the Specification Section relating to PROJECT CLOSEOUT or FINAL CLEANING for general requirements for final cleaning.

B. Clean all light fixtures, and lenses prior to final acceptance and replace inoperable drivers or LED modules.

END OF SECTION 26 00 01



SECTION 260500 - BASIC MATERIALS AND METHODS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The general provisions of the Contract, including the Conditions of the Contract (General, Supplementary, and other Conditions; as appropriate, apply to the work specified in this section.

B. Refer to all portions of the Contract Documents as well as the plans and specifications for the other various trades and materials and be thoroughly familiar with all provisions regarding electrical work.

PART 2 - PRODUCTS

2.1 WIRE (600 VOLT AND BELOW)

A. All conductors used in the work shall be soft drawn annealed copper having a composition of not less than 98% of pure copper. Conductors shall be standard code gauge in size, insulated, and shall have insulation rated for use at 600 volts. The contractor's bid shall reflect the use of all copper conductors unless specifically indicated otherwise. When aluminum conductors are used as part of the V.E. process, their use shall be limited to circuits, feeders and services rated 150 Amperes and larger and shall be of the high alloy, compact stranded type, Southwire SIM pull THHN, SIM pull THWN or equivalent. It shall be the contractor's responsibility for properly upsizing the conductors and associated conduit to achieve the equivalent ampere rating of the circuit/feeder/service as specified for copper conductors. As part of this VE item, Contractor shall provide an updated riser diagram (one-line diagram) indicating proposed conductor changes.

B. Unless otherwise noted or specified, insulation shall be Type THWN. Wires shall be of the single conductor type and shall be stranded. Wire insulation shall not contain any asbestos materials.

C. Wire #8 AWG and smaller may be type MC-cable where allowed by applicable codes and ordinances.

D. Throughout the system, conductors shall be identified as to phase and voltage of system by color-coding. Color-coding shall be continuous the full length of wire for all wire sizes. Identification by permanent paint bands or tags at outlets will not be acceptable. Surface printing at regular intervals on all conductors shall indicate manufacturer, size, voltage, and insulation type. White and/or gray colored insulation shall be used for grounded conductors and only for grounded conductors.

E. The color code assigned to each phase wire shall be consistently followed throughout the project. The following systems of color-coding shall be strictly adhered to:

1. 208/120 Volt, 3-Phase, 4-wire Wye Systems

a. Grounding leads = green
b. Grounded neutral leads = white
c. Ungrounded phase wires = black, red and blue

F. Where multiple neutral conductors are installed in a common raceway, the neutral conductor for each circuit shall be separately identified in accordance with the National Electric Code (NEC).

2.2 CONDUIT

A. Unless otherwise specified or shown on the drawings, all conduit shall be rigid galvanized steel (RGS), electrical metallic tubing (EMT), or rigid nonmetallic conduit (PVC) as allowed in the paragraphs below.

B. RGS may be used for conduit shown run underground (red concrete encasement required), may be used in concrete slabs, and shall be used for conduit run exposed to the weather (locations defined as damp locations and wet locations in Article 100 of the NEC) and shall be run in hazardous areas.

C. EMT shall be used for conduit not encased in concrete, not exposed to the weather, not run underground, and not run in hazardous areas.

D. PVC may be used for conduit run in concrete slabs or may be run underground (underground only where permitted by NEC and local ordinances). Concrete encasement will not be required on underground runs unless specifically noted or specified elsewhere. PVC shall not be run exposed nor concealed in walls nor above ceilings nor in hazardous areas. When rigid nonmetallic conduit (PVC) is installed underground, it shall be Schedule 80 at all underground road crossings, at all underground driveway crossings, and when required by the NEC or local ordinance or specified otherwise. PVC Schedule 40 may be used at all other underground locations. The only use of exposed above ground PVC conduit shall be for telephone service entrance use up utility poles (Schedule 80 required), for CATV service entrance use up utility pole (Schedule 80 required) or for power utility service entrance use up utility pole (Schedule 80 required).

E. Where PVC is utilized for underground installations, RGS 90° elbows and conduit shall be utilized to turn conduit vertical and to rise up to above grade/slab.

F. All conduit shall be new and shall bear the inspection label of the Underwriters Laboratories, Inc. (U.L.).

G. Where multiple conduits are installed underground in the same trench, carlon snap-n-stac spacers, or approved equivalent, shall be utilized and spaced a maximum of 5'-0" apart. Provide pre-cast, 4" thick, concrete bases at each spacer and where conduits are turned to be installed in a vertical orientation. Provide spacers immediately before and after all elbows and where conduit transitions from underground to above ground.

H. Fittings for rigid steel conduit and EMT shall be hot-dipped galvanized and shall be of an approved type specially designed and manufactured for their purpose.

I. All flexible conduit, where installed indoors and outdoors, shall be of the flexible liquid tight metallic type. Flexible weatherproof electrical conduit is prohibited from use on this project.

J. Metallic conduit shall be metallized, sheradized, or hot-dipped galvanized.

K. Where conduit is installed exposed in finished spaces and on the exterior of the building (excluding mechanical, equipment and electrical rooms), conduit shall be painted to match adjacent surfaces (color as selected by the Architect/Engineer). All other conduit installations shall be complete with factory applied paint finish as manufactured by Allied Tube and Conduit (True Color EMT) or Wheatland Tube Company (Color Check Conduit). All fittings, couplings, boxes, covers, etc. shall match color of conduit. Color of conduit shall comply with color code noted below.

Power and Lighting - Non-Emergency	Standard Conduit Finish
Fire Alarm	Red
Tele/Data/CATV	Green
Intercom	Orange

2.3 METAL-CLAD CABLE (600 VOLTS AND BELOW)

A. Where permitted by NEC and local codes and ordinances, metal-clad (MC) cables may be used in lieu of conduit and wiring specified elsewhere herein.

B. Installation of MC cables shall be in compliance with the National Electric Code (NEC).

C. Conductors shall be softdrawn annealed copper having a composition of not less than 98% of pure copper.

D. Conductors shall be solid -type, standard Code gauge in size, insulated, and shall be rated for use at 600 volts or below. Minimum size shall be No. 12.

E. Conductor insulation shall be of a type listed in the NEC and be rated for 75 deg. C (167 deg. F) as a minimum and shall be of a type approved for use in MC cable.

2.4 EXPANSION FITTINGS

A. Each conduit that is buried in or rigidly secured to the building construction on opposite sides of a building expansion joint and each long run of exposed conduit that may be subject to excessive stresses shall be provided with an expansion fitting. Expansion fittings shall be made of hot-dipped galvanized malleable iron and shall have a factory-installed packing, which will prevent the entrance of water, a pressure ring, and a grounding ring.

B. In addition to the grounding ring, a separate grounding conductor shall be provided. This grounding conductor shall be an external flexible copper ground securely bonded by approved grounding straps on each end of the fitting. Grounding conductor may be omitted when expansion fitting includes an approved integral grounding conductor or device.

C. Where conduits are buried in concrete, they shall cross the building expansion joints at right angles. Ends of conduit shall be provided with insulated bushings.

2.5 OUTLET BOXES

A. Outlet boxes in concealed conduit systems shall be flush mounted. Boxes shall be galvanized steel of sufficient size to accommodate devices shown and shall have raised covers. Requirements of the NEC shall be minimum.

B. Boxes for lighting fixtures shall be four-inch (4") octagon, not less than 1-1/2" deep. Where boxes are installed in concrete, boxes designed for this application shall be used.

C. Outlet boxes for switches and receptacles in concealed work shall be 4" square, and not less than 1-1/2" deep. Flush mounted outlet boxes shall be installed with plaster rings.

D. Outlet boxes for switches and receptacles installed in exposed conduit system shall be cast iron or cast aluminum Type FD or approved equivalent.

E. Where multiple outlet boxes are shown to be installed at the same location, they shall be installed using B-Line Series BB8 mounting bracket or approved equivalent. Where single boxes are shown to be installed, the B-Line Series BB2 mounting bracket or approved equivalent shall be used.

F. Outlet boxes for adjacent rooms shall not be installed in the same stud space to minimize sound transmission.

G. Outlet boxes used for lighting toggle switches shall have outlet box stabilizer(s) installed.

H. Outlet boxes installed in rated walls shall receive appropriately rated putty pads as manufactured by 3M or STI.

2.6 PULL BOXES

A. Furnish and install pull boxes. Boxes shall be code gauge galvanized steel with screw attached access panels unless noted otherwise in top, side or bottom as required.

2.7 OUTLET COVER PLATES

A. Unless otherwise noted, all outlets including telephone outlets, television outlets, computer outlets, etc. shall be fitted with cover plates of the type indicated below.

B. Cover plates shall be uniform in design and finish for switches, receptacles, and other outlets requiring cover plates. Plates shall be one (1) piece of the required number of gangs. Sectional plates shall not be used.

C. Cover plates shall be brushed aluminum or stainless steel 302/304.

D. Provide blank coverplates for all un-used/empty device boxes including, but not limited to tele/data, CATV, access controls, etc....boxes.

2.8 WIRING DEVICES

A. Wiring devices shall be as listed in the following table, except that color of device shall match color of outlet cover plate. Where cover plates are aluminum or stainless steel, device color shall be as selected by the Architect. The "*" in the model numbers indicate color selection to be made.

1. Leviton / Hubbell (or equivalent by Pass and Seymour)
Single Pole-20A (5621-2* / DS120*)
Rocker or Paddle Switch

2. 20A 125V 2P 3W Duplex (16342-* / DR20*)
Decora Style
Grounded Receptacle

3. 20A 125V 2P 3W Duplex (G5362-00*/ GFRST20SNAP*)
GFCI Receptacles (Indoor)

2.9 PHOTOELECTRIC CONTROLS

A. Unless otherwise noted on the drawings, photoelectric controls shall be electronic-stem/swivel with sensor on side: Intermatic EK4236S or equivalent by Voltage and power requirements of circuits controlled per drawings.

2.10 DIMMER SWITCHES

A. Dimmer switches shall be Legrand Radiant series, Acuity Brands nLight nPODMA series, Acuity Brands sPODMA series or approved equivalent. Ratings shall be of appropriate wattage for the circuits to be controlled. Provide and install all required 0-10V. control interface units for all LED lighting circuits. Dimmer loading shall not exceed 80% of the dimmer rating. Dimmers shall be UL listed.

2.11 MULTI-OUTLET ASSEMBLIES

A. Fixed multi-outlet assemblies shall consist of surface metal raceway with minimum dimensions of 1-1/4" wide by 3/4" deep and single receptacles spaced twenty-four inches (24") on centers or as noted on the drawings. Receptacles shall be 20 amperes, 125-volt NEMA 5-20R Specification Grade. Phase and neutral conductors shall not be smaller than No. 12 AWG. A green insulated equipment ground conductor shall be installed which shall connect all receptacle ground terminals to the building

equipment grounding system. Where more than one (1) circuit is indicated as serving a group of receptacles in a common raceway, adjacent receptacles shall be connected to alternate circuits.

B. The multi-outlet assemblies shall be provided with snap-on blank covers and/or snap-on receptacle covers to suit the receptacles furnished, all as manufactured by the raceway manufacturer, and shall be installed in such a manner that there will be no open cracks

C. Suitable fittings, elbows, clips, mounting straps, connection blocks, insulators, etc., as required, shall be provided.

D. Raceway and cover custom color shall be as selected by the Architect/Engineer during shop drawing submittal.

E. Multi-outlet assemblies shall be installed in accordance with the National Electrical Code.

2.12 SURFACE METAL RACEWAY

A. Provide and install surface metal raceways where shown on the drawings and/or where required by new installation where concealed devices cannot be installed in the existing structures as approved by the Architect/Engineer.

B. Raceways shall be approved for the number and size of wires indicated. Raceways shall be installed complete with boxes, angle fittings, straps, bushings, etc. especially designed for use with the particular raceway being used.

C. Installation of surface metal raceway shall be in accordance with the National Electrical Code. The raceway shall be supported at intervals of four feet (4') or less, and shall be installed parallel and perpendicular to walls, ceilings, and floors.

D. Custom color of the raceways shall be as selected by the Architect/Engineer during shop drawing submittal.

2.13 FLOOR OUTLETS/FLOOR BOXES

A. Floor outlets shall consist of the assembly of wiring devices, floor boxes and fittings. Floor boxes shall be16 gauge galvanized sheet metal complete with fusion-banded epoxy paint. Boxes shall be fully adjustable before concrete pour.

B. Contractor shall adjust box such that coverplate is flush against floor surface. When multiple floor outlets are shown directly adjacent to each other, multiple gang type boxes with separating partitions between each gang shall be utilized. Provide separate conduit for each function.

C. Floor boxes shall be round with threads for conduits or hubs as required and be of suitable height for concrete slab use. Box shall be capable of accepting duplex receptacles and/or other wiring devices or usage as indicated.

D. Each floor box shall be Legrand Resource RFBA Series Round Activation floor boxes, (or equivalent) with round covers. Quantity of gangs/size of box shall be individually determined by each location's requirements. Provide equivalent fire-rated poke-thrus, or equivalent shallow boxes as required by floor assemblies.

E. Where box is to be installed in an existing concrete slab above the ground level, caution must be taken to ensure that the structural integrity of the slab is not impaired by the box installation. Coordinate with the Architect. Use a core drill, poke through device, fire rated to at least the rating of the floor system, as per National Electrical Code (NEC). Depth of unit shall be as required. Hole by the Electrical Contractor. Color by Architect during shop drawing submittal. Color choices shall include satin brass, nickel, grey powder coated, brass, bronze, brushed aluminum, black power-coated, brass-plated, bronze-plated and/or satin nickel-plated.

F. As a minimum, provide and install two (2) 120V duplex convenience receptacles, two (2) RJ-45 data outlets in each floor box

PART 3 - EXECUTION

3.1 MOUNTING HEIGHTS

A. Unless otherwise noted on the drawings or required by the Architect/Engineer, the mounting heights set forth below shall apply. Dimensions given are from finished floor to the top of the device unless noted otherwise noted.

1.	Intercom Staff Stations	4'-0" to top of device
2.	Toggle Switches	4'-0" to top of device
3.	Receptacles	1'-6" to bottom of receptacle
4.	Panelboards	6'-7" to top of can
5.	Tele/Data Outlets	1'-6" to bottom of outlet
6.	Fire Alarm Audio/Visual	6" from ceiling on wall and in between 80" and 96"*
7.	Fire Alarm Hand Stations	4'-0" to top of device
8.	Fire Alarm Visual Only	6" from ceiling on wall *
9.	Electric Water Cooler	Concealed behind unit **

* Mounting height shall be 6" from ceiling or maximum 80" above finished floor, whichever is lowest.

** Contractor shall be responsible for coordinating exact location in field with the plumbing contractor.

B. Where overcurrent or safety switch devices are shown to serve exterior equipment, the Contractor shall review in detail with the Architect/Engineer proposed exterior mounting locations, mounting heights, conduit routing, etc., and receive approval prior to rough-in.

C. Where overcurrent or safety switch devices are shown to serve condensing units, the top of the overcurrent device shall be 3'- 0" AFG or level with the top of the

condensing unit(s) whichever is lower. Refer to detail on plans for additional requirements.

3.2 WIRE (600 VOLT AND BELOW)

A. Service entrance, feeders, and motor circuit conductors shall be run their entire length without joints or splices. Splices and joints in branch circuit wiring shall be only at outlets or in accessible junction boxes.

B. Joints and splices in branch circuit wiring shall be made with compression type solderless connectors. Connectors of the nonmetallic screw on type are not acceptable.

C. Terminations or splices for conductors # 6 AWG and larger shall utilize Burndy Unitap, Polaris Black or equivalent connectors.

D. Unless otherwise specified, all wiring shall be installed in conduit.

E. No wire shall be smaller than No. 12 for power or lighting service, fixture whips or for switch legs. Wire for each branch circuit shall be of a single size and type from the branch circuit protective device to the last outlet on the circuit unless noted otherwise.

F. Not more than three (3) branch circuits shall be installed in a raceway for three-phase electrical systems. For single phase electrical systems, the number of circuits in any one raceway shall be limited to two (2).

G. Branch circuit home run numbers shown on the drawings shall be used for connection of circuit wiring to similarly numbered protective devices in branch circuit panelboards.

H. Where the length of a home run, from panel to the first outlet exceeds 75 feet (75') for 120-volt circuits, the conductor size shall be No. 10 AWG or that shown on the drawings, whichever is larger.

I. For all 3-phase circuits, contractor shall provide and install a full-size neutral conductor and a grounding conductor for a complete 5-wire circuit. If the neutral conductor is not required by the equipment, contractor shall install wire nuts on each end of the neutral conductor for future use.

3.3 CONDUIT

A. When conduits are shown to be installed in the floor slab, under the floor slab, or underground, whenever possible and approved by the Architect/Engineer, conduits one-inch (1") trade size and smaller shall be installed in the concrete floor slab. Conduits embedded in concrete slabs shall have lateral spacing not less than three diameters except where the slab has been specially designed to accommodate closer spacing.

B. Conduits larger than one-inch (1") trade size shall not be installed in the floor slab and shall be installed a minimum of twelve inches (12") below the floor slab.

C. Conduits shown underground but not in or under a floor slab shall be installed not less than twenty-four inches (24") below grade. Conduit locations shall be identified by means of 4" wide; detectable, red warning/ marker tape installed in trench in accordance with NEC requirements.

D. Prior to backfilling of trenches and /or providing concrete encasement, contractor shall take photographs of conduit installation including spacers/supports and concrete support blocks. In addition, prior to backfilling trenches and after concrete encasement, take additional photographs of installation. Submit photographs to engineer upon request.

E. Rigid conduit joints shall be made with threaded fittings made up tight with at least five threads fully engaged. Compression type threadless fittings and setscrew type fittings shall not be used for RGS unless specifically approved in writing by the Architect/Engineer.

F. Couplings and connectors for EMT shall be compression type or cast-iron set screw type.

G. Where conduits enter boxes or cabinets that do not have threaded hubs the conduit shall be secured in place with galvanized locknuts inside and outside and shall have bushings inside for interior locations. All exterior terminations shall be made with Meyers hubs or approved equivalent. Conduits larger than one inch (1") shall have galvanized insulating bushings.

H. All conduits shall be installed as indicated or scheduled on the drawings and shall be of sufficient size to accommodate the required number of insulated conductors including equipment-grounding conductor. A grounding conductor shall be pulled in every raceway and properly terminated. The Contractor shall increase the conduit size from that shown on the drawings where necessary to accommodate the equipment-grounding conductor and/or where to comply with the NEC.

I. Unless otherwise noted, conduit shall be run concealed. Conduit runs from wall mounted receptacles, toggle switches, etc. shall be run concealed in walls whenever possible.

J. Conduit runs shall be straight; elbows and bends shall be uniform, symmetrical, and free from dents or flattening. All conduit shall be installed with runs parallel or perpendicular to walls, ceilings and structural members.

K. Conduit shall not be run nearer than three inches (3") to hot water or steam pipes except where crossings are unavoidable. Conduit shall be kept at least one inch (1") from covering of pipe crossed and the conductor size shall be increased one (1) size

L. Conduit shall be held securely in place by approved hangers and fasteners of appropriate design and dimensions for the particular application. Support shall be

such that no strain will be transmitted to the outlet box and/or pull box supports. Conduit shall be secured only to the building structure.

M. All conduit runs shall be installed in accordance with all applicable sections of the National Electrical Code and local codes or ordinances.

N. Where empty conduits are shown, a #14 pull wire shall be installed and conduits shall be capped.

O. Terminations to all mechanical equipment and to all dry-type transformers shall be made using a minimum of 12" to a maximum of 24" liquid-tight flexible metallic conduit.

P. At each concealed junction box in the power and lighting system, identify the panel and circuit number(s) contained in the junction box by writing in permanent marker on the outside of the junction box cover.

Q. Where conduits are run from condition spaces to/thru un-conditioned spaces, the ends of the conduits shall be sealed (after conductor installation) to prevent the transmission of air from non-conditioned spaces into the conditioned spaces. Expanding spray foam and EYS seals are approved methods of sealing conduits.

R. For all surface mounted devices, including fire alarm, intercom and nurse call systems, device boxes shall be Wiremold No. R5752 and R5753 or approved equivalent style boxes sized such that device does not overhang edge(s) of back box. Color of box shall match device.

3.4 METAL-CLAD CABLE (600 VOLTS AND BELOW)

A. The metallic sheath shall be galvanized steel or aluminum corrugated sheath type and shall be terminated at outlet boxes, cabinets, etc. with fittings specifically approved for such use, which shall properly ground the metallic sheath.

B. Each metal-clad cable assembly shall have one (1) green insulated ground conductor sized as required by NEC for the application as a minimum size.

C. Where run in walls, cable shall be fastened using B-Line Series BX4 or approved equivalent cable fasteners. Cable shall be fastened to wall stud not more than 8" from entry into device box.

D. MC Cable shall be supported horizontally and vertically every 5’ minimum or closer where required by NEC and applicable federal, state and local ordinances.

3.5 WIRING DEVICES

A. All wiring devices installed shall be identified as to which panel serves it and which overcurrent protection device protects the wiring device. This shall be accomplished via panel name and circuit number being written using a permanent marker on the

back side of the coverplate. Panel name and circuit number shall be permanently identified on each receptacle coverplate.

3.6 MANUFACTURER'S DIRECTION

A. Contractor shall be responsible for coordinating all aspects of equipment electrical service installation for all electrical gear, devices, mechanical, plumbing, fire protection, architectural, and owner furnished equipment. Contractor shall obtain and review actual manufacturer's installation instructions and shall install electrical facilities to said equipment in accordance with the instructions, NEC, NFPA and contract documents. Should a discrepancy exist between the manufacturer's installation directions and the contract documents, the engineer shall be notified in writing immediately.

3.7 COORDINATION WITH OTHER TRADES

A. Prior to purchasing and installing any wire and/or conduit for all circuitry to mechanical equipment, owner furnished equipment, and other equipment requiring electrical power furnished by other trades as part of this project, contractor shall review equipment cut sheets and shall verify exact equipment electrical requirements. Any discrepancies between contract documents and equipment submittals shall be immediately brought to the architect/engineer's attention for clarification.

END OF SECTION 26 05 00



SECTION 26 05 26 - GROUNDING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The general provisions of the Contract, including the Conditions of the Contract (General, Supplementary, and other Conditions) as appropriate, apply to the Work specified in this Section.

B. Refer to all Electrical portions of the specifications, as well as the Specifications for the other various trades and materials and be thoroughly familiar with all provisions regarding electrical work.

1.2 GENERAL

A. Contractor shall provide grounding of service equipment, transformers, non-current carrying conductive surfaces of equipment, cable tray, metallic raceways, fencing, metal buildings, structures and other equipment as specified herein and as shown on the drawings.

1.3 SCOPE

A. The equipment shall be grounded as shown on the plans and as specified herein. All metal structures and equipment, including fences, shall be connected to the systems ground grid. Ground conductors must be as short and straight as possible, protected from mechanical injury and, if practicable, without splice or joint.

B. Provide and install 1" C with insulated 3/0 C.U. service grounding conductor from grounding electrode(s) to telephone service backboard and to each and every tele/data/CATV closet.

C. Provide and install ERICO No. TMGBA24L33PT Tamper Resistant Copper Bus Bar Kit or approved equivalent, at each telephone service backboard, data backboard, CATV backboard in the MDF Room and IDF Rooms. Terminate 3/0 C.U. conductor to each bus bar. Refer to details.

PART 2 - PRODUCTS

2.1 CONDUCTORS

A. Main grounding conductors shall be bare, soft drawn, stranded, single conductor copper wire, and generally sized as follows:

1. Equipment and structures to grid conductor: #3/0 AWG

2.2 CONNECTORS

A. All connectors shall be of the exothermically welded type.

2.3 EXOTHERMIC WELD PROCESS

A. All wire-to-wire exothermic welds shall be the parallel type. Wire-to-wire rod connections shall be "T" type. To establish a basis of design for quality and type, the following is a partial list of approved Cadweld type connections. Approved equivalent connectors by other manufacturers may be utilized.

Connections	Cadweld Type
Parallel cable-to-cable	PG
Cable to ground rod	GR, FT, NT or NX
Cable to steel	VN
Cable to lug	LA
Cable to rebar	Consult factory (similar to RR)

PART 3 - EXECUTION

3.1 EXPOSED NON-CURRENT-CARRYING METAL PARTS

A. Ground connections to equipment or devices shall be made as close to the current-carrying parts as possible; that is, to the main frame rather than supporting structures, bases or shields. Grounding connections shall be made only to surfaces that are clean and dry. Steel surfaces shall be ground or filed to remove all scale, rust, grease and dirt. Copper and galvanized steel shall be cleaned to remove oxide before making welds or connections. Code size ground conductors shall be run in all conduits containing circuits protected by overcurrent devices; then properly terminated.

B. All raceways, cable racks, cable trays, conduits, armored or shielded cable or cables with ground and all exposed non-current carrying metal parts shall be grounded. Such items shall be bonded together and permanently grounded to the equipment ground bus. Conduits shall be connected by the grounding bushings or clamps to ground bus. Flexible "jumpers" shall be provided around all raceway expansion joints. Bonding straps for steel conduit shall be copper. Jumper connections shall be provided to effectively ground all sections of rigid conduit connected into plastic pipe. No metallic conduit shall be left ungrounded. In conduit systems interrupted by junction or switch boxes where locknuts and bushings are used to secure the conduit in the box, the sections of conduit and box must be bonded together using grounding bushings.

C. Any conduits entering low voltage (600 volts or below) equipment through sheet metal enclosure and effectively grounded to enclosure by hub need not be otherwise bonded. Both ends of ground buses in switchboards, etc., shall be separately connected to the main ground bus to form two (2) separate paths to ground.

D. All metal buildings shall be grounded by separate grounding conductor and ground rods. Fencing (existing and new) within 20' of electrical equipment/gear/transformers/etc…. shall be grounded as specified herein and as shown on the drawings. Where exposed to physical damage, the ground wires shall

be suitably protected with PVC conduit enclosures. Cables below grade shall be laid with a reasonable amount of slack to reduce the possibility of breakage.

3.2 EXOTHERMIC WELD PROCESS

A. The grounding grid shall be installed and connected as specified herein and as shown on the drawings using an exothermic weld process (Cadweld or other approved manufacturer). Where bolted connections are required, brass/bronze 2-hole pads exothermically welded to the grounding conductor shall be used.

B. All exothermic weld grounding connections shall be made using exothermic welded Cadweld (or other approved manufacturer) connections, tools and materials.

C. Unless noted otherwise, all copper-to-copper or copper-to-steel splices and terminating specified shall be made with exothermic welds.

D. Steel surfaces shall be ground or filed to remove the galvanizing coating and the surface cleaned and dried thoroughly prior to making the welds. All welds shall be repainted with an approved galvanized paint after the welds are made.

E. Copper surfaces shall be sanded to remove oxides and the surface cleaned and dried thoroughly prior to making the welds. All welds shall be painted with an approved anti-oxide manufactured by T&B or Burndy (or other approved manufacturer) to prevent corrosion.

F. Brass/bronze split bolts shall be used to connect the fence grounding conductors where shown on the drawings.

G. Where bolted connections are specified, brass/bronze 2-hole pads shall be utilized except for equipment manufactured neutral and ground busses. The equipment to be grounded shall be cleaned of all paint, dirt, and rust prior to making the bolted connection. All bolts, nuts, washers, and lock washers shall be stainless steel. All such connections shall be coated with an approved anti-oxide compound. Only one (1) 2-hole pad shall be terminated on one (1) set of bolts, nuts and washers.

H. Where approved in writing by the Engineer, brass/bronze pipe ground clamps or 2 set screw 2-hole pads may be used for special conditions.

I. Where grounding conductors or PVC conduits penetrate walls, floors, etc., these openings and conduits shall be sealed with Dow Corning No. 2001 Silicone RTV (or other prior approved manufacturer) after installation is complete.

J. Provide gradual bends for all grounding grid cables wherever possible. Sharp bends will not be permitted. The minimum being radius should be 8 inches.

K. The Contractor shall notify the Architect/Engineer when the buried grounding grid is completed for inspection by the Engineer prior to backfilling. Notification should be no less than 24 hours prior to scheduling the backfill of trenches.

L. The Contractor shall test the grounding grid resistance and continuity. The testing shall be performed after all underground and above ground connections have been made. Refer to "Acceptance Testing" specification section for additional requirements.

END OF SECTION 26 05 26



SECTION 26 05 71 - ACCEPTANCE TESTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The general provisions of the Contract apply to the Work specified in this Section.

B. Refer to all Electrical Sections of the Specifications, as well as the Specifications for the other various trades and materials and be thoroughly familiar with all provisions regarding electrical work.

1.2 SUMMARY

A. This section outlines the acceptance testing requirements and division of responsibility.

1.3 SCOPE

A. Contractor shall engage the services of a recognized independent NETA Certified testing firm or professional electrical engineering firm for the purpose of performing inspections and tests as herein specified.

B. The testing firm shall provide all materials, equipment, labor and technical supervision to perform such test and inspections.

C. It is the intent of these tests to assure that all electrical equipment is operational and within industry and manufacturer's tolerances and is installed in accordance with design specifications.

D. The tests and inspections shall determine suitability for energization.

1.4 REFERENCES

A. All inspections and tests shall be in accordance with the latest editions following applicable codes and standards except as provided otherwise herein.

1. National Electrical Code – NEC
2. National Electrical Manufacturer's Association - NEMA.
3. American Society for Testing and Materials - ASTM
4. Institute of Electrical and Electronic Engineers – IEEE
5. National Electrical Testing Association – NETA
6. American National Standards Institute – ANSI
7. State Codes and Ordinances
8. Insulation Cable Engineers Association – ICEA
9. National Electrical Safety Code – NESC

B. All inspections and tests shall utilize the following references:

1. Project Design Specifications
2. Project Design Drawings
3. Manufacturer's Instruction Manuals applicable to each particular apparatus.

1.5 QUALIFICATIONS OF TESTING AGENCY

A. The testing/engineering firm shall be a corporately independent testing organization that can function as an unbiased testing authority, professionally independent of the manufacturers, suppliers and installers of equipment or systems evaluated by the testing firm.

B. The testing firm shall be regularly engaged in the testing of electrical equipment devices, installations and systems.

C. The testing firm shall have been engaged in such practices for a similar size project.

D. The testing firm shall utilize only full-time technicians who are regularly employed by the firm. Electrically unskilled employees are not permitted to perform testing or assistance of any kind. Electricians and/or linemen may assist but may not perform testing and/or inspection services.

E. The testing firm shall submit the "on site" foreman's qualifications and experience through the Contractor at the pre-construction conference for review and approval by the Engineer.

F. Contractor shall submit statement of qualifications of proposed testing firm at the pre-construction conference for approval and acceptance by the Engineer.

1.6 DIVISION OF RESPONSIBILITY

A. Testing firm shall perform the following tests as outlined in these specifications:

1. Relay Calibration and Tests
2. Thermographic Survey

B. Contractor shall perform the following tests as outlined in these specifications:

1. Low Voltage Cable
2. Phasing and Rotation Tests

1.7 TEST REPORT

A. The test report shall include the following:

1. Summary of project.
2. Description of project.
3. Description of test

4. Test results.
5. Conclusions and recommendations.
6. Appendix, including appropriate test forms.
7. Identification of test equipment used.
8. Signature of responsible test organization authority.

B. Furnish three printed (3) copies of the complete report to the Engineer prior to requesting substantial completion and no later than thirty (30) days after completion of testing procedures unless directed otherwise. After acceptance of the report, Contractor shall submit an electronic copy of the report in PDF format.

C. All tests shall be performed with apparatus de-energized except where otherwise specifically required.

D. The testing firm shall have a designated safety representative on the project to supervise operations with respect to safety.

E. The testing firm shall have a calibration program that assures that all applicable test instrumentation is maintained within rated accuracy. The accuracy shall be directly traceable to the National Bureau of Standards. Instruments shall be calibrated in accordance with the following frequency schedule:

F. Field Instruments: Analog - 6 months maximum
Digital - 12 months maximum

G. Laboratory Instruments: 12 months

H. Leased specialty equipment: 12 months

I. Dated calibration labels shall be visible on all test equipment.

J. Records must be kept up to date which show date and results of instruments calibrated or tested.

K. An up-to-date instrument calibration instruction and procedure will be maintained for each test instrument.

L. Calibrating standard shall be of higher accuracy than that of the instrument tested.

1.8 GENERAL

A. An outline of tests required is included in this section. Refer to applicable NETA, ANSI, NEMA, IEEE and other test standards for exact procedures, methods and requirements.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.1 TESTS

A. Upon completion of the work, the entire electrical system shall be tested and shall be shown to be in perfect working condition, in accordance with the intent of the specifications.

3.2 LOW VOLTAGE CABLE, 600 V MAXIMUM

A. Compare cable data with drawings and specifications. Inspect exposed sections of cables for physical damage and correct connection in accordance with one-line diagram.

B. Verify tightness of accessible bolted connection by calibrated torque wrench in accordance with manufacturer's published data. Perform thermographic survey.

C. Inspect compression-applied connectors for correct cable match and indentation.

D. Verify cable color-coding with applicable Engineer's specifications.

E. For all panelboard feeders, perform insulation-resistance test on each conductor with respect to ground and adjacent conductors. Applied potential shall be 1000 volts dc for one minute.

F. Perform continuity test to insure correct cable connection.

G. Bolt-torque levels shall be in accordance with manufacturer's requirements. Measure and record results.

H. Minimum insulation-resistance values shall be not less than 50 mega-ohms.

I. Investigate and report on all deviations between adjacent phases.

3.3 PHASING AND ROTATION:

A. Perform phasing test on each circuit tie section energized by separate sources.

B. Perform tests from permanent source.

C. Damage caused due to omission of this test shall be corrected at Contractor's expense.

3.4 THERMOGRAPHIC SURVEY:

A. Thermographic survey shall be performed with equipment utilizing long wave technology that provides photo record of deficient areas.

B. Equipment to be inspected shall include all current-carrying devices installed under this contract, generally, all new high and low voltage cable terminations and splices. Specific equipment to be surveyed includes the following.

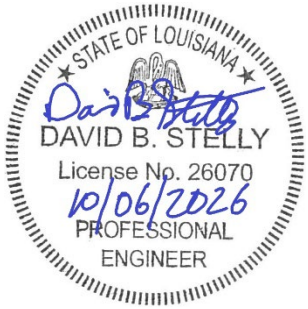
1. Panelboards
2. TVSS Units
3. Safety Switches (fused and non-fused)

C. Inspect physical, electrical and mechanical condition. Remove all necessary covers prior to thermographic inspection.

D. Provide report including the following:

1. Discrepancies.
2. Temperature difference between the area of concern and the reference area.
3. Cause of temperature difference.
4. Areas inspected. Identify inaccessible and/or unobservable areas and/or equipment.
5. Identify load conditions at time of inspection.
6. Provide photographic thermograms of all equipment (non-deficient and deficient areas). Provide corresponding digital photograph (non-thermal image) of electrical equipment scanned.
7. Inspect distribution systems with imaging equipment capable of detecting a minimum temperature difference of 1 degree C at 30 degrees C.
8. Equipment shall detect emitted radiation and convert detected radiation to visual signal.
9. Thermographic surveys should be performed during periods of maximum possible loading but not less than 40 percent of rated load of the electrical equipment being inspected. Refer to NFPA 70B-1994, Section 18-16 (Infrared Inspection).
10. Temperature differences for 1 degree C to 3 degrees C indicate possible deficiency and warrant investigation.
11. Temperature differences of 4 degrees C to 15 degrees C indicated deficiency; repair as time permits.
12. Temperature differences of 16 degrees C and above indicate major deficiency; repair immediately.

END OF SECTION 26 05 71



SECTION 26 05 72 - OVERCURRENT PROTECTIVE DEVICE SHORT-CIRCUIT STUDY

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 a computer-based, fault-current study to determine the minimum interrupting capacity of circuit protective devices.

1.3 DEFINITIONS

A. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

B. One-Line Diagram: A diagram which shows, by means of single lines and graphic symbols, the course of an electric circuit or system of circuits and the component devices or parts used therein.

C. Protective Device: A device that senses when an abnormal current flow exists and then removes the affected portion from the system.

D. SCCR: Short-circuit current rating.

E. Service: The conductors and equipment for delivering electric energy from the serving utility to the wiring system of the premises served.

1.4 ACTION SUBMITTALS

A. Product Data: For computer software program to be used for studies.

B. Other Action Submittals: Submit the following after the approval of system protective devices submittals. Submittals shall be in digital form.

1. Short-circuit study input data, including completed computer program input data sheets.
2. Short-circuit study and equipment evaluation report; signed, dated, and sealed by a qualified professional engineer.
    a. Submit study report for action prior to receiving final approval of the distribution equipment submittals. If formal completion of studies will cause delay in equipment manufacturing, obtain approval from Architect for preliminary submittal of sufficient study data to ensure

that the selection of devices and associated characteristics is satisfactory.

b. Revised single-line diagram, reflecting field investigation results and results of short-circuit study.

C. At the conclusion of the project, contractor shall have the specified studies updated to reflect "As-Installed" conditions and submit the revised studies as part of the O&M manuals. This includes final documented utility information with available primary side fault current and photo of transformer nameplate, the electronic software data files, PDF of the study and PDF's of the appropriate labels.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Short-Circuit Study Specialist and Field Adjusting Agency.

B. Product Certificates: For short-circuit study software, certifying compliance with IEEE 399.

1.6 QUALITY ASSURANCE

A. Studies shall use computer programs that are distributed nationally and are in wide use. Software algorithms shall comply with requirements of standards and guides specified in this Section. Manual calculations are unacceptable.

B. Short-Circuit Study Software Developer Qualifications: An entity that owns and markets computer software used for studies, having performed successful studies of similar magnitude on electrical distribution systems using similar devices.

1. The computer program shall be developed under the charge of a licensed professional engineer who holds IEEE Computer Society's Certified Software Development Professional certification.

C. Short-Circuit Study Specialist Qualifications: Professional engineer in charge of performing the study and documenting recommendations, licensed in the state where Project is located. All elements of the study shall be performed under the direct supervision and control of this professional engineer.

D. Field Adjusting Agency Qualifications: An independent agency, with the experience and capability to adjust overcurrent devices and to conduct the testing indicated, that is a member company of the International Electrical Testing Association or is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.

PART 2 - PRODUCTS

2.1 COMPUTER SOFTWARE

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. SKM Systems Analysis, Inc.
2. ETAP

B. Comply with IEEE 399 and IEEE 551.

C. Analytical features of fault-current-study computer software program shall have the capability to calculate "mandatory," "very desirable," and "desirable" features as listed in IEEE 399.

D. Computer software program shall be capable of plotting and diagramming time-current-characteristic curves as part of its output.

2.2 SHORT-CIRCUIT STUDY REPORT CONTENTS

A. Executive summary.

B. Study descriptions, purpose, basis, and scope. Include case descriptions, definition of terms, and guide for interpretation of the computer printout.

C. One-line diagram, showing the following:

1. Protective device designations and ampere ratings.
2. Cable size and lengths.
3. Transformer kilovolt ampere (kVA) and voltage ratings.
4. Motor and generator designations and kVA ratings.
5. Switchgear, switchboard, motor-control center, and panelboard designations.

D. Comments and recommendations for system improvements, where needed.

E. Protective Device Evaluation:

1. Evaluate equipment and protective devices and compare to short-circuit ratings.
2. Tabulations of circuit breaker, fuse, and other protective device ratings versus calculated short-circuit duties.
3. For 600-V overcurrent protective devices, ensure that interrupting ratings are equal to or higher than calculated 1/2-cycle symmetrical fault current.
4. For devices and equipment rated for asymmetrical fault current, apply multiplication factors listed in the standards to 1/2-cycle symmetrical fault current.
5. Verify adequacy of phase conductors at maximum three-phase bolted fault currents; verify adequacy of equipment grounding conductors and grounding electrode conductors at maximum ground-fault currents. Ensure that short-circuit withstand ratings are equal to or higher than calculated 1/2-cycle symmetrical fault current.

F. Short-Circuit Study Input Data: As described in "Power System Data" Article in the Evaluations.

G. Short-Circuit Study Output:

1. Low-Voltage Fault Report: Three-phase and unbalanced fault calculations, showing the following for each overcurrent device location:
   a. Voltage.
   b. Calculated fault-current magnitude and angle.
   c. Fault-point X/R ratio.
   d. Equivalent impedance.
2. Momentary Duty Report: Three-phase and unbalanced fault calculations, showing the following for each overcurrent device location:
   a. Voltage.
   b. Calculated symmetrical fault-current magnitude and angle.
   c. Fault-point X/R ratio.
   d. Calculated asymmetrical fault currents:
      i. Based on fault-point X/R ratio.
      ii. Based on calculated symmetrical value multiplied by 1.6.
      iii. Based on calculated symmetrical value multiplied by 2.7.
3. Interrupting Duty Report: Three-phase and unbalanced fault calculations, showing the following for each overcurrent device location:
   a. Voltage.
   b. Calculated symmetrical fault-current magnitude and angle.
   c. Fault-point X/R ratio.
   d. No AC Decrement (NACD) ratio.
   e. Equivalent impedance.
   f. Multiplying factors for 2-, 3-, 5-, and 8-cycle circuit breakers rated on a symmetrical basis.
   g. Multiplying factors for 2-, 3-, 5-, and 8-cycle circuit breakers rated on a total basis.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Obtain all data necessary for the conduct of the study.

1. Verify completeness of data supplied on the one-line diagram. Call any discrepancies to the attention of Engineer.
2. For equipment provided that is Work of this Project, use characteristics submitted under the provisions of action submittals and information submittals for this Project.
3. For relocated equipment and that which is existing to remain, obtain required electrical distribution system data by field investigation and surveys, conducted by qualified technicians and engineers. The qualifications of technicians and engineers shall be qualified as defined by NFPA 70E

B. Gather and tabulate the following input data to support the short-circuit study. Comply with recommendations in IEEE 551 as to the amount of detail that is required to be acquired in the field. Field data gathering shall be under the direct supervision and control of the engineer in charge of performing the study and shall be by the engineer or its representative who holds NETA ETT Level III certification or NICET Electrical Power Testing Level III certification.

1. Product Data for Project's overcurrent protective devices involved in overcurrent protective device coordination studies. Use equipment designation tags that are consistent with electrical distribution system diagrams, overcurrent protective device submittals, input and output data, and recommended device settings.
2. Obtain electrical power utility impedance at the service.
3. Obtain electrical power utility fault current contribution at point of connection utilizing calculated values. “Infinite bus” primary shall not be utilized as basis of the study.
4. Documentation of power utility data shall be included in the report.
5. Power sources and ties.
6. For transformers, include kVA, primary and secondary voltages, connection type, impedance, X/R ratio, taps measured in percent, and phase shift.
7. For reactors, provide manufacturer and model designation, voltage rating, and impedance.
8. For circuit breakers and fuses, provide manufacturer and model designation. List type of breaker, type of trip, SCCR, current rating, and breaker settings.
9. Generator short-circuit current contribution data, including short-circuit reactance, rated kVA, rated voltage, and X/R ratio.
10. Busway manufacturer and model designation, current rating, impedance, lengths, and conductor material.
11. Motor horsepower and NEMA MG 1 code letter designation.
12. Cable sizes, lengths, number, conductor material and conduit material (magnetic or nonmagnetic).

3.2 SHORT-CIRCUIT STUDY

A. Perform study following the general study procedures contained in IEEE 399.

B. Calculate short-circuit currents according to IEEE 551.

C. Base study on the device characteristics supplied by device manufacturer.

D. The extent of the electrical power system to be studied is indicated on Drawings.

E. Begin short-circuit current analysis at the service, extending down to the system overcurrent protective devices as follows:

1. To normal system low-voltage load buses where fault current is 10 kA or less.

F. Study electrical distribution system from normal and alternate power sources throughout electrical distribution system for Project. Study all cases of system-switching configurations and alternate operations that could result in maximum fault conditions.

G. The calculations shall include the ac fault-current decay from induction motors, synchronous motors, and asynchronous generators and shall apply to low- and medium-voltage, three-phase ac systems. The calculations shall also account for the

fault-current dc decrement, to address the asymmetrical requirements of the interrupting equipment.

1. For grounded systems, provide a bolted line-to-ground fault-current study for areas as defined for the three-phase bolted fault short-circuit study.

H. Calculate short-circuit momentary and interrupting duties for a three-phase bolted fault at each of the following:

1. Electric utility's supply termination point.
2. Incoming switchgear.
3. Unit substation primary and secondary terminals.
4. Low-voltage switchgear.
5. Motor-control centers.
6. Control panels.
7. Standby generators and automatic transfer switches.
8. Branch circuit panelboards.
9. Disconnect switches.

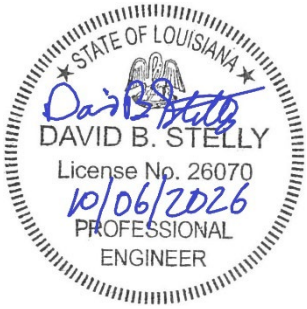
3.3 ADJUSTING

A. Make minor modifications to equipment as required to accomplish compliance with short-circuit study.

3.4 DEMONSTRATION

A. Train Owner's operating and maintenance personnel in the use of study results.

END OF SECTION 26 05 72



SECTION 26 05 74 - OVERCURRENT PROTECTIVE DEVICE ARC-FLASH STUDY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes a computer-based, arc-flash study to determine the arc-flash hazard distance and the incident energy to which personnel could be exposed during work on or near electrical equipment.

1.3 DEFINITIONS

A. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

B. One-Line Diagram: A diagram which shows, by means of single lines and graphic symbols, the course of an electric circuit or system of circuits and the component devices or parts used therein.

C. Protective Device: A device that senses when an abnormal current flow exists and then removes the affected portion from the system.

D. SCCR: Short-circuit current rating.

E. Service: The conductors and equipment for delivering electric energy from the serving utility to the wiring system of the premises served.

1.4 ACTION SUBMITTALS

A. Product Data: For computer software program to be used for studies.

B. Other Action Submittals: Submit the following submittals after the approval of system protective devices submittals. Submittals shall be in digital form.

1. Arc-flash study input data, including completed computer program input data sheets.
2. Arc-flash study report; signed, dated, and sealed by a qualified professional engineer.
    a. Submit study report for action prior to receiving final approval of the distribution equipment submittals. If formal completion of studies will cause delay in equipment manufacturing, obtain approval from

Architect for preliminary submittal of sufficient study data to ensure that the selection of devices and associated characteristics is satisfactory.

C. At the conclusion of the project, contractor shall have the specified studies updated to reflect “As-Installed” conditions and submit the revised studies as part of the O&M manuals. This includes final documented utility information with available primary side fault current and photo of transformer nameplate, the electronic software data files, PDF of the study and PDF’s of the appropriate labels.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Arc-Flash Study Specialist and Field Adjusting Agency.

B. Product Certificates: For arc-flash hazard analysis software, certifying compliance with IEEE 1584 and NFPA 70E.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance procedures according to requirements in NFPA 70E shall be provided in the equipment manuals.

B. Operation and Maintenance Procedures: In addition to items specified in Section 017823 "Operation and Maintenance Data," provide maintenance procedures for use by Owner's personnel that comply with requirements in NFPA 70E.

1.7 QUALITY ASSURANCE

A. Studies shall use computer programs that are distributed nationally and are in wide use. Software algorithms shall comply with requirements of standards and guides specified in this Section. Manual calculations are unacceptable.

B. Arc-Flash Study Software Developer Qualifications: An entity that owns and markets computer software used for studies, having performed successful studies of similar magnitude on electrical distribution systems using similar devices.

1. The computer program shall be developed under the charge of a licensed professional engineer who holds IEEE Computer Society's Certified Software Development Professional certification.

C. Arc-Flash Study Specialist Qualifications: Professional engineer in charge of performing the study, analyzing the arc flash, and documenting recommendations, licensed in the state where Project is located. All elements of the study shall be performed under the direct supervision and control of this professional engineer.

D. Field Adjusting Agency Qualifications: An independent agency, with the experience and capability to adjust overcurrent devices and to conduct the testing indicated, that is a member company of the International Electrical Testing Association or is a

nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.

PART 2 - PRODUCTS

2.1 COMPUTER SOFTWARE DEVELOPERS

A. Software Developers:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
   a. SKM Systems Analysis, Inc.
   b. ETAP

B. Comply with IEEE 1584 and NFPA 70E.

C. Analytical features of device coordination study computer software program shall have the capability to calculate "mandatory," "very desirable," and "desirable" features as listed in IEEE 399.

2.2 ARC-FLASH STUDY REPORT CONTENT

A. Executive summary.

B. Study descriptions, purpose, basis and scope.

C. One-line diagram, showing the following:

1. Protective device designations and ampere ratings.
2. Cable size and lengths.
3. Transformer kilovolt ampere (kVA) and voltage ratings.
4. Motor and generator designations and kVA ratings.
5. Switchgear, switchboard, motor-control center and panelboard designations.

D. Study Input Data: As described in "Power System Data" Article.

E. Short-Circuit Study Output: As specified in "Short Circuit Study Output" Paragraph in "Short-Circuit Study Report Contents" Article in Section 260572 "Overcurrent Protective Device Short-Circuit Study."

F. Protective Device Coordination Study Report Contents: As specified in "Protective Device Coordination Study Report Contents" Article in Section 260573 "Overcurrent Protective Device Coordination Study."

G. Arc-Flash Study Output:

1. Interrupting Duty Report: Three-phase and unbalanced fault calculations, showing the following for each overcurrent device location:
   a. Voltage.

b. Calculated symmetrical fault-current magnitude and angle.
c. Fault-point X/R ratio.
d. No AC Decrement (NACD) ratio.
e. Equivalent impedance.
f. Multiplying factors for 2-, 3-, 5-, and 8-cycle circuit breakers rated on a symmetrical basis.
g. Multiplying factors for 2-, 3-, 5-, and 8-cycle circuit breakers rated on a total basis

H. Incident Energy and Flash Protection Boundary Calculations:

1. Arcing fault magnitude with and without required Arc Energy Reduction methods.
2. Protective device clearing time.
3. Duration of arc.
4. Arc-flash boundary.
5. Working distance.
6. Incident energy.
7. Hazard risk category.
8. Recommendations for arc-flash energy reduction.

I. Fault study input data, case descriptions, and fault-current calculations including a definition of terms and guide for interpretation of the computer printout.

2.3 ARC-FLASH WARNING LABELS

A. Comply with requirements in Section 260553 "Identification for Electrical Systems." Produce a 3.5-by-5-inch thermal transfer label of high-adhesion polyester for each work location included in the analysis.

B. The label shall have an orange header with the wording, "WARNING, ARC-FLASH HAZARD," and shall include the following information taken directly from the arc-flash hazard analysis:

1. Location designation.
2. Nominal voltage.
3. Flash protection boundary.
4. Hazard risk category.
5. Incident energy.
6. Working distance.
7. Engineering report number, revision number, and issue date.

C. Labels shall be machine printed, with no field-applied markings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine Project overcurrent protective device submittals. Proceed with arc-flash study only after relevant equipment submittals have been assembled. Overcurrent protective devices that have not been submitted and approved prior to arc-flash study may not be used in study.

3.2 ARC-FLASH HAZARD ANALYSIS

A. Comply with NFPA 70E and its Annex D for hazard analysis study.

B. Preparatory Studies:

1. Protective Device Coordination Study Report Contents: As specified in "Protective Device Coordination Study Report Contents" Article in Section 260573 "Overcurrent Protective Device Coordination Study."

C. Calculate maximum and minimum contributions of fault-current size.

1. The minimum calculation shall assume that the utility contribution is at a minimum and shall assume no motor load.
2. The maximum calculation shall assume a maximum contribution from the utility and shall assume motors to be operating under full-load conditions.

D. Calculate the arc-flash protection boundary and incident energy at locations in the electrical distribution system where personnel could perform work on energized parts.

E. Safe working distances shall be specified for calculated fault locations based on the calculated arc-flash boundary, considering incident energy of 1.2 cal/sq.cm.

F. Incident energy calculations shall consider the accumulation of energy over time when performing arc-flash calculations on buses with multiple sources. Iterative calculations shall take into account the changing current contributions, as the sources are interrupted or decremented with time. Fault contribution from motors and generators shall be decremented as follows:

1. Fault contribution from induction motors should not be considered beyond three to five cycles.
2. Fault contribution from synchronous motors and generators should be decayed to match the actual decrement of each as closely as possible (e.g., contributions from permanent magnet generators will typically decay from 10 per unit to three per unit after 10 cycles).

G. Arc-flash computation shall include both line and load side of a circuit breaker as follows:

1. When the circuit breaker is in a separate enclosure.
2. When the line terminals of the circuit breaker are separate from the work location.

H. Base arc-flash calculations on actual overcurrent protective device clearing time. Cap maximum clearing time at two seconds based on IEEE 1584, Section B.1.2.

3.3 POWER SYSTEM DATA

A. Obtain all data necessary for the conduct of the arc-flash hazard analysis.

1. Verify completeness of data supplied on the one-line diagram on Drawings and under "Preparatory Studies" Paragraph in "Arc-Flash Hazard Analysis" Article. Call discrepancies to the attention of Engineer.
2. For new equipment, use characteristics submitted under the provisions of action submittals and information submittals for this Project.
3. For existing equipment, whether or not relocated, obtain required electrical distribution system data by field investigation and surveys, conducted by qualified technicians and engineers.

B. Electrical Survey Data: Gather and tabulate the following input data to support study. Comply with recommendations in IEEE 1584 and NFPA 70E as to the amount of detail that is required to be acquired in the field. Field data gathering shall be under the direct supervision and control of the engineer in charge of performing the study and shall be by the engineer or its representative who holds NETA ETT Level III certification or NICET Electrical Power Testing Level III certification.

1. Product Data for overcurrent protective devices specified in other Sections and involved in overcurrent protective device coordination studies. Use equipment designation tags that are consistent with electrical distribution system diagrams, overcurrent protective device submittals, input and output data, and recommended device settings.
2. Obtain electrical power utility impedance at the service.
3. Obtain electrical power utility fault current contribution utilizing calculated values. “Infinite bus” primary shall not be utilized as basis of the study.
4. Documentation of power utility data shall be included in the report.
5. Power sources and ties.
6. Short-circuit current at each system bus, three phase and line-to-ground.
7. Full-load current of all loads.
8. Voltage level at each bus.
9. For transformers, include kVA, primary and secondary voltages, connection type, impedance, X/R ratio, taps measured in per cent, and phase shift.
10. For reactors, provide manufacturer and model designation, voltage rating and impedance.
11. For circuit breakers and fuses, provide manufacturer and model designation. List type of breaker, type of trip and available range of settings, SCCR, current rating, and breaker settings.
12. Generator short-circuit current contribution data, including short-circuit reactance, rated kVA, rated voltage, and X/R ratio.
13. For relays, provide manufacturer and model designation, current transformer ratios, potential transformer ratios, and relay settings.
14. Busway manufacturer and model designation, current rating, impedance, lengths, and conductor material.

15. Motor horsepower and NEMA MG 1 code letter designation.
16. Low-voltage cable sizes, lengths, number, conductor material and conduit material (magnetic or nonmagnetic).
17. Medium-voltage cable sizes, lengths, conductor material, and cable construction and metallic shield performance parameters.

3.4 LABELING

A. Apply one arc-flash label for 600-V ac, 480-V ac, and applicable 208-V ac panelboards and disconnects and for each of the following locations:

1. Motor-control center.
2. Low-voltage switchboard.
3. Switchgear.
4. Medium-voltage switch.
5. Control panel.

3.5 APPLICATION OF WARNING LABELS

A. Install the arc-fault warning labels under the direct supervision and control of the Arc-Flash Study Specialist.

3.6 DEMONSTRATION

A. Engage the Arc-Flash Study Specialist to train Owner's maintenance personnel in the potential arc-flash hazards associated with working on energized equipment and the significance of the arc-flash warning labels.

END OF SECTION 26 05 74



SECTION 26 09 23 - OCCUPANCY SENSORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The general provisions of the Contract, including the Conditions of the Contract (General, Supplementary, and other Conditions) as appropriate, apply to the Work specified in this Section.

B. Refer to all other Electrical specification sections, as well as the Specifications for the other various trades and materials and be thoroughly familiar with all provisions regarding electrical work.

1.2 GENERAL

A. Contractor shall provide and install motion sensors in accordance with the plans and specifications herein. System shall be installed to provide detection system coverage of the entire space the sensors are located in. It is understood that due to some manufacturer's devices providing different coverage patterns, the plans represent a generic system. Contractors shall evaluate each space individually and shall at no additional costs to the owner, provide additional detection sensors where required to provide a complete coverage pattern and shall also adjust installation locations to retain the coverage while reducing false triggers of the sensors.

PART 2 - PRODUCTS

2.1 WALL MOUNTED SENSORS

A. For single-pole/single switch applications wall mounted motion sensors shall be IR-TecLDS700S, Watt Stopper No.: DSW-100, Lutron MS-A102, Greengate ONW-D-1001-MV, Leviton ODS10, Acuity Controls (Sensor Switch) WSX-PDT.

B. For two-pole/dual switch applications, wall mounted motion sensors shall be IR-TecLDT700S or Watt Stopper No.: DSW-200, Greengate ONW-D-1001-DMV, Leviton ODSOD, Acuity Controls (Sensor Switch) WSX-PDT-2P.

C. Color of sensor shall be selected by Architect/Engineer during shop drawing submittal.

2.2 CEILING MOUNTED SENSORS

A. Ceiling mounted motion sensors shall be IR-Tec-BDS-600S, Watt Stopper No. DT-305, Lutron LOS-CDT-2000-WH, Greengate OAC-DT-2000, Sensor Switch CM-PDT-9 (or 10 depending upon coverage required for space) or approved equivalent.

B. All relays, contactors, and power packs required to provide a fully operational system shall be provided and installed at no additional cost to the owner.

C. Install device using properly sized device box recessed in ceiling. Utilize MC-cable to run all conductors. Install power pack in properly rated junction box.

D. Color of sensor shall be selected by Architect/Engineer during shop drawing submittal.

2.3 POWER/SWITCH PACKS

A. Power packs shall employ zero crossing circuit to limit inrush current. Contacts shall be dry-type (Isolated) twenty-ampere (20A). Leads shall be Class 2 Teflon insulated for use in plenums. Power pack shall be rated for both 120 volt and 277-volt operation.

B. Install device using properly sized device box recessed in ceiling. Utilize flexible conduit to run all control voltage conductors. Install power pack in properly rated junction box.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Should a particular manufacturer's product require that additional sensors and associated wiring and accessories be provided to allow full and complete coverage of the space, the additional sensors and associated wiring and accessories shall be provided at no additional cost to the owner.

B. Installation of motion sensor shall be such that motion is detected as soon as a person enters the particular room and with the sensor being a minimum of four feet (4') from any HVAC diffuser/register.

C. All sensors shall be installed on the line side of all toggle switches so that power is maintained to the sensor at all times.

D. Prior to requesting substantial completion, contractor shall coordinate with the owner to determine the length of time the sensors shall keep the lighting illuminated after the room if vacated and shall program sensors accordingly. Time shall be adjustable from a minimum of 5 minutes to a maximum of 30 minutes. Contractor shall provide a minimum of one additional setting adjustment per sensor installed for the duration of the one-year warranty period.

3.2 SUBMITTALS

A. Prior to installation, contractor shall submit a proposed layout in shop drawings indicating all sensor and power pack locations. The sensor Contractor shall be responsible for such layout.

B. At time of substantial completion, contractor shall submit how each and every sensor is programmed including but not limited to trigger on technology, maintain on technology, time delay to off.

3.3 MISCELLANEOUS ITEMS

A. Contractor shall be responsible for providing all relays, contactors, power packs, etc. to provide a complete motion detecting lighting switching circuit.

END OF SECTION 26 09 23



SECTION 26 27 13 - ELECTRICAL DISTRIBUTION SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The general provisions of the Contract, including the Conditions of the Contract (General, Supplementary, and other Conditions); as appropriate, apply to the work specified in this section.

B. Refer to all Electrical specification sections, as well as the plans and specifications for the other various trades and materials and be thoroughly familiar with all provisions regarding electrical work.

1.2 ELECTRIC SERVICE

A. Contractor shall modify existing normal 208 volt 3 phase 4 wire electrical system(s) at the facility as specified herein and noted on the drawings. This Contractor shall be responsible for the coordination of all electrical work with the local utility company. Contractor shall be responsible for determining the proper breakers and connectors to tie into the existing electrical systems. Short circuit current interrupting rating of new breakers shall match rating of existing breakers. Contractor shall be responsible for examining the panelboards to be tied into, building structure, and site, and shall include in his bid all materials and time (regular pay and overtime pay) to install the new feeders avoiding conflicts with existing equipment to remain.

1.3 GENERAL

A. All electrical gear furnished as part of this project, panelboards, switchboards, motor control centers, dry-type transformers, safety switches, etc. shall be of the same manufacturer unless specified otherwise. Electrical equipment manufactured by a subsidiary or parent company of manufacturer that is prior approved is not itself prior approved unless its own manufacturer's name specifically is listed as being prior approved.

1.4 ARC-FLASH; COORDINATION AND FAULT CURRENT STUDIES

A. As part of the electrical gear shop drawings, the contractor shall perform and submit complete arc–flash, coordination and fault current studies, including phase-to-phase and ground faults for coordinating all elements of the distribution system. These three studies shall be performed and furnished by the successful electrical gear manufacturer. Contractor shall refer to these specification sections for specific study requirements: These studies shall be submitted simultaneously with the gear submittal, or the gear submittal will be returned un-reviewed.

1. Overcurrent Protective Device Short-Circuit Study (Cannot be VE'd from project)
2. Overcurrent Protective Device Arc-Flash Study (Cannot be VE'd from project)

B. Provide all arc-flash safety and short circuit current stickers on all panels, switchboards, safety switches, motor control center, etc. as required/specified. Refer to details for additional requirements. Proposed stickers for each individual piece of gear shall be submitted for review as part of shop drawings.

C. Provide and install a fully coordinated electrical distribution system as directed by the Overcurrent Protective Device Coordination Study at no additional costs to the Owner.

D. In addition, this study shall indicate all required settings for adjustable circuit breakers and motor circuit protectors. These settings include instantaneous, short time, long time, ground fault trip characteristics and all-time based pick-up, drop-out and re-close parameters.

E. The contractor shall provide all breakers, trip plugs, solid state breakers, etc. to provide a fully coordinated electrical system as identified in the coordination study. This shall be accomplished as part of the Base Bid and all alternates at no additional costs to the owner and/or design team.

F. Refer to individual specification sections of each specified study for additional requirements.

G. Electrical gear submittals will not be reviewed until all device studies specified are performed, submitted and approved.

H. At the conclusion of the project, contractor shall have the specified studies updated to reflect “As-Installed” conditions and submit the revised studies as part of the O&M manuals. This includes the electronic software data files, PDF of the study and PDFs of the appropriate labels.

1.5 SERIES RATING OF EQUIPMENT

A. Where it is indicated that electrical gear is series rated to accomplish a particular fault current interrupting rating, this series rated electrical gear shall be properly identified as such. Equipment shall be labeled with a plastic tag, orange background with white 1/4" embossed characters, thereon identifying the panelboard as being series rated. Tag shall indicate the individual equipment’s name/use, individual interrupting rating and the combined series rating of the equipment such as:

1. Panel Name
2. Interrupting Rating: _____ Amps
3. Series Rating: _____ Amps

B. The tags shall be fixed to the interior of the panelboard door with a suitable adhesive.

C. The electrical gear provided and installed as part of this project shall not be series rated.

PART 2 - PRODUCTS

2.1 PANELBOARDS

A. Panelboards shall be circuit breaker type using quick-make, quick-break, trip free, thermal magnetic trip indicating, bolt-on circuit breakers. Two and three pole branches and mains shall be common trip. Panelboards shall be dead front safety type with main breaker or main lugs, and number and size of branches as shown on the drawings. Panelboards shall have single, feed through, or double lugs, to accommodate feeder conductors as shown on the drawings, and shall have neutral and ground bus for termination of conductors. Bussing shall be copper.

B. Doors shall be fitted with flush cylinder locks, keys to which shall all on project be alike. Two (2) keys shall be furnished for each lock. Cabinet fronts shall be finished as directed by the Architect/Engineer. Cabinet fronts shall not be removable with door in the locked position. Provide for each panel a directory frame with waterproof transparent plastic window on inside of door and place therein a typewritten identification of all circuits.

C. Directories shall be made only after permanent room numbers have been assigned. Room numbers shown on the construction drawings shall not be used for making directories. Each circuit shall be clearly identified as to use and location (ex: Receptacles Rooms 201, 202 or Lighting Rooms 207, 209, 211, and 213).

D. Cabinets shall be galvanized steel not less than twenty inches (20") in width. Gutters shall not be smaller than minimum dimensions required by the National Electrical Code.

E. Double section panelboards shall be comprised of cabinets of equal dimensions.

F. All panels rated NEMA 1, shall be of the door-in-door type construction providing tool-less access to interior of the panelboard(s).

G. Panelboards shall be as shown in the schedules and shall be completely factory assembled. Do not purchase panelboards or cabinets until shop drawings have been approved. Approved manufacturers include:

1. General Electric
2. Square D
3. Eaton-Cutler Hammer
4. Siemens
5. Approved Equivalent

H. Minimum short circuit current interrupting ratings for circuit breakers shall be 10,000 amps. Where a specific interrupting rating is shown on the drawings, in the panel schedules, or as required by the coordination and fault current study, panelboards and associated circuit breakers shall be rated for that value as a minimum at no additional cost to the owner.

I. In branch circuit panelboards having two (2) vertical columns of devices, circuit numbers shall be such that, starting at the top, odd numbers shall be used in sequence down the left-hand side. See Schedule of Panelboards on drawings for circuit device sizes and number of poles.

J. Construction of panelboards shall be such that, where applicable, any three (3) adjacent single-pole devices are individually connected to each of the three different phases in such a manner that 2 or 3 pole devices, when available, can be installed at any location.

K. UL Listing: Panelboards shall be listed by UL and bear the UL label.

L. Interior panelboards shall be NEMA 1 unless noted otherwise. All exterior panelboards shall be rated NEMA 3R.

2.2 LABELS

A. All switchboards, panelboards, starters, VFD's, contactors, transformers, safety switches and fused safety switches installed by this contractor shall have laminated phenolic tags with 1/4" characters embossed thereon identifying the equipment by name, voltage, ampacity, phase and number of current carrying conductors such as:

Panel Name
120/208 V - 400A
3 Phase - 4 Wire
Fed From Panel: _____, Circuit _____
Fused @ _____**

The tags shall be fixed to the center of the equipment cover/door with a suitable heavy duty industrial grade adhesive.

**Note – For fused safety switches, label shall include fuse sizes contained therein.

B. Color Coding of labels shall be as follows:

Normal Power White Background with Black Letters

2.3 LIGHTING CONTACTORS

A. The Contractor shall furnish and install lighting contactors where shown on the drawings except those contactors shown mounted in branch circuit panelboards shall be factory mounted by panelboard manufacturer. Contactors shall be suitable for use at voltage rating of circuits controlled and shall have the number of poles and ampere rating shown on the drawings as a minimum.

B. The contactor amp rating shall be continuous per pole for all types of ballast and tungsten lighting, resistance and motor loads. The contactor shall have totally enclosed, double-break silver-cadmium-oxide power contacts. Auxiliary arcing contacts are not acceptable. Contact inspection and replacement shall be possible

without disturbing line or load wiring. The contactor shall have straight-through wiring with all terminals clearly marked. The contactor shall be approved per UL508 and/or CSA and be designed in accordance with NEMA ICS2-211B. They shall be industrial-duty rated for applications to 600 volts maximum. The contactor shall have the following:

1. Control-circuit fuse holder, with one (1) fuse.
2. 0.2-60 second TDE (Time Delay Energize) and TDD (Time Delay De-energize) timer attachments.

C. The contactor shall have a NEMA Type 1 enclosure and shall be the mechanically held type.

D. Coil-clearing contacts shall be supplied so that the contactor coils shall be energized only during the instance of operation. Both latch and unlatch coils shall be encapsulated.

2.4 SAFETY SWITCHES

A. Furnish and install safety switches at locations and in capacities shown on the drawings, as hereinafter specified and/or as required by the latest edition of the National Electrical Code.

B. Safety switches shall be rated heavy duty and fusible.

C. Safety switches exposed to the weather shall be rated NEMA 3R.

D. Safety switches shall be of the solid neutral type where required by circuit or feeder specified.

E. Safety switch covers shall be internally mechanically held closed when in the ON position and shall be allowed to open in the OFF position. The switch shall come equipped with provisions to allow the switch to be padlocked in the off position.

F. Galvanized angle or other suitable supports shall be provided for switches that cannot be mounted on walls or other rigid surfaces. Switches shall not be supported by conduit alone and shall not be mounted on HVAC or other equipment unless specifically approved by the Architect/Engineer. Verify mounting heights for all exterior locations with Architect/Engineer prior to rough-in.

G. Fuses shall be installed so that fuse rating and type are clearly and easily readable from the front of the disconnect.

H. Safety switches shall be General Electric, Square "D", Eaton Electrical, Siemens or approved equivalent.

2.5 FUSES

A. Unless otherwise noted or specified, all fuse holders shall be equipped with dual-element, time-lag, and current limiting fuses. Provide one (1) spare set of fuses for each size initially installed, with a minimum of three (3) fuses of each size. Spare fuses shall be turned over to the Owner's maintenance supervisor prior to requesting substantial completion inspection.

B. Fuses shall be Gould, Bussman, or approved equivalent.

PART 3 - EXECUTION

3.1 MANUFACTURER'S DIRECTION

A. All electrical gear shall be installed in accordance with the manufacturer's directions. Contractor shall review these directions prior to rough-in. Should any discrepancies exist between the contract documents and the manufacturer's direction, contractor shall advise the engineer in writing.

B. All electrical terminations shall be properly tightened to manufacturer's specifications. Where manufacturer's specifications are not available, contractor shall refer to the NEC and adjust tightness valves (torque) to the NEC published values.

C. Install all safety switches, breakers, disconnects, etc., in accordance with manufacturer's directions and maintain all required NEC clearances. Coordinate exact locations in field with applicable contractors.

END OF SECTION 26 27 13



SECTION 26 43 13 - SURGE PROTECTION FOR LOW-VOLTAGE ELECTRICAL POWER CIRCUITS

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 SPDs for low-voltage (120 to 600 V) power distribution and control equipment.

1.3 DEFINITIONS

A. I-nominal: 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. VPR: Voltage protection rating.

1.4 ACTION SUBMITTALS

A. 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, I nominal ratings, MCOVs, type designations, OCPD requirements, model numbers, system voltages, and modes of protection.

3. Copies of test reports from a recognized independent testing laboratory, capable of producing 200kA surge current waveforms, verifying the suppressor can survive published surge current rating on a per mode basis using the ANSI/IEEE C62.41 impulse waveform C3 (8 x 20 microsecond, 20kV/10kA). Test data on an individual module is not acceptable. In house testing will not be accepted.
4. Copy of warranty statement clearly establishing the terms and conditions to the building/facility owner/operator.

1.5 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

B. Sample Warranty: For manufacturer's special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For SPDs to include in maintenance manuals.

1.7 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to replace or replace SPDs that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Fifteen (15) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 GENERAL SPD REQUIREMENTS

A. SPD with Accessories: Listed and labeled as defined in 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. MCOV shall be a tested value per section 37.7.3 of UL1449 4th Edition.

2.2 PANEL SUPPRESSORS (Type C)

A. Basis of Design: Subject to compliance with requirements. Provide comparable product by the following:

1. Current Technology “TG3”. Equivalent by Square D SurgeLogic “EM Series”

B. SPDs: Listed as Type 1 SPD per UL1449 4th Edition

1. Include LED indicator lights for power and protection status.
2. Internal thermal protection that disconnects the SPD before damaging internal suppressor components.
3. Include Form-C contacts rated at 2 to 5 A and 24- V ac to 250-V ac, one normally open and one normally closed, for remote monitoring of protection status.

C. Peak Surge Current Rating: The minimum single-pulse surge current withstand rating per mode shall not be less than 50 kA (Type C) 100kA per Phase. The peak surge current rating shall NOT be the arithmetic sum of the ratings of the individual MOVs in a given mode. SPD manufacturer shall provide independent 3rd party testing validating unit is capable of surviving a single surge at the specified rating.

D. Comply with UL 1283 with a maximum attenuation of 34dB based on 50ohm insertion loss test per MIL-STD-220B

E. Protection modes and UL 1449 VPR for grounded wye circuits with 208Y/120V, three-phase, four-wire circuits shall not exceed the following:

1. Line to Neutral: 700 V for 208Y/120 V.
2. Line to Ground: 700 V for 208Y/120 V.
3. Neutral to Ground: 700 V for 208Y/120 V.
4. Line to Line: 1200 V for 208Y/120 V.

F. SCCR: Equal or exceed 200 kA.

G. Inominal Rating: 20 kA

2.3 ENCLOSURES

A. Indoor Enclosures: NEMA 250, Type 1.

B. Outdoor Enclosures: NEMA 250, Type 3R.

2.4 CONDUCTORS AND CABLES

A. Power Wiring: SPD shall be equipped with mechanical lugs that can accept up to #2 AWG wire. Where conductors between SPD and switchgear exceed 10’ in total length, they shall be “High Performance Interconnect” (HPI) cables with Ultra Low impedance characteristics at 10kHz and above.

B. Class 2 Control Cables: Multi-conductor cable with copper conductors not smaller than No. 18 AWG, complying with Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

C. Class 1 Control Cables: Multi-conductor cable with copper conductors not smaller than No. 14 AWG, complying with Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with NECA 1.

B. Install an OCPD or disconnect as required to comply with the UL listing of the SPD.

C. 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. If installed lead length exceeds 10', SPD manufacturer shall provide a low impedance cable that improves the installed performance.

D. Use crimped connectors and splices only. Wire nuts are unacceptable.

E. Wiring:

1. Power Wiring: Comply with wiring methods in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."
2. Controls: Comply with wiring methods in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

3.2 FIELD QUALITY CONTROL

A. Contractor shall 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.

B. An SPD will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

3.3 SYSTEM TESTING

A. Upon completion of installation, provide the start-up and testing services of a factory-authorized and factory-trained local service representative. The tests shall include:

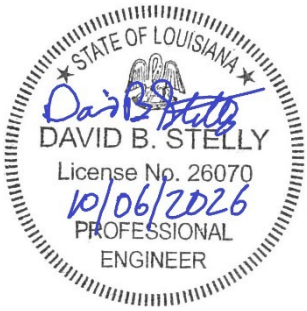
1. Off-line Testing: Impulse injection to verify the system tolerances as well as verification of proper facility neutral-to-ground bond. Compare field test results to factory benchmark test parameters supplied with each individual unit.
2. On-line Testing: Verify that suppression and filtering paths are operating with 100% protection as well as verification of proper facility neutral-to-ground bond by measuring neutral-to-ground current and voltage and by visual inspection.
3. Voltage measurements from Line-to-Ground (L-G), Line-to-Neutral (L-N), Line-to-Line (L-L), and Neutral-to-Ground (N-G), taken at the time of the testing procedure.

3.4 DOCUMENTATION AND REPORTING

A. Record results of field testing and compare to factory benchmark test parameters supplied with each individual surge protective device. Indicate that the integrity of neutral-to-ground bonds were verified through testing and visual inspection, and that grounding bonds were observed to be in place.

B. Submit to the Owner's representative and to the Architect/Engineer copies of the startup test results and the factory benchmark testing results for confirmation of proper suppression filter system function, as required by this section. Provide the number of copies as required by Division One and the Electrical General Provisions section; and three copies where not otherwise specified.

END OF SECTION 26 43 13



SECTION 26 51 00 - LIGHTING FIXTURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The general provisions of the Contract, including the Conditions of the Contract (General, Supplementary, and other Conditions) as appropriate, apply to the Work specified in this Section.

B. Refer to other Electrical specifications, as well as the Specifications for the other various trades and materials and be thoroughly familiar with all provisions regarding electrical work.

1.2 GENERAL

A. The Contractor shall furnish and install lighting fixtures and accessories as shown on the drawings and/or described herein.

B. Unless otherwise specified, lighting fixtures shall be permanently installed and connected to the wiring system.

C. The Contractor shall support each new fixture independently, from the building structure. Ceiling framing members shall not be used to support fixtures except in specific areas where ceiling supports for this purpose have been specified elsewhere in these specifications.

D. Catalog numbers scheduled on the drawings or descriptions of lighting fixtures contained herein may indicate fixture compatibility with certain types of ceiling construction. The Contractor shall determine exact type of ceilings actually to be furnished in each area and shall obtain fixtures to suit, deviating from specified catalog numbers or descriptions only where necessary, and only to the extent necessary to insure fixture-ceiling compatibility. The Contractor shall notify the Architect/Engineer in writing where such changes are to be made. Contractor shall clean all lighting fixtures of dirt and debris upon completion of project prior to requesting substantial completion inspection.

E. Incandescent fixtures for recessed locations shall have a thermal cutout and be installed in accordance with manufacturer's requirements and in accordance with NEC.

F. Unless noted otherwise on the drawings, lamps installed in each fixture shall be of the type specifically recommended by the manufacturer of the fixture for use in the fixture. Fixtures shall not be wired with or have any parts constructed using asbestos materials.

G. All requests for prior approval shall contain the following:

1. Photometric data for each fixture being submitted.

2. For all exterior lighting, point by point foot candle levels shall be submitted. (Exception: Wall packs, ground mounted flood lights, landscape lighting).
3. Listing of all deviations of fixtures proposed as compared to fixtures specified.
4. For interior lighting point by point foot-candle levels shall be submitted for typical interior spaces (offices, classrooms, corridors) and for spaces with indirect and/or specialty lighting.

PART 2 - PRODUCTS

2.1 EMERGENCY BATTERY PACKS

A. Emergency battery packs shall be provided and installed in all fixtures denoted by the letter "E" appearing at the end of the fixture type designation and where required in the light fixture schedule. Emergency battery packs shall be installed in the ballast/driver housing (not on top of the fixture) of the fixture(s) unless specifically noted otherwise on the drawings.

B. At the contractor's option, a central inverter (or multiples thereof) may be provided in the electrical room(s) to provide emergency lighting as indicated. If contractor elects to implement this option, they shall be responsible for providing the appropriate sub-feed breaker in the lighting distribution panel as well as all required sub-feed circuitry. Any and all required generator transfer devices (GTD's) shall be provided at no additional costs. All required branch emergency circuitry shall be provided as well as all branch circuit overcurrent protective devices required in the central inverter(s). As part of the lighting submittal package, fixture supplier shall provide connection diagrams indicating installation requirements for the emergency lighting system showing all switching, inverters (battery packs), GTDs, etc…. required for a complete and fully operational emergency lighting system.

C. Operation of the fixture shall be as follows:

Normal A/C Power	Switch Position	Operation of Lamps/LED's
On	On	All lamps/LED's operating
On	Off	All lamps/LED's off
Off	On	Emergency Lamps/LED'S all operating
Off	Off	Emergency Lamps/LED's all operating

D. Emergency operation of the light fixture shall provide a minimum total lamp output of 1200 lumens for a minimum time period of ninety (90) minutes.

E. Emergency battery packs shall be as manufactured by Bodine, Iota Engineering Co., or approved equivalent.

F. The Contractor shall be responsible for any additional wiring, conduit, labor, etc., to provide the emergency lighting system specified at no additional cost to the Owner. This includes running of a continuously energized conductor to each and every battery pack.

2.2 LED FIXTURES

A. Manufacturers of LED luminaires shall demonstrate a suitable testing program incorporating high heat, high humidity and thermal shock test regimens to ensure system reliability and to substantiate lifetime claims.

B. The use of IESNA LM-80 data to predict luminaire lifetime is not acceptable.

C. At time of manufacture, electrical and light technical properties shall be recorded for each luminaire. At a minimum, this should include lumen output, CCT, and CRJ. Each luminaire shall utilize a unique serial numbering scheme. Technical properties must be made available for a minimum of 5 years after the date of manufacture.

D. Luminaires shall be provided with a full, non-pro-rated, non-limited, 5-year warranty covering LEDs, drivers, paint and mechanical components.

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. The rated operating temperature range shall be 30°C to +40°C.
3. Each luminaire is capable of operating above 100°F° (37°C), but not expected to comply with photometric requirements at elevated temperatures.
4. Photometry must be compliant with IESNA LF-79 and shall be conducted at 25°C ambient temperature.
5. The individual LEDs shall be constructed such that a catastrophic loss or the failure of one LED will not result in the loss of the entire luminaire.
6. Luminaire shall be constructed such that LED modules may be replaced or repaired without replacement of whole luminaire.
7. Each luminaire shall be listed with Underwriters Laboratory, Inc. under UL 1598 for luminaires, or an equivalent standard from a nationally recognized testing laboratory.
8. Power Consumption: Maximum power consumption allowed for the luminaire shall be determined by application. The luminaire shall not consume power in the off state.
9. Operation Voltage: The luminaire shall operate from a 60 HZ ± 3HZ AC line over a voltage ranging from 108 VAC to 305 VAC. The fluctuation of line voltage shall have no visible effect on the luminous output.
10. Power Factor: The luminaire shall have a power factor of 0.90 or greater.
11. THD: Total harmonic distortion (current and voltage) induced into an AC power line by a luminaire shall not exceed 20 percent.
12. Surge Suppression: The luminaire onboard circuitry shall include fused surge protection devices (SPD) to withstand high repetition noise transients as a result of utility line switching, nearby lightning strikes, and other interference. The SPD shall protect the luminaire from damage and failure for common mode transient peak voltages up to 10 kV (minimum) and transient peak currents up to 5 kA (minimum) SPD shall conform to UL 1449 depending on the components used in the design. SPD performance shall be tested per the procedures in ANSI/IEEE C62.41-1992 (or current edition for category C

(standard). The SPD shall fail in such a way as the luminaire will no longer operate. The SPD shall be field replaceable.

13. Each luminaire shall have integral UL Listed Class II power supplies. Class I power supplies will not be acceptable.
14. Operational Performance: The LED circuitry shall prevent visible flicker to the unaided eye over the voltage range specified above.
15. RF Interference: LED drivers must meet Class A emission limits referred in Federal Communications Commission (FCC) Title 47, Subpart B, Section 15 regulations concerning the emission of electronic noise.
16. Drivers shall have a Class A sound rating.
17. Illuminance: The illuminance shall not decrease by more than 30% over the expected operating life. The measurements shall be calibrated to standard photopic calibrations.
18. Light Color Quality: The luminaire shall have a correlated color temperature (CCT) range of 3300K to 3700K (for fixtures specified at 3500K), 3800K to 4200K (for fixtures specified at 4000K) and 4800K to 5200K (for fixtures specified at 5000K). The color rendition index (CRI) shall be 80 or greater (see fixture schedule for fixtures requiring CRI's greater than 80). Binning of LEDS shall conform to ANSI/G.NEMA SSL 3-2010.
19. Backlight –Uplight-Glare: the luminaire shall not allow more than 10 percent of the rated lumens to project above 80 degrees from vertical. The luminaire shall not allow more than 2.5 percent of the rated lumens to project above 90 degrees from vertical. Backlight and Glare ratings as per fixture schedule and calculated per IESNA TM-15.
20. 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.
21. The LED manufacturer's maximum thermal pad temperature for the expected life shall not be exceeded.
22. Thermal management shall be passive by design. The use of fans or other mechanical devices shall not be allowed.
23. 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.
24. The heat sink shall be aluminum.
25. The luminaires shall be dimmable from 100 percent output to 0 percent output.
26. Driver shall be integral to the fixture and field replaceable.

PART 3 - EXECUTION

3.1 INSTALLATION

A. All surface mounted fixtures shall be properly anchored so that all sides of the fixture are butted up against the mounting surface. A minimum of two (2) anchors shall be used; however, where additional anchors are required to properly install fixture (all sides evenly spaced from ceiling), the Contractor shall provide and install them at no additional cost to the Owner.

1. Anchor types shall be as follows:

Mounting Surface Material	Anchor type
* Gypsum board (wall)	Toggle bolts or blocking with screws
Gypsum board (ceiling)	Expansion type anchor
Concrete/concrete block	Expansion type anchor
** Wood	Screws

*Anchor type shall be determined in field by Architect/Engineer as dictated by fixture weight.
** Any fixture installed on combustible material shall be installed on ½ minimum spacers unless prior approved, otherwise in writing by Architect/Engineer.

B. All recessed fixtures in suspended ceiling shall be supported by a minimum of two (2) support wires, at opposite corners of the fixture. Each support wire shall be continuous without splices to the building structure and separately anchored. Fixture support wires shall support only the light fixture and not the ceiling. Surface mounted fixtures installed on lay-in ceiling shall be supported as lay-in fixtures. Refer to details for additional requirements.

END OF SECTION 26 51 00



SECTION 28 05 13 - TELEPHONE/DATA/CATV COMMUNICATION SYSTEM(s)

PART 1 - GENERAL

1.1 The Contractor shall provide, install and connect the complete telephone/data system equipment, backboards, conduit, cable tray, j-hooks, wiring and testing as specified herein and shown on the drawings.

1.2 SCOPE OF WORK

A. This installation includes the furnishing of labor, materials, and equipment required for the installation of all service, inside station, and riser cables for telephone and data use between distribution frames, and to each station outlet location required by the plans and specifications.

B. The work shall include but is not necessarily limited to the following:

1. Furnish and install telephone outlets, data outlets, TV outlets, cables, connecting blocks, backboards, conduits, mounting brackets and associated hardware for bundling, racking and cross-connecting as required.
2. Furnish and install one (1) 1" C from each tele/data outlet concealed up wall to above ceiling. Turn conduits 90̊ and extend conduit to accessible ceiling space. Provide nylon bushings at ends of conduits.
3. Furnish and install two (2) 4-pair EIA - Category 6 UTP telephone/data station cable to each tele/data outlet shown on the drawing and specified herein. Coil 36" of spare cable (for each cable installed) and secure loop at quarter points of the loop. Extend cables to respective termination point(s). Cables shall be plenum rated where installed in plenums.
4. Furnish and install duplex EIA/TIA 568A, 8 pin 4-pair modular RJ45 data jacks at each telephone/data outlet shown on drawings as specified herein. Color of each jack shall comply with owner's color-coding requirements. Verify color coding requirements in writing with owner prior to purchasing jacks.
5. Furnish and install 6-position modular type wall outlets for all telephone/data shown on the plans. Color of wall outlets shall match color of wall devices and shall be selected in shop drawings.
6. Furnish and install grounding and ground bars as shown on the drawings and as specified. Refer to specification section "Grounding" and to details for additional requirements.
7. Contractor shall submit an installation color coding, labeling and testing plan for each floor prior to commencing work.

1.3 APPLICABLE DOCUMENTS

A. The following current issues of rules and regulations shall apply to this scope of work:

1. EIA/TIA 568, 569, 570, 606, TSB36, TSB40
2. Building Industry Consulting Service (BICS)

3. Telephone Standards Handbook GHB-155
4. Planning Handbook CHB-156
5. Design Handbook CHB-157
6. REA Construction and Installation Manuals
7. REA Specification PC4 for Acceptance Tests
8. List of Materials Acceptable for use on telephone systems of REA borrowers
9. National Electric Code (NEC)
10. State and Local Codes
11. Telco System Practices
12. UL

1.4 GENERAL REQUIREMENTS

A. Installation costs including all necessary materials, cables, closures, bridging clips, splice materials, and terminations are to be the responsibility of the Contractor.

B. Cables routed above the drop ceiling and where not installed in conduit shall be supported to the structure utilizing "J" hooks. Cables are not allowed to rest on the ceiling tiles nor building steel. Maximum clearance to other electrical systems shall be maintained.

C. All cables, wires, and equipment shall be securely and neatly installed. Inside routings shall be installed parallel and perpendicular to existing structural lines and members.

D. All cables, wires, and equipment shall be firmly held in place. Fastening and support shall be adequate to support their load with ample safety factors.

E. The Contractor shall be responsible for replacing, restoring, or bringing to original condition any damage to floor, ceilings, walls, furniture, grounds, pavement, etc., caused by his personnel and operations. Contractor shall restore any damage or disfigurements at his expense.

F. Cables shall be continuous; no splices will be allowed.

G. The Contractor shall refer to the Construction Phasing Description section of these specifications for additional information and requirements. It is intended that the Telephone and Data Communications System be placed in service and be of beneficial use to the Owner at the completion of each construction phase of the work prior to occupancy by the Owner.

H. The Contractor shall coordinate all of his work with the Owner's Information Network Department to maintain tele/data service to the old and new systems as may be required. The Contractor will provide all new services as specified and shown on the drawings in a timely manner.

I. The Contractor shall not interrupt existing tele/data services and systems in any way until new facilities are in place and approval is received from the Information Network Department and the Architect/Engineer.

1.5 SUBMITTALS

A. Submit to the engineer shop drawings, product data (including cut sheets and catalog information). Submit shop drawings, product data with such promptness and in such sequence as to cause no delay in the work or in the activities of separate contractors. The engineer will indicate approval of shop drawings and product data submitted to the engineer by stamping such submittals "APPROVED" with a stamp. Submitted shop drawings shall be initialed or signed by the contractor, showing the date and the contractor's legitimate firm name.

B. By submitting shop drawings and product data, the contractor represents that he or she has carefully reviewed and verified materials, quantities, field measurements, and field construction criteria related thereto. It also represents that the contractor has checked, coordinated, and verified that information contained within shop drawings and product data conform to the requirements of the work and of the contract documents.

C. The engineer remains responsible for the design concept expressed in the contract documents as defined herein.

D. The engineer’s approval of shop drawings and product data submitted by the contractor shall not relieve the contractor of responsibility for deviations from requirements of the contract documents, unless the contractor has specifically informed the engineer in writing of such deviation at time of submittal, and the engineer has given written approval of the specific deviation. The contractor shall continue to be responsible for deviations from requirements of the contract documents not specifically noted by the contractor in writing, and specifically approved by the engineer in writing.

E. The engineer’s approval of shop drawings and product data shall not relieve the contractor of responsibility for errors or omissions in such shop drawings and product data.

F. The engineer’s review and approval, or other appropriate action upon shop drawings and product data, is for the limited purpose of checking for conformance with information given and design concept expressed in the contract documents. The engineer’s review of such submittals is not conducted for the purpose of determining 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 review shall not constitute approval of safety precautions or of construction means, methods, techniques, sequences, or procedures. The engineer’s approval of a specific item shall not indicate approval of an assembly of which the item is a component.

G. Perform no portion of the work until the engineer has approved the respective submittal. Such work shall be in accordance with approved submittals.

H. Submit shop drawings and product data as a complete set within thirty (30) days of award of contract.

I. For initial submission and for re-submission required for approval, submit one (1) electronic copy of each item. Make reproductions as required for your use and distribution to subcontractors. Reproduction of documents will be at contractor's expense. Illegible submittals will not be checked by the engineer.

J. General: Submit the following:

1. Bill of materials, noting long lead time items
2. Project schedule including all major work components that materially affect any other work on the project

K. Shop drawings: Submit the following:

1. Backbone (riser) diagrams.
2. System block diagram, indicating interconnection between system components and subsystems.

L. Product Data -- Provide catalog cut sheets and information for the following:

1. Wire/Cable.
2. Outlets, jacks, faceplates, and connectors.
3. Terminal blocks and patch panels.
4. Enclosures, racks, and equipment housings.
5. Over-voltage protectors.
6. Splice housings.
7. Fiber optic cable

1.6 QUALITY ASSURANCE

A. Commscope cabling systems, Hubbell Premise Wiring Cat 6 Cabling, and Com Tran Cable - Signamax connectivity are approved for the work of this section.

B. The contractor shall be an authorized Manufacturer's cabling system contractor.

C. The contractor shall have worked satisfactorily for a minimum of five (5) years on systems of this type and size and be currently operating service organization within 50 miles of project site.

D. Material and equipment shall be new, and conform to grade, quality, and standards specified. Equipment and materials of the same type shall be a product of the same manufacturer throughout.

E. Subcontractors shall assume all rights and obligations toward the contractor that the contractor assumes toward the owner and engineer/designer.

1.7 WARRANTY

A. Unless otherwise specified, unconditionally guarantee in writing the materials, equipment, and workmanship, of all cabling system components, for a period of not less than twenty-five (25) years from date of acceptance by the owner.

B. Transfer manufacturer's warranties to the owner in addition to the General System Guarantee. Submit these warranties on each item in list form with shop drawings. Final payment shall not relieve contractor of these obligations.

C. Installation costs including all necessary materials, cables, closures, bridging clips, splice materials, and terminations are to be the responsibility of the Contractor.

D. Installer Qualifications:

1. The Data Cable System Installer shall be licensed and shall meet all applicable regulations of the local and state authorities insofar as they apply to this type of system. The proposer shall be a firm normally employed in the low voltage and data cabling industry and shall provide a reference list of ten (10) large-scale projects and contact names confirming successful Category 6 premises wiring system installations.
2. The Installer shall be a local area, integrator of the manufacturer's product and must provide the manufacturer's maximum available warranty on the entire system. The contractor's certification must have been obtained and held within 75 miles of the project's location.
3. The installing contractor must have a full-time employed RCDD (Registered Communications Distribution Designer) on staff. Current RCDD certification shall be provided in the product submittals.
4. All individuals must be employees of the certified installer and at least 25% of the installing staff shall have undergone a training class given by the manufacturer. Current certification indicating the successful completion of the training course shall be available upon request at the project and submitted in the contractor's product submittals.

PART 2 - PRODUCTS

2.1 MATERIAL SPECIFICATIONS

A. Inside Unshielded Twisted Pair (UTP)

1. All unshielded twisted pair requirements for use shall meet EIA Category 6 specifications (plenum rated when installed in plenum spaces).
   a. NEC
   b. UL
   c. ANSI/ICEA Publication S-80-576
   d. EIA/TLA 568, 569, 570, 606, TSB 36, TSB 40
2. Multi-pair Riser Cables
   a. Cables from the MDF shall be further distributed to each of the other closets and terminated on 110 block in the IDFs there. The intra-

building inter-IDF cables shall be of the multi-pair type, conforming to or exceeding the following EMMA 568 physical specifications of CAT 6 physical specification.

3. UTP Patch Cords
   a. EIA Category 6 UTP patch cords (8' in length) shall be supplied at each wall outlet for each jack installed. At the MDF's and IDF's, patch cords shall be terminated at both ends in 4-pair Type 110 or equivalent connectors for plugging onto the type 110 or equivalent cross-connect panels, IDFs and MDFs. The other patch cords shall be terminated in 8 position modular male connectors at both ends conforming to FCC Part 68 Rules, Subpart F. The ends shall be wired in accordance with EIA/TIA 568B.
4. UTP Termination Wall Plates
   a. The four-pair horizontal cables shall be terminated on 6-position modular duplex (two) outlets meeting EIA specifications for EIA Category 6 UTP and configured in compliance with T56B. The outlets shall be in compliance with FCC Part 68 Rules, Subpart F. The outlets with integrated or separate cover plates shall be installed in single standard electrical wall boxes. The data termination shall allow keyed connectors. The termination of wires shall be by the insulation displacement method equivalent to type 110 and shall require the use of the same punch down tool as the UTP termination blocks specified below.
   b. Jacks shall allow the insertion of 4 and 6 pin plugs as well as 8 pin plugs or RG6 - Coax connectors. Metal faceplates specified for all wiring devices. Each faceplate shall have provisions for inserting colored tabs to provide use identification for each jack
5. UTP TERMINATION BLOCKS
   a. At the MDF and IDF closets, all UTP cables shall be terminated on rack mounted two (2) "U" 48 -port patch panels and terminating blocks meeting EIA/TIA 568 specifications for EIA Category 6 UTP. These terminating blocks shall be used for MDFS, IDFs and all UTP cross-connect requirements. They shall allow termination of cables as well as the capability of connecting pre-assembled single pair and composite 4-pair patch cords. Termination blocks to be used for terminating outside plant cables shall be equipped with gas discharge protection units.
   b. The blocks shall be equipped with designation strips and color coded for terminating sets of four pairs of wires in accordance with ICEA specifications.
   c. Cable tie wraps shall be included to neatly route, store and organize the termination cables.
6. INSIDE FIBER
   a. All fiber optic cables shall comply with the FDDI specifications published in ANSI Standard. The cables shall also comply with EIA and the FOTP specifications. The fibers in the cable shall conform to the industry standard color coding as specified by EIA. The outer jacket shall have markings indicating that it is a fiber optic cable. Other markings shall be core size and mode.

b. Unless specified otherwise, all fiber optic cables shall be a minimum of twelve (12) strands.
c. Fiber optic cable shall be tight-buffered riser cable, multi-mode, OM 3, complete with flame retardant jacket.
d. Cables shall be NEC OFNR listed and compliant to UL-1666, CSA FT-4, and ICEA S-83-596 standards.

7. FIBER CONNECTORS
   a. All fiber optic cables shall be terminated on connectors installed on rack mounted patch panels. The connectors shall be of the Type LC as defined in the EIA 568 or ANSI FDDI standards, constructed of ceramic or metal/ceramic materials. Plastic connectors shall not be used.
   b. The connector design shall incorporate strain relief such that it can withstand pulling, bending or twisting of the cable during installation and removal without affecting its operating characteristics.
   c. The connectors shall conform to all applicable EIA specifications for attenuation, durability, tensile strength, thermal shock, temperature cycling, humidity, impact, etc.
   d. Provide and install all fiber patch cords complete with LC connectors at both ends. Patch cords shall be 3-meters in length.
8. TYPE LC TERMINATING OUTLETS
   a. The connectors and adapters shall conform to specifications as outlined for connectors.
9. FIBER OPTIC SPLICES
   a. All fiber optic cables shall be installed in continuous lengths without splices. If splicing is required for extra-long distances, the splices shall be constructed by fusion and offer an attenuation of no more than 0.2 dB per splice. Mechanical splices are not permitted. All splices shall be stored neatly in splice boxes that allow easy access for maintenance and testing.
10. FIBER TERMINATION PANELS AND ADAPTERS
    a. The fiber optic cables shall be terminated in Type LC connectors. The terminated fibers shall be inserted in Type LC or equivalent fiber optic couplings /adapters/barrels mounted on rack mounted termination panels/enclosures. The panels shall be of metal construction with the capability of neatly storing excess fiber lengths and providing protection from dust and dirt. The panels shall allow ease of access to and maintenance of fibers.
    b. The panels shall allow cables to be installed and stored such that they do not alter the attenuation of the cables (as may happen when the fibers are tightly coiled, or the fiber is excessively bent at the connector strain relief). The adapters shall be metal, of the same manufacture as the connectors and shall introduce a loss of no more than 0.1 dB when two connectors are installed in it.
11. EQUIPMENT RACKS
    a. Each closet shall be equipped with an EIA standard heavy-duty steel 4-post 19-inch equipment racks. Each rack shall be free standing with holes for anchoring it to the floor. They shall be 72 inches high and tapped with mounting holes of 19 inches in width. Provide vertical wire management system on each side of the rack.

12. UTP CABLES AND PATCH CORDS COLOR CODING
    a. Wireless access points - white.
    b. All other ethernet - blue.

PART 3 - EXECUTION

3.1 PAIR IDENTIFICATION

A. The following room recording procedure shall be completed after each wire or cable has been pulled:

1. Terminations: Telephone station cables, CATV station cables and data station cables shall be tagged at backboards with cable tags indicating telephone or data and marked with room number to which it is connected. In rooms where more than one jack exists, the jacks are to be numbered sequentially and indicated on the cable tag. The outlet number shall also be indicated on the faceplate of the jack.
    a. Each pair terminated shall be legibly labeled on the terminal blocks according to the room number and jack with which it is associated.
    b. Each station wire shall be plainly marked at its backboard end with the room number to which it is connected and terminated on the Type 110 termination blocks.
    c. All cables will be legibly and permanently numbered at each end. String tags are not acceptable.

3.2 CROSS CONNECTIONS

A. At the backboards, Contractor shall cross connect all pairs from each station cable designated for telephone and/or data use to an incoming pair of the riser cable designated for telephone and/or data use. The cross connection of these pairs should provide four (4) continuous pair from each data outlet and one (1) continuous blue/white pair from each telephone located on that floor. Contractor shall label each pair on the Type 110 terminal according to the numbering scheme.

3.3 MDF LAYOUT AND CABLE DISTRIBUTION

A. The MDF and IDF are constructed of a combination of a backboard on which shall be mounted to type 110 cross-connect blocks and 4-post rack. Provide a minimum of ten feet spare cable for each run coiled on wall (see detail).

3.4 UTP NETWORK

A. The UTP network consist of the following elements:

1. Outside Plant
2. Inside Plant - Riser and Horizontal
3. MDFs
4. IDFs

5. Wall Plates
6. Patch Cables

3.5 CABLE INSTALLATION

A. The contractor shall optimize cable utilization by designing splice points. All cable splices and cable routed through manholes shall be supported on cable racks.

3.6 INSIDE

A. The cables in the risers and closets shall be neatly bundled and tie wrapped. Cable trays shall be provided and installed where necessary, especially between the backboards and equipment racks, and the backboard and the horizontal pathways. Cables traversing the vertical paths shall be anchored to the wall. The method and means of running horizontal cable distribution will vary. Each duplex wall outlet shall have a conduit that runs in the wall from that outlet to the wire closet. Thus, the 4-pair horizontal cable runs shall emanate at the wall outlets, run along the wall conduit, and terminate at the voice or data patch panel in the wire closet.

B. All cables shall be labeled and color coded in accordance with the EIA 606 standard.

3.7 HORIZONTAL RUNS

A. The wall outlets are of three types: voice, data, and CATV. The voice outlets shall be connected to the voice cross-connect panels in the wire closets. The data outlets are identified by the keyed slot, and they shall be connected to the data cross-connect panels in the wire closets. The voice and data cross- connect panels are so identified on the closet drawings. The wall outlets shall be wired in accordance with EIA T568B configuration. At each wall outlet, 18 inches of wire shall be allowed spare for future changes.

B. Since the cables to be terminated shall be of EIA Category 6 quality, all terminations shall ensure minimum of untwisting at the connections. The length of wire shall be untwisted only to the extent necessary for making the connection. Both the cross-connect panels and the wall outlets are of type 110. These allow the twists to be maintained to the point of termination. Also, the cable slots between the index strips provide space to maintain cable shield to the point of termination.

C. All terminations on the cross-connect panels shall be labeled and color coded in accordance with industry standards as specified by EIA. All terminations, cables and panels shall be identified and labeled in accordance with EIA 606.

3.8 RISER CABLES

A. The individual cable wires shall be installed in accordance with the method and color coding described under Installation and Test Instructions.

B. The terminations on the central IDF shall be identified to indicate the MDF connections and the floor connections, both with their own sequential numbering

scheme that corresponds with the other end of the cable and also indicated at the location of the other end of the cable. The terminations on the individual floor IDFs shall identify the position on the MDF.

3.9 TESTING

A. All conductors in every cable shall be tested end-to-end to prove that they meet the cable specifications described in EIA standards and this document. The tests shall be conducted in the presence of a Telecommunications Specialist. All tests shall be completed first before any corrective action is taken. Corrected conductors shall be tested again. The Telecommunications Specialist reserves the right to request that the conductors passing the previous tests be tested again after corrective action has been taken on the faulty conductors. Conductors not passing the tests shall also be documented together with the corrective action taken. Test results shall be documented and supplied before the installation is considered for acceptance.

B. The following tests shall be conducted as a minimum:

1. Compliance with color coding
2. Tip and ring polarity
3. Neatness of cable routing and tie downs
4. Continuity
5. Shorts, grounds and opens
6. Crosses (shorts to other pairs)
7. Rolls (reversed polarity)
8. Splits

3.10 ACCEPTANCE TESTING

A. When the Contractor has completed all cable installation and termination, and he is ready for testing, he shall inform the Architect/Engineer of the intent. The Architect/Engineer shall assign the Telecommunications Specialist who shall monitor the Contractor testing. The Architect/Engineer has the authority to accept or reject any test and request, and, at his discretion, complete retesting of any portion of the plant if there are an unreasonable number of pairs not passing tests indicated above. The Architect/Engineer may request the Contractor to replace any portion of the plant if the tests indicate faulty or improper installation, or numerous repairs are necessary to pass the tests. The plant shall be accepted by the Architect/Engineer after the Contractor has demonstrated that all the pairs have passed all the tests, all the tests have been documented, the plant is labeled and recorded, and all plant records have been provided in accordance with the requirements of the Documentation Sub-Section later in this document. The Contractor shall comply with any and all warranties required by the general contract agreement with the Architect/Engineer.

3.11 RECEIVING FIBER OPTIC CABLES

A. Before commencing installation, the Contractor shall inspect and test the cables on the reel. The reels shall be accompanied by manufacturer's test report for that

particular glass strand and cable indicating such parameters as the attenuation and bandwidth. The Contractor shall at a minimum perform attenuation, break/kink and length verification tests on each strand on the reel with the aid of an OTDR. A printout of the test for each fiber shall be generated and submitted for records. A five-foot section of the cable shall be stripped back and inspected for consistency of manufacture of the jacket, buffer, plastic coating, etc. An inspection and test report shall be provided. Installation shall only proceed after the test documentation has been submitted and the cables have been accepted for installation by a telecommunication specialist.

3.12 INSTALLATION OF FIBER OPTIC CABLES

A. The installation plan shall describe the approach that the Contractor plans to take in installing the fiber optic cables. Some of the typical factors are:

1. Supervisory and technical staff contingent and qualifications
2. Testing the ducts before installation
3. Use of mechanical devices
4. Pulling Force
5. Manhole organization - laying on cable racks and loops of extra cable, etc.

B. All outside fiber optic cables shall be installed in inner ducts and prominently labeled with “caution, glass fiber cables” or equivalent, at six-foot intervals wherever the cables are exposed to view. Inside cables shall be installed in inner ducts only where installation is in conduits. Open trays do not require inner ducts. Unwound cables shall be placed in figure 8 configurations when they are not on the reels. When a cable is installed, the pulling tension shall be minimal, less than the manufacturer’s recommended tension. The cable on the reel shall be unwound such that there is no tension on the cable. The cable shall either be unwound manually, or by any mechanical means that turns the wheel as opposed to pulling the cable. The cable shall be hand-fed over or around any curves, bends or edges without scrapes or bends in the cable. Strain reliefs or supports shall be provided where necessary, such as in manholes or vertical risers.

C. At each end of the cable a minimum of ten feet of service loop cable shall be allowed for termination and future use. All excess cable shall be neatly stored out of harm’s way.

3.13 TERMINATIONS OF FIBER OPTIC CABLE

A. Both single mode and multi-mode-cables are to be installed. Both these types of cables shall be terminated in LC type connectors. However, the two cable types shall be connected on separate fiber patch panels. Proper procedures shall be followed and the right tools used for terminating the fibers in the connectors. Below are examples of precautions and procedures which shall be conformed to:

1. The tool used for stripping the fiber shall conform to the size of the fiber being stripped and shall leave no nicks on the fiber; the stripping shall be effortless

and, for example, not require looping of the fiber around the finger for gripping.

2. If crimping is required, the appropriate size apertures on the tool shall be selected.
3. The jacket material remaining after stripping shall be removed by dissolving in chemicals and not by scraping.
4. If the connector required adhesives or epoxy for fastening the fiber to the connector, the material shall be injected in the connector such that it oozes out, displacing all the air from the space to be occupied by the fiber.
5. While seating the fiber in the adhesive filled connector, no air bubbles shall be introduced, such as by inserting and re-inserting the fiber. The fiber protruding from the connector ferrule shall have a small bead formed at its base.
6. The scribe tool used for preparing the excess fiber for removal shall be of high quality and sharp so as not to shatter the glass fiber. The scribed fiber shall be pulled rather than snapped.
7. Heat guns or hot-air blowers shall not be used for curing.
8. Heat shrink tubing shall not be used.
9. A minimum of three types of polishing paper shall be used (changing them often).
10. Polishing shall be performed using the figure 8 routine, creating a spherical polished end profile; a recessed profile shall be rejected.
11. The quality of the polish end shall be inspected using a microscope with a minimum magnification of 200x.
12. All finished terminations shall be covered with boots at all times; similarly, all adapters shall also be covered with boots.
13. Strands of fiber from loose tube cables shall be sheathed in protective fan-out tubing or spiral from the point the fiber leaves the cable to the point where it is terminated on a connector. All gel or waterproofing compounds shall have been cleaned off.
14. The terminations shall be sequentially numbered in synchronization with the color code. The terminations and cables shall be labeled to clearly describe the location at the other end.

3.14 TESTING OF FIBER OPTIC CABLE

A. All tests shall be conducted at 1300 mn.

B. The cable shall be tested on the reels with the OTDR before beginning installation.

C. The fibers shall be tested with the OTDR after the cables have been pulled and the ends dressed for termination. A paper trace of the test shall be provided for each fiber. Evidence of kinked or otherwise damaged fibers shall be cause for replacement of the entire cable.

D. Termination of the fiber on connectors shall only commence after OTDR traces have been approved by the Architect/Engineer and the cable accepted for termination. The terminated fibers shall be tested using the power meter. The OTDR - and power

meter tests shall be performed from both ends using calibrated adapters and connectors.

E. Reference measurements of the power receivers shall be checked frequently. Any deviation of 0.1 dB or more shall be cause for retesting the fibers that were tested with that reference.

F. All test equipment, especially the OTDR and the power meter shall have been calibrated by the manufacturer or an accredited test facility within six months prior to beginning the tests on site.

G. Acceptance Testing. When the Contractor has completed all cable installation and termination, and he is ready for testing, he shall inform the Contracting Officer of the intent. The Contracting Officer has the authority to accept or reject any test and request, and at his discretion, complete retesting of any portion of the plant if there are an unreasonable number of fibers not passing tests indicated above. The Contracting Officer may request the Contractor to replace any portion of the plant if the tests indicate faulty or improper installation, or excessive re-work is necessary to pass the tests. The plant shall be accepted by the Contracting Officer after the Contractor has demonstrated that all the fibers have passed all the tests, all the tests have been documented, the plant is labeled and recorded, and all plant records have been provided in accordance with the requirements of Documentation, Section 3.4 later in this document. The Contractor shall comply with any and all warranties required by the general contract agreement with the Contracting Officer.

3.15 GROUNDING

A. The buildings shall be equipped with central point grounding schemes. A master ground bar shall be installed at the MDF. Ground window bars shall be installed at the IDF in every other closet. All cables with metallic elements and all metallic hardware shall be grounded in accordance with REA Section 810 and EIAMA PN-2327 grounding specifications for telecommunications.

3.16 DOCUMENTATION

A. The Contractor shall provide two sets of documents. One set shall provide a record of all the tests conducted on cables, terminations, etc. Another set shall depict all the telecommunications wiring and cabling installation, within and to the building.

3.17 TEST DOCUMENTATION

A. Test records shall be provided for the following tests:

1. UTP, Terminations
    a. Manufacturing test results
    b. Outside plant cables
    c. Riser cables
    d. Horizontal cables

2. Fiber
   a. Manufacturing test results
   b. Outside plant fibers - OTDR before and after installation
   c. Fiber terminations - power meter tests

3.18 RECORD DOCUMENTATION

A. After all installations have been completed and tested, the Contractor shall provide records of the installation in accordance with EIA/TIA Standard 606. The records shall be required in hard copy format printed from a software such as Cable Management Systems by Microtest (CMS). CMS is a commercially available off-the-shelf software designed specifically for cable installation records. The Contractor shall supply the software and the records using the software to one FWS technician.

B. As described in the EIA standard, the following types of records shall be supplied:

1. Fiber, voice and data terminations located in work areas, telecommunications closets, equipment rooms and entrance facilities.
2. Telecommunications media between terminals (horizontal distribution).
3. Pathways between terminations that contain the media.
4. Spaces where terminations are located.
5. Bonding/grounding as it applies to telecommunications.

C. All the elements of the telecommunications infrastructure shall be identified and labeled by a code. The coding method to be used shall be as specified in the EIA 66 standard. On the following page is a representative list reproduced from the standard (xxx denotes a numerical designation).

CODE	DESCRIPTION
BCxxx	Bonding Conductor
BCDxxx	Backbone Conduit
Cxxx	Cable
CBxxx	Backbone Cable
CDxxx	Conduit
CTxxx	Cable Tray
ECxxx	Equipment (bonding) conductor
EFxxx	Entrance Facility
ERxxx	Equipment Room
Fxxx	Fiber
HHxxx	Hand Hole

ICxxx	Intermediate Cross-Connect (IDF)
Jxxx	Jack (Outlet)
MCxxx	Main-Cross-connect (MDF)
MHxx	Man hole or maintenance hole
PHxxx	Pull Box
Sxxx	Splice
SExxx	Service Entrance
SLxxx	Sleeve
TCxxx	Telecommunications Closet
TGBxxx	Telecommunications grounding busbar
TMGB	Telecommunications main grounding busbar
WAxxx	Work Area

3.19 MAINTENANCE CONSIDERATIONS

A. The cable installation shall be installed to maximize the safety, maintainability, and performance effectiveness of maintenance personnel, and shall minimize demands upon skills, training and manpower. Splices/terminations shall be placed and supported so as to maximize the efficiency and ease with which it can be maintained and shall ensure accessibility.

3.20 CABLE TESTS

A. Contractor shall perform testing of all pairs for each cable installed as directed by these specifications. Post construction cable acceptance tests consist of conductor continuity tests, and conductor insulation resistance tests. These tests assure that the cable has been terminated properly and has not been damaged during construction. An Owner's representative will be required to witness these tests.

B. Each cable pair shall be tested for shorts (T to R and T&R to ground), continuity, and loop resistance. Maximum loop resistance from the main telephone/data panel to each jack shall be within 5% of the calculated value based on the actual length of cable installed, and the loop ohms/1000 ft. for copper conductors.

3.21 DEFECTIVE CABLE PAIRS

A. The vendor shall test all cable pairs and shall record, on the pair assignment record, the nature of the defect for each pair found to be defective and remedies used to clear the defect. In order for the cable distribution system to be considered acceptable,

there shall be no defective pairs in any cable. Any cable having defective pairs shall not be used and shall be replaced at Contractor's expense.

3.22 INSPECTIONS

A. Routine on-site construction inspections by the Architect/Engineer and/or an Owner's representative will involve trips to the complex to inspect construction, so as to assure adherence to standard construction practices. The number of such inspections will be at the Architect/Engineer's discretion.

3.23 ACCEPTANCE

A. The project shall be considered acceptable based upon the following:

1. Contractor has furnished and installed all equipment and materials and performed all work in accordance with these specifications.
2. Contractor has successfully completed all the required testing assuring compliance with the required specifications.
3. Contractor has removed all trash and debris by contractor from the area and restored site to original condition.
4. Contractor has submitted the required documentation to state officials.

END OF SECTION 28 05 13

SECTION 312000 - EARTH MOVING



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. Excavating and filling for rough grading the Site.
2. Preparing subgrades for slabs-on-grade, walks, and pavements.
3. Excavating and backfilling for buildings and structures.
4. Subbase course for concrete walks and pavements.
5. Subsurface drainage backfill for walls and trenches.
6. Excavating and backfilling trenches for utilities and pits for buried utility structures.
7. Work identified in S series drawings (only)

B. Related Requirements:

1. Section 033000 “Cast-in-Place Concrete”

1.3 DEFINITIONS

A. Backfill: Soil material or controlled low-strength material used to fill an excavation.

1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
2. Final Backfill: Backfill placed over initial backfill to fill a trench.

B. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe. Commercially available as “610 Roadbase”.

C. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.

D. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.

1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Engineer. Authorized additional excavation and replacement material will be paid for according to Contract provisions for unit prices.
2. Bulk Excavation: Excavation more than 10 feet in width and more than 30 feet in length.
3. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Engineer. Unauthorized excavation, as well as

remedial work directed by Engineer, shall be without additional compensation or contract time.

E. Fill: Soil materials used to raise existing grades.

F. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

G. Subgrade: Uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase or topsoil materials.

H. Utilities: On-site underground pipes, conduits, ducts, and cables as well as underground services within buildings.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of the following manufactured products required:

1. Geotextiles.

B. Material Test Reports: For each soil material proposed for fill and backfill as follows:

1. Classification according to ASTM D 2487.
2. Laboratory compaction curve according to ASTM D 698.
3. For material proposed for treatment, provide material test reports prior to treatment.

C. Lime Treatment Material

1. Product information
2. Proposed application rate (i.e. – depth and quantity)

D. Pre-excavation Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces that might be misconstrued as damage caused by earth-moving operations. Submit before earth moving begins.

E. Photographic documentation positively identifying depth of excavation.

1.5 FIELD CONDITIONS

A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during earth-moving operations.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.

B. Utility Locator Service: Notify utility locator service Louisiana One Call for area where Project is located before beginning earth-moving operations. If a SUE (subsurface utility engineering)

survey has been performed for the project site, Contractor shall use this to assist with locating and avoiding subsurface improvements that are to remain or otherwise to be protected.

C. Do not commence earth-moving operations until temporary site fencing and erosion- and sedimentation-control measures are in place.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. General: Provide borrow soil materials.

B. Satisfactory Soils: Lime-treated silty or sandy clay free of debris, waste, vegetation, and other deleterious matter.

1. Liquid Limit: 55 max prior to treatment, 30-42 after treatment
2. Plasticity Index: 35 or less prior to treatment; 12-22 after treatment

3. Lime Treatment:

a. Lime treatment material shall be either hydrated lime or granular quicklime conforming to ASTM C 977.
b. Application rate shall be 19 lbs of material (hydrated lime or granular quicklime) per square yard per 12" depth.
c. Properties, including soil properties prior to lime treatment, properties after lime treatment, and confirmation of lime application (i.e. – depth and quantity), shall be submitted for approval by Engineer prior to installation and shall be field verified by testing agency during mixing operations.
d. Lime treatment shall occur at the borrow pit – no on-site mixing will be permitted.

C. Unsatisfactory Soils: Any soils that do not satisfy the requirements for "Satisfactory Soils".

1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content to at least 95% of the Standard Proctor maximum dry density at time of compaction.

D. Sand: ASTM C 33; fine aggregate.

2.2 GEOTEXTILES

A. Separation Geotextile: Woven geotextile fabric, manufactured for separation applications.

1. Manufacturers: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to the following:

a. Mirafi 600X by Tencate
b. Geotex 315ST by Propex Geosolutions

c. Alternate products meeting or exceeding the specifications of the above products will be considered; submit prior to bid submission.

2.3 ACCESSORIES

A. Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility; colored as follows:

1. Red: Electric.
2. Yellow: Gas, oil, steam, and dangerous materials.
3. Orange: Telephone and other communications.
4. Blue: Water systems.
5. Green: Sewer systems.

B. Detectable Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; colored as follows:

1. Red: Electric.
2. Yellow: Gas, oil, steam, and dangerous materials.
3. Orange: Telephone and other communications.
4. Blue: Water systems.
5. Green: Sewer systems.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth-moving operations.

B. Protect and maintain erosion and sedimentation controls during earth-moving operations.

C. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.

3.2 DEWATERING

A. Provide dewatering system of sufficient scope, size, and capacity to control hydrostatic pressures and to lower, control, remove, and dispose of ground water and permit excavation and construction to proceed on dry, stable subgrades. No modification of contract amount or time will be awarded for unanticipated dewatering efforts, or otherwise for damage (and any required repairs and testing) caused by a lack of proper dewatering.

B. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.

C. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.

1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.

D. Dispose of water removed by dewatering in a manner that avoids endangering public health, property, and portions of work under construction or completed. Dispose of water and sediment in a manner that avoids inconvenience to others.

E. Damage to the site, including subgrade and fill, sand and aggregate material and installed products, that are a result of degradation by precipitation, insufficient dewatering efforts, construction traffic, etc. as determined by the Engineer, will be repaired by the contractor, with no modification of contract amount or time. Repair efforts may include, but are not limited to, tilling, windrowing, scarifying, and drying the site until a satisfactory moisture content is achieved.

3.3 EXCAVATION, GENERAL

A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include soil materials and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for removal of obstructions.

1. If excavated materials intended for fill and backfill include unsatisfactory soil materials, replace with satisfactory soil materials.

3.4 EXCAVATION FOR STRUCTURES

A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch. If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.

1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.
2. Excavation for Underground Tanks, Basins, and Mechanical or Electrical Utility Structures: Excavate to elevations and dimensions indicated within a tolerance of plus or minus 1 inch. Do not disturb bottom of excavations intended as bearing surfaces.

3.5 SUBGRADE INSPECTION

A. Notify Engineer when excavations have reached required subgrade.

B. If Engineer determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.

C. Proof-roll subgrade below the building slabs and pavements with a pneumatic-tired and loaded 10-wheel, tandem-axle dump truck to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.

1. Completely proof-roll subgrade in one direction, repeating proof-rolling in direction perpendicular to first direction. Limit vehicle speed to 3 mph.
2. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Engineer, and replace with compacted backfill or fill as directed.
3. Proof-roll shall not be performed with any vehicle other than a tandem-axle dump truck.
4. Engineer reserves the right waive witnessing of the proof-roll and can direct testing agency to perform witnessing on his behalf.
5. Testing agency is not authorized to fail a proof-roll or otherwise provide any direction to the Contractor. Testing agency shall immediately contact the Engineer directly to discuss potentially unsatisfactory conditions observed during the proof-roll.

D. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.

E. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Engineer, without additional compensation.

3.6 UNAUTHORIZED EXCAVATION

A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 2500 psi, may be used when approved by Architect.

1. Fill unauthorized excavations under other construction, pipe, or conduit as directed by Architect.

3.7 STORAGE OF SOIL MATERIALS

A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.8 BACKFILL

A. Place and compact backfill in excavations promptly, but not before completing the following:

1. Construction below finish grade.
2. Surveying locations of underground utilities for Record Documents.
3. Testing and inspecting underground utilities.
4. Removing concrete formwork.
5. Removing trash and debris.

6. Removing temporary shoring, bracing, and sheeting.
7. Installing permanent or temporary horizontal bracing on horizontally supported walls.

B. Place backfill on subgrades free of mud, frost, snow, or ice.

3.9 SOIL FILL

A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material. "Bench" site as required to achieve slope this condition.

B. Place and compact fill material in layers to required elevations.

C. Place soil fill on subgrades free of mud, frost, snow, or ice.

3.10 SOIL MOISTURE CONTROL

A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.

1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
2. Remove and replace, or scarify and air dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

3.11 COMPACTION OF SUBGRADE, SOIL BACKFILLS AND FILLS

A. Under structures, building slabs, steps, and pavements, scarify and recompact top 12 inches of existing subgrade to not less than 95 percent of maximum dry unit weight according to ASTM D 698.

B. Place backfill and fill soil materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment and not more than 4 inches in loose depth for material compacted by hand-operated tampers.

C. Place backfill and fill soil materials evenly on all sides of structures to required elevations and uniformly along the full length of each structure.

D. Compact soil materials to not less than 95 percent of maximum dry unit weight according to ASTM D 698. Compact bedding and backfill materials at utility trenches to not less than 85 percent.

3.12 GRADING

A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.

1. Provide a smooth transition between adjacent existing grades and new grades.
2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.

B. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch when tested with a 10-foot straightedge.

3.13 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified geotechnical engineering testing agency to perform tests and inspections.

B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earth moving only after test results for previously completed work comply with requirements.

C. Testing agency will test compaction of subbase and soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2937, and ASTM D 6938, as applicable. Tests will be performed at the following locations and frequencies:

1. Paved and Building Slab Areas: At subgrade and at each compacted fill and backfill layer, at least one test for every 2000 sq. ft. or less of paved area or building slab but in no case fewer than three tests.

D. Testing agency will positively identify and photographically document depths of excavations following satisfactory proof-roll and prior to installation of backfill.

E. Testing agency will positively identify and document thicknesses of layers of backfill and fill prior to compaction.

F. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil materials to depth required; recompact and retest until specified compaction is obtained.

3.14 PROTECTION

A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.

1. Scarify or remove and replace soil material to depth as directed by Engineer; reshape and recompact.

C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.

1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.15 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Remove surplus satisfactory soil and waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.

END OF SECTION 312000

SECTION 313116 – TERMITE CONTROL

PART 1 - GENERAL

1.1 CODES

A. Architect shall take approval action on required submittal data for proposed products and qualifications of applicator.

B. Conform to applicable code for requirements for application, application licensing, and authority to use toxicant chemicals in accordance with EPA.

C. EPA - Environmental Protection Agency - Federal Insecticide, Fungicide & Rodenticide Act.

1.2 COORDINATION

A. Applicator shall be state licensed.

B. Provide certificate of compliance from authority having jurisdiction indicating approval of toxicants.

1.3 INSTALLATION

A. Install termiticide products at the application rate recommended by the manufacturer.

B. Install termiticide products in strict accordance with the manufacturer's installation instructions.

1.4 REPORTING REQUIREMENTS

A. Comply with Regulatory Agencies for requirements regarding documentation and reporting of application of Termiticides.

B. Test Reports: Initiate and file regulatory agency approval reports when required.

1.5 APPLICATION LOCATIONS

A. Soil treatment for termite control below grade and foundation perimeter.

B. Under slabs-on-grade at building.

C. Soil within 10 ft. of building perimeter, after completion of construction and final grading/contouring around the building.

D. Install application ports at locations where paving is installed adjacent to the building

1.6 INSTALLER REQUIREMENTS

A. Applicator shall be state licensed.

B. Installer shall be secured with a bond by a Louisiana-licensed Surety.

1.7 WARRANTY

A. 5-years non-prorated from Date of Substantial Completion (not the application date) against infestation and/or termite damage.

B. Warranty shall be written in the form of an insurance policy in the amount of 10% of the project construction cost or $150,000.00, whichever is less, for damages to building and contents. Rating for insurance company shall be A- IV (4). Warranty insurance policy shall include coverage for damage and repairs to the building, as well as replacement of any building contents due to damage caused by termites.

C. If evidence of termites occurs within warranty period, all direct and indirect damage, including incidental damages shall be repaired, and areas shall be retreated, at no cost to the Owner.

D. Installer shall make Annual Inspections of the Exterior and Interior of the building, and shall issue a written report to the Owner of any findings (or of the lack thereof).

E. Include optional renewal policy on annual basis after fifth year; fee shall be equitable and agreed upon by applicator and the Owner.

END OF SECTION 313116

SECTION 32 31 14 - ORNAMENTAL ALUMINUM FENCING & GATES

PART 1 - GENERAL

1.01 WORK INCLUDED

The contractor shall provide all labor, materials and accessories necessary for installation of ornamental aluminum fence system.

1.02 RELATED WORK

A. Section 32 13 00 - Paving and Surfacing
B. Section 03 06 30 - Cast-In-Place Concrete

1.03 SYSTEM DESCRIPTION

The manufacturer shall supply a total ornamental aluminum fence system manufactured. The system shall include all components. (i.e., pickets, rails, posts, gates and hardware) as required for a complete install.

1.04 QUALITY ASSURANCE

The contractor shall provide laborers and supervisors who are thoroughly familiar with the type of construction involved and materials and techniques specified.

1.05 REFERCENCES

A. AAMA 2604 - Performance Requirements and Test Procedures for coating on aluminum extrusions.
B. AAMA 2603 - Performance Requirements and Test Procedures for coating on aluminum extrusions.
C. ASTM B85 - Specification for Aluminum Die Castings.

1.06 SPECIAL WARRANTY

A. Provide manufacturer's standard lifetime limited warranty electro statically applied SUPER DURABLE polyester powder coated fence for a lifetime from date of purchase. We guarantee the finish will not crack, chip, or peel. (lose adhesion)

1.07 DELIVERY AND STORAGE

A. All materials should be checked for any damage that may have occurred during shipping.

B. Products must be stored in manufacturers' packaging.

C. Materials should be stored in a dry secure area to protect against weather, damage, vandalism or theft.

D. All materials should be handled with care when transporting before installation.

1.08 SUBMITTAL

Product data: Manufacturer's catalog indicating materials and all conditions of the specifications have been met.

PART 2 – PRODUCTS

2.01 MANUFACTURER

A. Obtain fencing and gates, including accessories, fittings, and fastenings, from a single source.

B. Products from other qualified manufacturers having a minimum of 5 years experience manufacturing aluminum ornamental picket fencing will be acceptable by the architect as equal, if approved ten days prior to bidding, and if they meet the following specifications for design, size, gauge of metal parts and fabrication.

C. Approved Suppliers:
    1. Elite Fence Products Inc. (EFS-10 "Black" Basis of Design)
    2. Approved Equal

2.02 MATERIAL

A. Aluminum material for fence framework (i.e., tubular pickets, rails and posts) shall conform to the requirements of ASTM B221.The aluminum extrusions for posts, pickets, and rails Alloy and Temper Designation 35,000-psi strength aluminum alloy 6063-T5 and 6005-T5.

B. Coating: The fence system shall have an electro statically applied SUPER DURABLE Polyester powder coat finish that exceeds AAMA 2604. Factory applied and baked at a temperature of 400°F to 425°F.

Color: **Black**

C. PICKETS - 1" square x 0.062" or wall thickness extruded tubing and fastened to rail by 410 stainless steel corrosion resistant screws. The heads are coated with zinc and yellow chromate, then painted to match the color of fence. See available colors.
   a. Picket Spacing- 3 ¾”

D. RAIL – Horizontal rail is 1-5/8” x 1 5/8” (.070 top wall and .100 side wall)

E. POSTS – Form fitting to rail profile, pre-punched aluminum posts, 3”x 3” x .125” wall.

F. PANELS - Standard Panel Width- *Center to Center posts spacing* @ 6’-0” max (Or nearest manufacturer’s standard.)

G. Aluminum castings shall be used for all rings, post caps, finials, and miscellaneous adornments.

2.03 FABRICATION

A. Pickets, rails and posts pre-cut to specified lengths. Rails pre-punched to accept pickets.

B. Gates: Fabricated with mechanical fastening with 410 stainless steel screws with optional welding available. Components, 1” pickets x .062”, Rails 1 5/8” x 1 5/8” rail, Uprights are 2” x 2” square. Walk gates adjustable commercial hinges and with latching device.

Gate Posts:

4" sq. for gate leaf sizes 4'-1" to 8'-0"
6” sq. for gate leaf sizes 8’-1” to 12’-0”

PART 3 - EXECUTION

3.01 PREPARATION

All new installation shall be laid out by the contractor in accordance with the construction plans.

3.02 INSTALLATION

Fence posts set at O.C. spacing of 77 1/2" or 96 1/2", depending on the nominal span specified. Gate posts spaced according to the gate openings specified in the construction plans. Elite Fence Products Inc. panels attached to pre-punched posts using mechanically fastened 410 stainless steel corrosion resistant screws supplied by the manufacturer.

3.03 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.

3.04 CLEANING

A. The contractor shall clean the jobsite of excess materials; post-hole excavations shall be scattered uniformly away from posts.

B. When cleaning fence system use mild household detergent and clean water. Remove all excess concrete around posts before material hardens.

END OF SECTION 32 31 14

SECTION 32 92 00 - LAWNS, GRASSES, AND LANDSCAPING

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 the following:

1. Sod
2. Hydroseeding

1.3 DEFINITIONS

A. Finish Grade: Elevation of finished surface of planting soil.

B. Manufactured Soil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.

C. Subgrade: Surface or elevation of subsoil remaining after completing excavation, or top surface of a fill or backfill immediately beneath planting soil.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer whose work has resulted in successful lawn and plantings establishment.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Hydroseed Lawns: Deliver at time of application only.

B. Solid Sod: Deliver on pallets, store in area as directed by General Contractor; maintain moisture levels of sod.

1.6 SCHEDULING

A. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit.

B. Do not undertake hydroseed operations when chance of rain is imminent within 48 hour period.

1.7 LAWN MAINTENANCE

A. Begin maintenance immediately after each area is planted and continue until acceptable lawn is established, but for not less than time required for vigorous growth to be noticeable and all bare or eroded areas are sustaining growth.

B. Maintain and establish lawn by watering, fertilizing, weeding, etc. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth lawn.

C. Watering: Provide and maintain temporary piping, hoses, and lawn-watering equipment to convey water from sources and to keep lawn uniformly moist to a depth of 4 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 lawn at a minimum rate of 1 inch per week.

D. Mow lawn as soon as top growth is tall enough to cut. Remove no more than 40 percent of grass-leaf growth in initial mowing. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. Schedule initial mowing to obtain grass height of 2 to 3 inches.

PART 2 - PRODUCTS

2.1 TOPSOIL

A. Topsoil: ASTM D 5268, 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.

1. Topsoil Source: Reuse surface soil stockpiled on-site. Verify suitability of stockpiled surface soil to produce topsoil. Clean surface soil of roots, plants, sod, stones, clay lumps, and other extraneous materials harmful to plant growth.

a. Supplement with imported or manufactured topsoil from off-site sources when quantities are insufficient. Obtain topsoil displaced from naturally well-drained construction or mining sites where topsoil occurs at least 4 inches deep; do not obtain from agricultural land, bogs or marshes.

2.2 SOLID SOD

A. Farm-grown, palletized St. Augustine sod squares. Provide sod with uniform density, color, and texture, strongly rooted and capable of vigorous growth when planted. AREA TO HAVE HYDROSEED ARE INDICATED ON DRAWINGS.

2.3 HYDROSEED

A. Solution of water, fertilizer, combination of Rye and Bermuda or St. Augustine grass seed and dye. AREA TO HAVE HYDROSEED ARE INDICATED ON DRAWINGS.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to receive lawns and grass for compliance with requirements and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities, trees, shrubs, and plantings from damage caused by planting operations.

B. Provide 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 areas of lawns and planting beds and obtain approval from architect for layout; adjust areas as directed.

3.3 LAWN PREPARATION

A. Loosen subgrade to a minimum depth of 6 inches. Remove stones larger than 1-1/2 inches in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.

B. Finish Grading: Grade areas to be hydro-seeded or sod to a smooth, uniform surface plane 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 hydroseeded or sod laid in the immediate future.

C. Restore areas if eroded or otherwise disturbed after finish grading and prior to hydroseeding operations; replace dead sod squares.

3.4 HYDROSEEDING

A. Hydroseed areas indicated on the Drawings, and/or areas disturbed by construction operations.

B. Prior to installation of hydroseeding, fill, level, and fine grade all areas to drain. If finish grade elevations are provided on the Drawings, grade areas to within 0.5" +/-, prior to installation.

C. Spray-apply for uniform coverage & sufficient density for full growth free of bare spots, voids, etc.

D. Re-seed areas not exhibiting full coverage growth, washed away by runoff or otherwise barren.

3.5 CLEANUP AND PROTECTION

A. Promptly remove soil and debris created by lawn work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.

END OF SECTION 32 92 00