

CONTRACT DOCUMENTS AND SPECIFICATIONS

Phase 8 – Stadium Improvements
Washington-Marion High School

2017 Bond Issue Improvements
Washington-Marion High School
2802 Pineview Street, Lake Charles, Louisiana 70601

Calcasieu Parish School Board
3310 Broad Street – Lake Charles, Louisiana 70602
CPSB Bid No. 2026-01 PC



Prepared by:
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October 2025

The following Contract Documents and Technical Specifications have been prepared under my direct supervision and guidance in conjunction with the Plans and for the explicit use by the Owner and Contractors for bidding and construction of this project.

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BIDDING & CONTRACT DOCUMENTS



Dr. Jason VanMetre, Superintendent

NOTICE TO BIDDERS

The Calcasieu Parish School Board will receive sealed bids until **2:00 P.M., November 18, 2025**, at its offices at the **Calcasieu Parish School Board, Planning & Construction Department, Chennault Facilities, 3800 Mallard Cove Drive, P.B.506, Lake Charles, Louisiana 70615 for Phase 8 Stadium Improvements Washington Marion High School, SD# 31 Bond Funds. Bid No. 2026-01PC**. Complete plans and specifications may be obtained from **Ellender Architects & Associates, LLC, 1521 Cypress Street, Sulphur, Louisiana 70663.**

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 in this state and who is residing in this state.

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 of 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 No bid may be withdrawn for a period of thirty (30) days after receipt of bids, except under the provisions of LA.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, **"Phase 8 Stadium Improvements, Washington Marion High School SD#31 Bond Funds Bid No. 2026-01PC at the Calcasieu Parish School Board, Planning & Construction Department, Chennault Facilities, P.B. #506, and Lake Charles, Louisiana 70615"**.

Bids 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.centrauctionhouse.com.

Building Foundations for the Future

The Owner reserves the right to reject 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, Architect or Designer, State License Board for Contractors,
Daily Journal of Commerce, F. W. Dodge, File

Publish in the Lake Charles American Press: October 17th, 24th, and 31st.

INSTRUCTIONS TO BIDDERS

ARTICLE 1

DEFINITIONS

- 1.1 The Bidding Documents include the following:

Notice to Bidders
Instruction to Bidders
Insurance & Bond Requirements
General Conditions of the Contract for Construction (AIA Document A201, 2017 Edition)
Supplementary Conditions (September 2018)
Bid Form (Louisiana Uniform Public Works Bid Form)
Unit Price Form (Louisiana Uniform Public Work Bid Form)
Bid Bond
Resolution
Sub-Contractor Listing
Attestation Form – Past Criminal Convictions of Bidders (R.S. 38.2227)
Affidavit Form – Verification of Employees (R.S. 38.2212.10 (C))
Contract (Owner and Contractor), Performance and Payment Bond
Affidavit
Change Order Form
Beneficial Occupancy Form
Recommendation of Acceptance Form
Louisiana Department of Revenue Tax Exemption Form
Approved Applicator Letter (Roofing)
Manufacturer's Warranty Letter (Roofing)
Specifications dated October 2025
Drawings dated October 2025
Addenda Issued during the bid period and acknowledged on Bid Form.

- 1.2 Forms turned in with the bid. Bid Form, Unit Price Bid Form, Bid Bond, and Corporate Resolution or Written Evidence of the authority of the person signing the bid for public work (R.S. 38.2212 (B)(5)).
- 1.3 Forms turned in within ten (10) days after the bid opening. Sub-Contractor's List, Schedule of Values, Attestation Form (R.S. 38.2227), Affidavit Form (R.S. 38.2212.10 (C)), Affidavit, Resolution, Approved Applicator (Roofing), Manufacturer's Warranty Letter (Roofing), and Superintendent's Resume'. These forms shall be sent to the Project Architect or Project Engineer on behalf of the Owner via electronic mail for review. See paragraphs 1.3.1, 1.3.2, and 1.3.3 for instructions regarding submission of original documents.
- 1.3.1 The Contractor shall be responsible for submitting six (6) sets of original documents with embossments and signatures in "blue" ink. Each set shall include: Affidavit, Resolution, Attestation Form (R.S. 38.2227), and Affidavit Form (R.S. 38.2212.10 (C)). Submission to the Project Architect or Project Engineer on behalf of the Owner shall coincide with

return submission of the signed Construction Contract, of which there will also be six (6) originals.

- 1.3.2 The Contractor shall be responsible for attaching an original, including embossments and signatures in “blue” ink, of the Performance & Payment Bond, Power of Attorney, and Certificate of Insurance to each original signed Construction Contract.
- 1.3.3 If required and/or applicable, the Contractor shall be responsible for submitting original documents, with embossments and signatures in “blue” ink, for the roofing Approved Applicator and roofing Manufacturer’s Warranty forms. These documents shall be submitted to the Project Architect or Project Engineer on behalf of the Owner within ten (10) days after the bid opening.
- 1.4 All definitions set forth in the General Conditions of the Contract for Construction, A.I.A. Document A201, or in other Contract Documents are applicable to the Bidding Documents.
- 1.5 Addenda are written on graphic instruments issued by the Architect prior to the opening of bids which modify or interpret the bidding documents by additions, deletions, clarifications, corrections and prior approvals.
- 1.6 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 Bidding Documents.
- 1.7 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.
- 1.8 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 Bidding Documents is accepted.
- 1.9 A Bidder is one who submits a bid for a prime contract with the Owner for the work described in the proposed contract documents.
- 1.10 A Sub-bidder is one who submits a bid to a Bidder for materials and/or labor for a portion of the work.
- 1.11 Where the word “Architect” is used in any of the Documents, it shall refer to the Prime Designer of the project, an Architect, Engineer or Landscape Architect.

ARTICLE 2

BIDDER’S REPRESENTATION

- 2.1 Each Bidder by making his bid represents that:
 - He has read and understands the Bidding Documents and his Bid is made in accordance therewith.

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

-His bid is based upon the materials, systems and equipment described in the Bidding 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 Statutes 37:2150, et seq. will be considered, if applicable. The Contractor shall be responsible for determining that all of his sub-bidders or prospective subcontractors are duly licensed in accordance with law.

ARTICLE 3

BIDDING DOCUMENTS

3.1 Copies

- 3.1.1 Bidding Documents may be obtained from the Architect for a deposit as stated in Specification Section 011000. The deposit will be refunded if so stated. No deposits will be refunded on Bidding Documents returned later than ten days after receipt of bids.
- 3.1.2 Complete sets of Bidding Documents shall be used in preparing bids; neither the Owner nor the Architect assumes any responsibility for errors or misinterpretation resulting from the use of incomplete sets of Bidding Documents.
- 3.1.3 The Owner or Architect in making copies of the Bidding Documents available on the above terms, do so only for the purpose of obtaining bids on the work and do not confer a license or grant for any other use.

3.2 Interpretation or Correction of Bidding Documents.

- 3.2.1 Bidders shall promptly notify the Architect of any ambiguity, inconsistency or error which they may discover upon examination of the Bidding Documents or of the site and local conditions.
- 3.2.2 Bidders requiring clarification or interpretation of the Bidding Documents shall make a written request to the Architect, to reach him at least seven days prior to the date of receipt of bids.
- 3.2.3 Any interpretation, correction or change of the Bidding Documents will be made by Addendum. Interpretations, corrections or changes of the Bidding Documents made in any other manner will not be binding, and Bidders shall not rely upon such interpretations, corrections and changes.

3.3 Substitutions

- 3.3.1 The materials, products and equipment described in the Bidding Documents establish a standard of required function, dimension, appearance and quality to be met by any proposed substitution.

- 3.3.2 Whenever the name of a particular brand, make, or manufacturer is utilized, it is solely for the purpose of denoting a basis of design and quality standard of product desired.
- 3.3.2.1 The Bidder is not limited to the particular brand, make, or manufacturer named unless the project calls for and specifies a certain product to ensure a uniform appearance of an existing structure, extend an existing system presently being used at the facility or site, and that does not detract from the utility or uniform appearance of the facility or site.
- 3.3.2.2 Equivalent products will be acceptable, provided all other specified requirements are met.
- 3.3.3 Substitution prior approvals are not required, but recommended. If a potential supplier wishes to submit for prior approval on a particular product other than the product specified in the Contract Documents, he shall do so no later than seven (7) working days prior to the date for receipt of bids. Each such request shall include the name of the material or equipment for which it is to be substituted and a complete description of the proposed substitute including model numbers, drawings, cuts, performance and test data and other information necessary for an evaluation. A statement setting forth any changes in other materials, equipment or work that incorporation of the substitute would require shall be included. 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.
- 3.3.4 If the Architect approves any prior proposed substitution, such approval will be set forth in an Addendum.
- 3.4 Addenda
- 3.4.1 Addenda will be mailed or delivered to all who are known by the Architect to have received a complete set of Bidding Documents.
- 3.4.2 Copies of Addenda will be made available for inspection wherever Bidding Documents are on file for that purpose.
- 3.4.3 Addenda shall not be issued within a period of seventy-two (72) hours prior to the advertised time for the opening bids, excluding Saturdays, Sundays, and any other legal holidays; however, if the necessity arises to issue an addendum modifying plans and specifications within the seventy-two hour (72) period prior to the advertised time for the opening of bids, then the opening of bids shall be extended exactly one week, without the requirement of re-advertising. Calcasieu Parish School Board shall be consulted prior to issuance of such an Addendum, and shall approve such issuance.
- 3.4.4 Each Bidder shall ascertain from the Architect prior to submitting his bid that he has received all Addenda issued, and he shall acknowledge their receipt on the Bid Form.

ARTICLE 4

BIDDING PROCEDURE

- 4.1 Form and Style of Bids

- 4.1.1 Bids shall be submitted on the forms provided by the Architect.
- 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 Bidder is a sole proprietor, a partnership, a corporation, or any other legal entity, legally authorized to bind the Bidder to a contract. A Bid submitted by an agency shall have a current Power of Attorney attached certifying agent's authority to bind Bidder.
- 4.1.8 On any Bid in excess of fifty thousand dollars (\$50,000.00), the Contractor shall certify that he is licensed under R.S. 37:2150-2163 and show his license number on the Bid above his signature or 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 a bid bond written by a surety company licensed to do business in Louisiana and with an 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 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.

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.

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.

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

4.3 Submission of Bids

- 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 Calcasieu Parish School Board at the appointed place and prior to the announced time for the opening of bids. Later delivery of a bid for any reason, including late delivery by United States Mail, or express delivery, shall disqualify the bid. The bid envelope shall be identified on the outside with the name of the project, and the name, address, and license number of the Bidder as required by RS 37:2163. If the Bid is sent by mail, the sealed envelope shall be enclosed in a separate mailing envelope with the notation "Bid Enclosed" on the face thereof. Such bids shall be sent by Registered or Certified Mail, Return Receipt Requested, addressed to: Calcasieu Parish School Board, P.O. Box 800, Lake Charles, LA 70602.
- 4.3.2 Bids shall be deposited at the designated location prior to the time on the date for receipt of bids indicated in the advertisement for Bids, or an extension thereof made by Addendum. Bids received after the time and date for receipt of bids will be returned unopened.
- 4.3.3 Bidder shall assume full responsibility for timely delivery at location designated for receipt of bids.
- 4.3.4 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 have the effect of amending the Bid.

4.4 Modification or Withdrawal of Bid

- 4.4.1 A bid may not be modified, withdrawn or canceled by the Bidder during the time stipulated in the Advertisement for Bids, for the period following the time and bid date designated for the receipt of bids, and the Bidder so agrees in submitting his bid, except in accordance with Act 111 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 for 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 will be read aloud, and a tabulation abstract of the amounts of the Base Bids and Alternates, if any, will be made available to Bidders.
- 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 Bidding Documents or a Bid in any way incomplete or irregular.
- 5.3 Acceptance of Bid
 - 5.3.1 Deleted
 - 5.3.2 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 shall reserve the right to accept alternates in any order which does not affect determination of the low bidder. LA. R.S. 38:2212 (A) (3) (e); Act 868.
 - 5.3.3 It is the intent of the Owner to award a contract to the lowest responsible Bidder in accordance with the requirements of the Bidding Documents, and if the bid does not exceed the funds available.

ARTICLE 6

POST BID INFORMATION

- 6.1 Proposed list of subcontractors, materials suppliers, and superintendents.
 - 6.1.1 The lowest responsive and responsible bidder must submit to the Owner, or the Project Architect, on behalf of the Owner, within ten (10) days after the bid opening, the completed Contractor Compliance Certificate on State Residency Requirements, Attestation Form (R.S. 38.2227), Affidavit Form (R.S. 38.2212.10 (C)), Affidavit, Resolution, Approved Applicator (Roofing), Manufacturer's Warranty Letter (Roofing), and Superintendent's Resume'.
 - 6.1.2 The lowest responsive and responsible bidder must also submit to the Owner within ten (10) days after bids are opened, a 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. Also, provide a designation of the work to be performed by the Contractor with his own forces. No bids shall be received within 24 hours before a weekend or legal holiday, unless deemed necessary by the Superintendent of Schools.

- 6.1.3 Subcontractors, other persons, and organizations selected by the Bidder must be used on the work for which they were proposed and shall not be changes, except with the written approval of the Owner and Architect.
- 6.1.4 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.
- 6.1.5 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.
- 6.1.6 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.
- 6.1.7 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.
- 6.1.8 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.
- 6.2 Additional Submissions
 - 6.2.1 A breakdown of the contract into the 48 Divisions of the C.S.I. shall be provided to the Architect. No payments will be made to the Contractor until this is received.
 - 6.2.2 A copy of applicable state, parish, or municipal licenses legally required for General Contractor and subcontractors shall be provided to the Architect. No payments will be made to the Contractor until this is received.
 - 6.2.3 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 AND PAYMENT BOND

7.1 Bond Required

- 7.1.1 The Contractor shall furnish and pay for a Performance and Payment Bond written by a company licensed to do business in Louisiana, which shall be countersigned by a person who is contracted with the surety company or bond issuer as an agent 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 the form furnished by Calcasieu Parish School Board, entitled Contract Between Owner and Contractor and Performance and Payment Bond, a copy of which is included in the Contract 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 bound in the Bidding 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 execute the Non-collusion Affidavit included in the Contract Documents.
- 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 Owner and Contractor is duly executed.

ARTICLE 9

COMPLETION TIME AND LIQUIDATED DAMAGES

- 9.1 The completion of the Contract must be within the time stated in Specification Section 011000 – Project Information and Basic Requirements, Article 1.7 included in these bid documents, subject to such extensions as may be granted under AIA Document A201-2017, 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 as stated in Specification Section 011000 – Project Information and Basic Requirements, Article 1.7 included in these bid documents.

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 will be held on Tuesday, November 4, 2025 @ 2:00 p.m. at Washington Marion High School Stadium. 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 Bidding 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 two set of Articles.

ARTICLE 13

FEDERAL FUNDED PROJECTS

- 13.1 In addition to all other conditions contained herein, if a project is funded in whole or in part by federal funds, the following provisions are applicable.

-The Contractor shall comply with the Copeland "Anti-Kickback" Act which prohibits the Contractor and his assignees from inducing, by any means, any person employed in the construction, completion, or repair of public work, to give up any part of the compensation to which he is otherwise entitled.

-The Contractor shall comply with the Davis-Bacon Act, which requires contractors to pay wages to laborers and mechanics at a rate not less than the minimum wages specified in a wage determination made by the U.S. Secretary of Labor. In addition, the Contractor shall be required to pay wages not less often than once a week.

-The Contractor shall comply with the Contract Work Hours and Safety Standards Act, which requires the Contractor to compute the wages of every mechanic and laborer on the basis of a standard work day of eight (8) hours and standard work week of forty (40) hours. Work in excess of the standard workday or workweek is permissible provided that the worker is compensated at a rate of not less than 1-1/2 times the in any calendar day or forty (40) hours in the work week. The Contractor shall not require any laborer or mechanic to work in surroundings or under working conditions which are unsanitary, hazardous or dangerous to his health and safety as determined under construction, safety and health standards promulgated by the U.S. Secretary of Labor.

-For contracts in excess of \$100,000, the Contractor shall comply with all applicable standards, orders or requirements issued under Section 306 of the Clean Air Act, Section 508 of the Clean Water Act Executive Order 11738 and Environmental Protection Agency (EPA) regulations which prohibit the use of facilities included on the EPA list of Violating Facilities.

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

ARTICLE 14

MISCELLANEOUS PROVISIONS

- 14.1 The general 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 general contractor will be responsible for the removal and relocation of any playground equipment that needs to be moved due to construction.

- 14.3 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.

ARTICLE 15

MINORITY PARTICIPATION

- 15.1 The Calcasieu Parish School Board encourages minority Contractors, Subcontractors, businesses, and residents to participate in working on this project and that are domiciled in Calcasieu Parish.

ARTICLE 16

SALES and USE TAX EXEMPTION

- 16.1 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 art 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.



AIA® Document A201® – 2017

General Conditions of the Contract for Construction

for the following PROJECT:

(Name and location or address)

Phase 8 Stadium Improvements
Washington - Marion High School

THE OWNER:

(Name, legal status and address)

Calcasieu Parish School Board
P O Box 800
Lake Charles, Louisiana 70602

THE ARCHITECT:

(Name, legal status and address)

Ellender Architects & Associates, LLC - Project Architect
Moss Reed Architects - Project Management

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- 15 CLAIMS AND DISPUTES

ADDITIONS AND DELETIONS:

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

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

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

Init.

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ARTICLE 1 GENERAL PROVISIONS

§ 1.1 Basic Definitions

§ 1.1.1 The Contract Documents

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

§ 1.1.2 The Contract

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

§ 1.1.3 The Work

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

§ 1.1.4 The Project

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

§ 1.1.5 The Drawings

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

§ 1.1.6 The Specifications

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

§ 1.1.7 Instruments of Service

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

§ 1.1.8 Initial Decision Maker

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

§ 1.2 Correlation and Intent of the Contract Documents

§ 1.2.1 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent

consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

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

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

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

§ 1.3 Capitalization

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

§ 1.4 Interpretation

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

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

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

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

§ 1.6 Notice

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

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

§ 1.7 Digital Data Use and Transmission

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

§ 1.8 Building Information Models Use and Reliance

Any use of, or reliance on, all or a portion of a building information model without agreement to written protocols governing the use of, and reliance on, the information contained in the model shall be at the using or relying party's

sole risk and without liability to the other party and its contractors or consultants, the authors of, or contributors to, the building information model, and each of their agents and employees.

ARTICLE 2 OWNER

§ 2.1 General

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

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

§ 2.2 Evidence of the Owner's Financial Arrangements

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

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

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

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

§ 2.3 Information and Services Required of the Owner

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

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

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

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

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

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

§ 2.4 Owner's Right to Stop the Work

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

§ 2.5 Owner's Right to Carry Out the Work

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

ARTICLE 3 CONTRACTOR

§ 3.1 General

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

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

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

§ 3.2 Review of Contract Documents and Field Conditions by Contractor

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

§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.3.4, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

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

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

§ 3.3 Supervision and Construction Procedures

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

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

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

§ 3.4 Labor and Materials

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

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

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

§ 3.5 Warranty

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

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

§ 3.6 Taxes

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

§ 3.7 Permits, Fees, Notices and Compliance with Laws

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

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

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

§ 3.7.4 Concealed or Unknown Conditions

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

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

Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 15.

§ 3.8 Allowances

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

§ 3.8.2 Unless otherwise provided in the Contract Documents,

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

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

§ 3.9 Superintendent

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

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

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

§ 3.10 Contractor's Construction and Submittal Schedules

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

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

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

§ 3.11 Documents and Samples at the Site

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

§ 3.12 Shop Drawings, Product Data and Samples

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

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

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

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

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

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

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

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

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

§ 3.12.10 The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's

responsibilities for construction means, methods, techniques, sequences, and procedures. The Contractor shall not be required to provide professional services in violation of applicable law.

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

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

§ 3.13 Use of Site

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

§ 3.14 Cutting and Patching

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

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

§ 3.15 Cleaning Up

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

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

§ 3.16 Access to Work

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

§ 3.17 Royalties, Patents and Copyrights

The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner and Architect harmless from loss on account thereof, but shall not be responsible for defense or loss when a particular design, process, or product of a particular manufacturer or manufacturers is required by the Contract Documents, or where the copyright violations are contained in

Drawings, Specifications, or other documents prepared by the Owner or Architect. However, if an infringement of a copyright or patent is discovered by, or made known to, the Contractor, the Contractor shall be responsible for the loss unless the information is promptly furnished to the Architect.

§ 3.18 Indemnification

§ 3.18.1 To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the Owner, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), but only to the extent caused by the negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss, or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity that would otherwise exist as to a party or person described in this Section 3.18.

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

ARTICLE 4 ARCHITECT

§ 4.1 General

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

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

§ 4.2 Administration of the Contract

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

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

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

§ 4.2.4 Communications

The Owner and Contractor shall include the Architect in all communications that relate to or affect the Architect's services or professional responsibilities. The Owner shall promptly notify the Architect of the substance of any

direct communications between the Owner and the Contractor otherwise relating to the Project. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and suppliers shall be through the Contractor. Communications by and with Separate Contractors shall be through the Owner. The Contract Documents may specify other communication protocols.

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

§ 4.2.6 The Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the Work in accordance with Sections 13.4.2 and 13.4.3, whether or not the Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, suppliers, their agents or employees, or other persons or entities performing portions of the Work.

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

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

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

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

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

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

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

§ 4.2.14 The Architect will review and respond to requests for information about the Contract Documents. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with

reasonable promptness. If appropriate, the Architect will prepare and issue supplemental Drawings and Specifications in response to the requests for information.

ARTICLE 5 SUBCONTRACTORS

§ 5.1 Definitions

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

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

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

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

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

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

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

§ 5.3 Subcontractual Relations

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

§ 5.4 Contingent Assignment of Subcontracts

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

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

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

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

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

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

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

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

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

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

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

§ 6.2 Mutual Responsibility

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

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

for discrepancies or defects in the construction or operations by the Owner or Separate Contractor that are not apparent.

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

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

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

§ 6.3 Owner's Right to Clean Up

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

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 General

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

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

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

§ 7.2 Change Orders

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

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

§ 7.3 Construction Change Directives

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

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

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

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

.4 As provided in Section 7.3.4.

§ 7.3.4 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.4 shall be limited to the following:

- .1** Costs of labor, including applicable payroll taxes, fringe benefits required by agreement or custom, workers' compensation insurance, and other employee costs approved by the Architect;
- .2** Costs of materials, supplies, and equipment, including cost of transportation, whether incorporated or consumed;
- .3** Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;
- .4** Costs of premiums for all bonds and insurance, permit fees, and sales, use, or similar taxes, directly related to the change; and
- .5** Costs of supervision and field office personnel directly attributable to the change.

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

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

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

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

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

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

§ 7.4 Minor Changes in the Work

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

ARTICLE 8 TIME

§ 8.1 Definitions

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

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

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

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

§ 8.2 Progress and Completion

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

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

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

§ 8.3 Delays and Extensions of Time

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

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

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

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 Contract Sum

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

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

§ 9.2 Schedule of Values

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

§ 9.3 Applications for Payment

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

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

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

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

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

§ 9.4 Certificates for Payment

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

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

§ 9.5 Decisions to Withhold Certification

§ 9.5.1 The Architect may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect's opinion the representations to the Owner required by Section 9.4.2 cannot be made. If the Architect is unable to certify payment in the amount of the Application, the Architect will notify the

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

- .1 defective Work not remedied;
- .2 third party claims filed or reasonable evidence indicating probable filing of such claims, unless security acceptable to the Owner is provided by the Contractor;
- .3 failure of the Contractor to make payments properly to Subcontractors or suppliers for labor, materials or equipment;
- .4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
- .5 damage to the Owner or a Separate Contractor;
- .6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or
- .7 repeated failure to carry out the Work in accordance with the Contract Documents.

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

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

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

§ 9.6 Progress Payments

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

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

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

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

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

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

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

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

§ 9.7 Failure of Payment

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

§ 9.8 Substantial Completion

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

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

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

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

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

§ 9.9 Partial Occupancy or Use

§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented

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

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

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

§ 9.10 Final Completion and Final Payment

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

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

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

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

- .1 liens, Claims, security interests, or encumbrances arising out of the Contract and unsettled;
- .2 failure of the Work to comply with the requirements of the Contract Documents;

- .3 terms of special warranties required by the Contract Documents; or
- .4 audits performed by the Owner, if permitted by the Contract Documents, after final payment.

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

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 Safety Precautions and Programs

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

§ 10.2 Safety of Persons and Property

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

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

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

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

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

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

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

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

§ 10.2.8 Injury or Damage to Person or Property

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

§ 10.3 Hazardous Materials and Substances

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

§ 10.3.2 Upon receipt of the Contractor's notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of the material or substance or who are to perform the task of removal or safe containment of the material or substance. The Contractor and the Architect will promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities proposed by the Owner. If either the Contractor or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor and the Architect have no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable additional costs of shutdown, delay, and start-up.

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

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

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

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

§ 10.4 Emergencies

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

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 Contractor's Insurance and Bonds

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

Owner, Architect, and Architect's consultants shall be named as additional insureds under the Contractor's commercial general liability policy or as otherwise described in the Contract Documents.

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

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

§ 11.1.4 Notice of Cancellation or Expiration of Contractor's Required Insurance. Within three (3) business days of the date the Contractor becomes aware of an impending or actual cancellation or expiration of any insurance required by the Contract Documents, the Contractor shall provide notice to the Owner of such impending or actual cancellation or expiration. Upon receipt of notice from the Contractor, the Owner shall, unless the lapse in coverage arises from an act or omission of the Owner, have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by the Contractor. The furnishing of notice by the Contractor shall not relieve the Contractor of any contractual obligation to provide any required coverage.

§ 11.2 Owner's Insurance

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

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

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

§ 11.3 Waivers of Subrogation

§ 11.3.1 The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents, and employees, each of the other; (2) the Architect and Architect's consultants; and (3) Separate Contractors, if any, and any of their subcontractors, sub-subcontractors, agents, and employees, for damages caused by fire, or other causes of loss, to the extent those losses are covered by property insurance required by the Agreement or other property insurance applicable to the Project, except such rights as they have to proceeds

of such insurance. The Owner or Contractor, as appropriate, shall require similar written waivers in favor of the individuals and entities identified above from the Architect, Architect's consultants, Separate Contractors, subcontractors, and sub-subcontractors. The policies of insurance purchased and maintained by each person or entity agreeing to waive claims pursuant to this section 11.3.1 shall not prohibit this waiver of subrogation. This waiver of subrogation shall be effective as to a person or entity (1) even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, (2) even though that person or entity did not pay the insurance premium directly or indirectly, or (3) whether or not the person or entity had an insurable interest in the damaged property.

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

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

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

§ 11.5 Adjustment and Settlement of Insured Loss

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

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

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 Uncovering of Work

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

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

§ 12.2 Correction of Work

§ 12.2.1 Before Substantial Completion

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

§ 12.2.2 After Substantial Completion

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

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

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

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

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

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

§ 12.3 Acceptance of Nonconforming Work

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

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 Governing Law

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

§ 13.2 Successors and Assigns

§ 13.2.1 The Owner and Contractor respectively bind themselves, their partners, successors, assigns, and legal representatives to covenants, agreements, and obligations contained in the Contract Documents. Except as provided in Section 13.2.2, neither party to the Contract shall assign the Contract as a whole without written consent of the

other. If either party attempts to make an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

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

§ 13.3 Rights and Remedies

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

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

§ 13.4 Tests and Inspections

§ 13.4.1 Tests, inspections, and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules, and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections, and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections, and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Owner shall bear costs of tests, inspections, or approvals that do not become requirements until after bids are received or negotiations concluded. The Owner shall directly arrange and pay for tests, inspections, or approvals where building codes or applicable laws or regulations so require.

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

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

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

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

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

§ 13.5 Interest

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

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 Termination by the Contractor

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

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

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

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

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

§ 14.2 Termination by the Owner for Cause

§ 14.2.1 The Owner may terminate the Contract if the Contractor

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

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

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

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

§ 14.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Architect's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance,

the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall be certified by the Initial Decision Maker, upon application, and this obligation for payment shall survive termination of the Contract.

§ 14.3 Suspension by the Owner for Convenience

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

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

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

§ 14.4 Termination by the Owner for Convenience

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

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

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

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

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 Claims

§ 15.1.1 Definition

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

§ 15.1.2 Time Limits on Claims

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

§ 15.1.3 Notice of Claims

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

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

§ 15.1.4 Continuing Contract Performance

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

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

§ 15.1.5 Claims for Additional Cost

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

§ 15.1.6 Claims for Additional Time

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

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

§ 15.1.7 Waiver of Claims for Consequential Damages

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

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

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

§ 15.2 Initial Decision

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

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

Initial Decision Maker's sole discretion, it would be inappropriate for the Initial Decision Maker to resolve the Claim.

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

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

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

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

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

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

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

§ 15.3 Mediation

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

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

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

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

§ 15.4 Arbitration

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

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

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

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

§ 15.4.4 Consolidation or Joinder

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

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

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

SUPPLEMENTARY CONDITIONS

These Supplementary Conditions modify, change, delete from or add to the General Conditions of the Contract for Construction AIA Document A201, 16th Edition, 2017. When any article of the General Conditions is modified or any paragraph, subparagraph or clause thereof is modified or deleted by this supplement, the unaltered provisions of that article, section, paragraph, or clause shall remain in effect.

Articles, sections, paragraphs, or clauses modified or deleted have the same numerical designation as those occurring in the General Conditions.

ARTICLE 1 - GENERAL PROVISIONS

§ 1.1 BASIC DEFINITIONS

§ 1.1.1 THE CONTRACT DOCUMENTS

(In paragraph 1.1.1, delete the third sentence and add the following sentence)

“The Contract Documents shall include the bidding documents as listed in the Instructions to Bidders and any modifications made thereto by Addenda.”

ARTICLE 2 - OWNER

§ 2.3 INFORMATION AND SERVICES REQUIRED OF THE OWNER

(Add the following sentence to the end of paragraph 2.3.5)

§ 2.3.5 “The Owner shall not be responsible for any explanation or interpretation of the Contract Documents.”

(Delete paragraph 2.3.6 and substitute the following)

§ 2.3.6 “After the project has been awarded and pursuant to Subsection 1.5.2, the Architect shall furnish the Contractor, free of charge, two (2) CD copies of the Construction Documents, including any addenda issued. Any additional sets shall be paid for by the Contractor.”

(Add new section 2.6)

§ 2.6 OWNER’S RIGHT OF PARTIAL OCCUPANCY

(Add new paragraph 2.6.1)

§ 2.6.1 “The Owner shall have the right to use any and all portions of the building that have reached such a stage of completion as to permit occupancy or use provided that such occupancy or use does not hamper the Contractor or prevent his efficient completion of the Contract. Use form provided in the Contract Documents entitled “Beneficial Occupancy”.”

ARTICLE 7 - CHANGES IN THE WORK

§ 7.2 CHANGE ORDERS

(Add new paragraph 7.2.2)

§ 7.2.2 “The Contractor shall include extensions of time, if any, with the change order request and shall submit substantiation for such extension of time.”

§ 7.3 CONSTRUCTION CHANGE DIRECTIVES

§ 7.3.1 (Delete the second sentence of paragraph 7.3.1)

(Delete paragraphs 7.3.2, 7.3.3, 7.3.4, 7.3.5, 7.3.6, 7.3.7, 7.3.8, 7.3.9 and 7.3.10)

ARTICLE 8 - TIME

§ 8.1 DEFINITIONS

§ 8.1.2 (In paragraph 8.1.2, change the words “in the agreement” to read “by the written Notice to Proceed”.)

(Add new paragraph 8.1.5)

§ 8.1.5 “The date of Beneficial Occupancy shall be the date when a certain portion or portions of a project are complete to a point where they can be occupied by the Owner.”

§ 8.2 PROGRESS AND COMPLETION

(Delete paragraph 8.2.1 and substitute the following)

§ 8.2.1 “Time is of the essence and completion of the work must be within the time stated in the Agreement, subject to such extensions as may be granted under section 8.3. The Contractor agrees to commence work not later than ten days after the transmittal date of the written notice to proceed from the Owner and to substantially complete the project within the time stated in the Agreement. The Owner will suffer financial loss if the project is not substantially complete in the time set forth in the Contract Documents. The Contractor and his surety shall be liable for and shall pay to the Owner the sum stated in the Contract Documents as fixed, agreed and liquidated damages for each consecutive calendar day (Saturday, Sunday, and holidays included) of delay until the Work is substantially complete.”

§ 8.3 DELAYS AND EXTENSIONS OF TIME

§ 8.3.1 In paragraph 8.3.1, change the words “for such reasonable time as the Architect may determine” to read, “as recommended by the Architect, subject to Owner’s approval of the change order”.

(Delete paragraph 8.3.3)

ARTICLE 9 - PAYMENTS AND COMPLETION

§ 9.3.1 APPLICATIONS FOR PAYMENT

(Delete paragraph 9.3.1 and substitute the following)

§ 9.3.1 “Monthly, the Contractor shall submit to the Architect an Application of Certificate for Payment on the most recent versions of AIA Document G702, accompanied by AIA Document G703, notarized, and supported by such data substantiating the right to payment as the Owner or Architect may require. Application for payment shall be submitted on or about the first of each month for the value of labor and materials incorporated in the work and of material suitably stored on site as of the twenty-fifth (25th) day of the preceding month, less normal retainage as follows:”

1. Project with Contract sum of less than \$500,000:
10% of Contract Sum
2. Project with Contract sum of more than \$500,000:
5% of Contract Sum

§ 9.3.1.1 (Delete this paragraph)

§ 9.6 PROGRESS PAYMENTS

(Delete paragraph 9.6.1 and substitute the following)

§ 9.6.1 “After the Architect has issued a certificate for payment, the Owner shall make payment in a timely manner.”

§ 9.7 FAILURE OF PAYMENT

(Delete section 9.7 and substitute the following)

§ 9.7 “If the Architect does not issue a Certificate of Payment, through no fault of the Contractor, in a timely manner after receipt of the Contractor’s Application for Payment (unless held for reasons set forth in Section 9.5), or if the Owner does not pay the Contractor in a timely manner the amount certified by the Architect or awarded by binding dispute resolution, then the Contractor may, upon written notice to the Owner and Architect, stop the work until payment of the amount owed 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 for shut-down, delay, and start-up, as provided for in the Contract Documents.”

§ 9.8 SUBSTANTIAL COMPLETION

§ 9.8.5 (Delete the second and third sentences of paragraph 9.8.5 and substitute the following)

“Upon such acceptance and consent of surety, and upon receipt of a clear lien certificate, the Owner shall make payment, including retainage, sufficient to increase the total payment to one hundred percent (100%) of the Contract Sum, less such amounts as the Architect shall determine for incomplete and/or non-conforming work, including unsettled claims.”

(Add new paragraph 9.8.6)

§ 9.8.6 “Upon the recommendation of the Architect, the Contractor shall record with the Clerk of Court a “Certificate of Substantial Completion” of the Building Contract.”

§ 9.10 FINAL COMPLETION AND FINAL PAYMENT

§ 9.10.2 (Completely delete that part of the sentence following (5) and substitute the following)

“The Contractor shall furnish a clear lien certificate from the Clerk of Court not less than forty-five (45) days after the recordation of acceptance.”

ARTICLE 11 - INSURANCE AND BONDS

§ 11.1 CONTRACTOR’S INSURANCE AND BONDS

(Delete all paragraphs and substitute the following)

§ 11.1.1 “The Contractor shall, before commencing any work to be conducted under this Agreement, procure Workmen’s Compensation and Employer’s Liability Insurance with an insurance company authorized to write such policies of insurance in the State of Louisiana. It shall be the further responsibility of the Contractor to require that all Subcontractors have in full force and effect, a policy of Workmen’s Compensation and Employer’s Liability Insurance before proceeding with any of the Work required under this Agreement. The Contractor shall procure and maintain, during the life of this Agreement, such public liability and property damage insurance, including the operation of motor vehicles, with limits as hereinafter provided which will cover the Contractor’s legal liability arising out of the Work performed by the Contractor and any Subcontractor, and by anyone directly or indirectly employed by either of them for claims for damages for bodily injury, including accidental death, as well as claims for property damages, which may arise from operations under this contract.”

(Add new paragraph 11.1.1.1)

§ 11.1.1.1 Insurance coverage specified in the General Conditions (AIA Document A201) to be provided by the Contractor, and any other insurance described below shall be furnished with the following minimum limits:

Workmen's Compensation:

.1	Applicable State:	Standard Louisiana.
.2	Employer's Liability:	\$500,000.00

(Add new paragraph 11.1.1.2)

§ 11.1.1.2 Contractor's Liability Insurance, including Contractual Liability: Form of insurance shall be Comprehensive Liability including Broad Form CGL and the Contractor shall furnish a certificate naming the Calcasieu Parish School Board as an additional insured:

Coverage Required for Projects: <\$1,000,000 >\$1,000,000

- .1 Bodily Injury and Property Damage
 Combined Single Limit (CSL) – Includes Products, Completed Operations, and Contractual Liability

Each Occurrence	\$500,000 (CSL)	\$1,000,000 (CSL)
Aggregate	\$500,000 (CSL)	\$1,000,000 (CSL)

- .2 Personal Injury
 Combined Single Limit (CSL) (Aggregate Limits) – Including products and completed operations and Contractual Liability.

Each Person Aggregate	\$500,000 (CSL)	\$1,000,000 (CSL)
General Aggregate	\$500,000 (CSL)	\$1,000,000 (CSL)

- .3 Automobile Liability
 Combined Single Limit (CSL) – Owner, non-owned and hired car bodily injury and property damage.

\$300,000 (CSL)	\$500,000 (CSL)

- .4 XCU Coverage. Remove Exclusion

- .5 Umbrella Policy – The Contractor shall procure and maintain during the life of this agreement, an Umbrella Policy in the amount of \$1,000,000 in excess of all other insurance requirements.

§ 11.1.4 NOTICE OF CANCELLATION OR EXPIRATION OF CONTRACTOR'S REQUIRED INSURANCE

(Add the following statement)

“The Contract Time and Contract Sum may be equitably adjusted for the procurement of replacement coverages as stated herein if mutually agreed upon by all parties and approved by the Owner.”

§ 11.2 OWNERS’ INSURANCE

(Delete paragraph 11.2.1 and substitute the following)

§ 11.2.1 Owner’s and Contractor’s Protective Liability Insurance shall be furnished by the Contractor naming the Calcasieu Parish School Board as an additional insured.

Coverage Required for Projects: <\$1,000,000 >\$1,000,000

.1 Bodily Injury and Property Damage
 Combined Single Limit (CSL) – Includes Products, Completed
 Operations, and Contractual Liability

Each Occurrence	\$500,000 (CSL)	\$1,000,000 (CSL)
Aggregate	\$500,000 (CSL)	\$1,000,000 (CSL)

(Add new paragraph 11.2.1.1)

§ 11.2.1.1 “Unless otherwise provided, the Contractor shall purchase and maintain property insurance upon the entire work at the site to the full insurable value equal to the Contract Sum.

The Contractor is to provide “Builder’s Risk Insurance” to protect the Owner, Contractor, and Subcontractors as their interests may appear.

The policy insures against “All Risk” of direct physical loss or damage subject to certain exclusions and limitations.”

(Delete paragraphs 11.2.2 and 11.2.3)

ARTICLE 13 - MISCELLANEOUS PROVISIONS

(Add new section 13.7)

§ 13.6 RECORDATION OF CONTRACT AND BOND

(Add new paragraph 13.7.1)

§ 13.6.1 “The Owner shall record the Agreement between the Owner and Contractor and Performance and Payment Bond with the Clerk of Court in the parish in which the work is to be performed.”

ARTICLE 15 – CLAIMS and DISPUTES

§ 15.1.6 CLAIMS FOR ADDITIONAL TIME

(Delete paragraph 15.1.6.2 and substitute the following)

§ 15.1.6.2 “If adverse weather conditions are the basis for a claim for additional time, the Contractor shall document that weather conditions had an adverse effect on the scheduled construction. An increase in the Contract Time due to weather shall not be cause for an increase in the Contract Sum, unless mutually agreed upon between the Owner, Architect, and Contractor. At the end of each month, the Contractor shall make one (1) claim for any adverse weather days occurring within the month. The claim must be accompanied by sufficient documentation evidencing the adverse days and the impact on construction/critical path. Failure to make such claim within twenty-one (21) days from the last day of the month shall prohibit any future claims for adverse days for that month.”

(Add new paragraph 15.1.6.2.1)

§ 15.1.6.2.1 “The following days are considered reasonable anticipated days of adverse weather on a monthly basis.”

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

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

“Note: Agreement is on a calendar day basis.”

(Add new Article 16)

ARTICLE 16 - EQUAL OPPORTUNITY

(Add new section 16.1)

§ 16.1 “The Contractor and all Subcontractors shall not discriminate against any employee or applicant for employment because of race, religion, color, sex or national origin. The Contractor shall take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, religion, color, sex, or national origin. Such action shall include, but not limited to the following: “employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices setting forth in policies of non-discrimination.”

(Add new section 16.2)

§ 16.2 “The Contractor and all Subcontractors shall, in all solicitations or advertisements for employees placed by them or on their behalf, state that all qualified applicants will receive consideration for employment without regard to race, religion, color, sex or national origin.”

(Add new Article 17)

ARTICLE 17 - DOCUMENT INTENT

(Add new section 17.1)

§ 17.1 “The Contract Documents are intended to produce a piece of work complete in every respect and the Contractor shall furnish all things necessary to complete the work within the meaning and intent of the said documents. It shall be the responsibility of the Contractor to provide everything necessary to complete the work as enumerated in these Supplementary Conditions.”

END OF SUPPLEMENTARY CONDITIONS

LOUISIANA UNIFORM PUBLIC WORK BID FORM

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

BID FOR: Phase 8 Stadium Improvements
Washington-Marion High School
2017 Bond Issue Improvements

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

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

TOTAL BASE BID: For all work required by the Bidding Documents (including any and all unit prices designated "Base Bid" * but not alternates) 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 (To provide and install alum. fencing & gates as specified in lieu of chain link fencing):

_____ Dollars (\$ _____)

Alternate No. 2 (Not Applicable):

NOT APPLICABLE Dollars (\$ NOT APPLICABLE)

Alternate No. 3 (Not Applicable):

NOT APPLICABLE Dollars (\$ NOT APPLICABLE)

NAME OF BIDDER: _____

ADDRESS OF BIDDER: _____

LOUISIANA CONTRACTOR'S LICENSE NUMBER: _____

NAME OF AUTHORIZED SIGNATORY OF BIDDER: _____

TITLE OF AUTHORIZED SIGNATORY OF BIDDER: _____

SIGNATURE OF AUTHORIZED SIGNATORY OF BIDDER **: _____

DATE: _____

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

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

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

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

LOUISIANA UNIFORM PUBLIC WORK BID FORM

UNIT PRICE FORM

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

BID FOR: Phase 8 Stadium Improvements
Washington-Marion High School
2017 Bond Issue Improvements

UNIT PRICES: This form shall be used for any and all work required by the Bidding Documents and described as unit prices. Amounts shall be stated in figures and only in figures.

DESCRIPTION:	☒ Base Bid or ☐ Alt.# ____ Removal and disposal of unsatisfactory soil and replacement with imported structural fill material per Civil Site Drawings.			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION (<i>Quantity times Unit Price</i>)
1	1	In-Place Cubic Yard		

DESCRIPTION:	☒ Base Bid or ☐ Alt.# ____ To provide and install 1x4 S4S paint grade hardwood for base material. S4S to be primed and painted as specified.			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION (<i>Quantity times Unit Price</i>)
2	1	LF		

DESCRIPTION:	☒ Base Bid or ☐ Alt.# ____ To provide and install 1x12 S4S paint grade exterior grade hardwood trim material. S4S to be primed and painted as specified.			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION (<i>Quantity times Unit Price</i>)
3	1	LF		

DESCRIPTION:	☒ Base Bid or ☐ Alt.# ____ To provide and install 1x6 S4S paint grade exterior grade hardwood trim material. S4S to be primed and painted as specified.			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION (<i>Quantity times Unit Price</i>)
4	1	LF		

DESCRIPTION:	☒ Base Bid or ☐ Alt.# ____ To provide and install 3/8" exterior grade plywood, finished face for ceiling material. Plywood to be primed and painted.			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION (<i>Quantity times Unit Price</i>)
5	1	SF		

DESCRIPTION:	☒ Base Bid or ☐ Alt.# ____ To provide and install 3/4 inch hardwood paint grade cove mold. Molding to be primed and painted.			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION (<i>Quantity times Unit Price</i>)
6	1	LF		

DESCRIPTION:	☒ Base Bid or ☐ Alt.# ____ To provide and install 5/8" exterior grade plywood, finished face for soffit material. Plywood to be primed and painted.			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION (<i>Quantity times Unit Price</i>)
7	1	SF		

DESCRIPTION:	☐ Base Bid or ☐ Alt.# ____			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION (<i>Quantity times Unit Price</i>)

Wording for "DESCRIPTION" is to be provided by the Owner.

All quantities are estimated. The contractor will be paid based upon actual quantities as verified by the Owner

BID BOND

Date: _____

KNOW ALL MEN BY THESE PRESENTS:

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

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

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

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

Phase 8 – Stadium Improvements
Washington-Marion High School

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

PRINCIPAL (BIDDER)

SURETY

BY: _____
AUTHORIZED OFFICER-OWNER-PARTNER

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

CORPORATE RESOLUTION

BE IT RESOLVED that _____
Officer/Owner of _____
is hereby authorized to sign any contract or document on behalf of _____

Officer/Owner

Signature Officer/Owner

SWORN TO AND SUBSCRIBED before me this _____
day of _____, 2025 _____, in _____, Louisiana.

NOTARY PUBLIC

SUBCONTRACTOR LISTING
ELLENDER ARCHITECTS & ASSOCIATES, LLC
 (See Post Bid Information Article VI for further instructions)

Date _____

Note: Also see the “Basic Requirements” Section 011000 of specifications for requirements of the proposed Project Superintendent’s resume’ which **shall be submitted** along with this Subcontractor’s Listing.

SU-1

ATTESTATION FORM
(R.S. 38:2227)
(Past Criminal Convictions of Bidders)

PHASE 8 –STADIUM IMPROVEMENTS
WASHINGTON-MARION HIGH SCHOOL
2017 BOND ISSUE IMPROVEMENTS

Appearer, as a Bidder on the above-entitled Public Works Project, does hereby attest that:

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

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

(a) Public bribery (R.S. 14:118)	(c) Extortion (R.S. 14:66)
(b) Corrupt influencing (R.S. 14:120)	(d) Money laundering (R.S. 14:230)

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

(a) Theft (R.S. 14:67)	(f) Bank fraud (R.S. 14:71.1)
(b) Identity Theft (R.S. 14:67.16)	(g) Forgery (R.S. 14:72)
(c) Theft of a business record (R.S.14:67.20)	(h) Contractors; misapplication of payments (R.S. 14:202)
(d) False accounting (R.S. 14:70)	(i) Malfeasance in office (R.S. 14:134)
(e) Issuing worthless checks (R.S. 14:71)	

NAME OF BIDDER

NAME OF AUTHORIZED SIGNATORY OF BIDDER

DATE

TITLE OF AUTHORIZED SIGNATORY OF BIDDER

**SIGNATURE OF AUTHORIZED
SIGNATORY OF BIDDER**

THIS FORM MUST BE SUBMITTED TO THE OWNER, OR THE PROJECT ARCHITECT/ENGINEER, ON BEHALF OF THE OWNER, WITHIN TEN (10) DAYS AFTER THE BID OPENING.

AFFIDAVIT FORM
(R.S. 38:2212.10(C))
(Verification of Employees E-Verify)

PHASE 8 – STADIUM IMPROVEMENTS
WASHINGTON-MARION HIGH SCHOOL
2017 BOND ISSUE IMPROVEMENTS

Appearer, as a Bidder on the above-entitled Public Works Project, does hereby attest that:

L.A. R.S. 38:2212.10 Verification of Employees (E-Verify)

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

WITNESS

WITNESS

NOTARY PUBLIC

THIS FORM MUST BE SUBMITTED TO THE OWNER, OR THE PROJECT ARCHITECT/ENGINEER,
ON BEHALF OF THE OWNER, WITHIN TEN (10) DAYS AFTER THE BID OPENING.

**CONTRACT BETWEEN OWNER AND CONTRACTOR
AND PERFORMANCE AND PAYMENT BOND**

This agreement entered into this _____ day of _____
2025, _____

hereinafter call the "Contractor", whose business address is _____

_____ 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:

PHASE 8
STADIUM IMPROVEMENTS
WASHINGTON-MARION HIGH SCHOOL
2017 BOND ISSUE IMPROVEMENTS
Calcasieu Parish School Board

in strict accordance with Contract Documents prepared by:

Ellender Architects & Associates, LLC
1521 Cypress Street
Sulphur, Louisiana 70663

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 2025, Addenda number(s) _____ General Conditions, Supplementary Conditions, any Addenda thereto, impose duties and obligations upon the parties herein, and said parties thereby agree that they shall be bound by said duties and obligations. For these purposes, all of the provisions contained in the aforementioned Construction Documents are incorporated herein by reference with the same force and effect as though said Construction Documents were herein set out in full.

Time for Completion: The work shall be commenced on a date to be specified in a written order of the Owner and shall be substantially complete by _____ or any mutually agreed extension thereto.

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 _____

DOLLARS (\$ _____), which sum represents the Base Bid plus Alternates
_____.

Performance and Payment Bond: To these presents personally came and intervened _____
_____,
herein acting for _____,
a corporation organized and existing under the laws of the State of _____, and
duly authorized to transact business in the State of Louisiana, as surety, who declared that having
taken cognizance of this contract and of the Construction Documents mentioned herein, he hereby
in his capacity as its Attorney in Fact obligates his said company, as Surety for the said
contractor, unto the said Owner, up to the sum of _____
_____.
_____.

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

Provided, that any alterations which may be made in the terms, of the contract or in the work to be done under it, or the giving by the Owner of any extensions of time for the performance of the contract, or any other forbearance on the part of either the Owner or the Contractor or the Surety from their liability hereunder, notice to the Surety of any such alterations, extensions or other forbearance being hereby waived.

In Witness whereof, the parties herein on the day and year first above written have executed this agreement in six 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: _____

TITLE

SURETY

ATTORNEY IN FACT

STATE OF LOUISIANA
PARISH OF CALCASIEU

PROJECT: PHASE 8 – STADIUM IMPROVEMENTS
WASHINGTON-MARION HIGH SCHOOL
2017 BOND ISSUE IMPROVEMENTS

LOCATION: Lake Charles, Louisiana

AFFIDAVIT

Before me, the undersigned authority, duly commissioned and qualified within and for the state and parish aforesaid, personally came and appeared

_____representing

_____,
who, being by me first duly sworn deposed and said that he has read this affidavit and does hereby agree under oath to comply with all provisions herein as follows:

PART I

Section 2224 of Part I of Chapter 10 of Title 38
of the La. Revised Statutes of 1950 as Amended.

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

PART II

Section 2190 of Part I of Chapter 10 of Title 38
of the Louisiana Revised Statutes of 1950 as amended.

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

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

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

PART III

That affiant does hereby state that he has read and agrees to comply with and be subject to the provisions of Part V of Chapter 10 of Title 38 of the Louisiana Revised Statutes of 1950, being Sections 2290 through 2296 of Title 38 as amended.

Sworn to and Subscribed Before Me This _____ day of _____
_____, 2025.

CHANGE ORDER

PROJECT NAME: Phase 8 CHANGE ORDER No. _____
STADIUM IMPROVEMENTS DATE: _____
Washington-Marion High School
PROJECT NUMBER: _____ Bid No. _____
CONTRACTOR: _____
TO: Calcasieu Parish School Board

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

The Original Contract Sum _____
Total Changes by Previous Change Order(s) _____
Current Contract Sum _____
Contract Sum will be (increased) (decreased) (unchanged) by this Change Order _____
New Contract Sum _____
The Original Contract Completion Date and Contract Time Date: _____ DAYS
Total Time extended by Previous Change Order(s) _____ DAYS
Contract Time will be (increased) (decreased) (unchanged) by this Change Order _____ DAYS
New Contract Completion Date & Revised Contract Time Date: _____ DAYS
Added Building Area _____ (Sq. Ft.)

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

RECOMMENDED

Ellender Architects & Associates, LLC
1521 Cypress St., Sulphur, LA 70663

Address: _____

ellenderllc@outlook.com

Email Address: _____

By: _____

Date: _____

ACCEPTED

"Contractor's Name"

"Contractor's Address"

Address: _____

Email Address: _____

By: _____

Date: _____

APPROVED

Calcasieu Parish School Board

P.O. Box 800, Lake Charles, LA 70602

Address: _____

Email Address: _____

By: _____

Date: _____

Construction Contract Change Order SUMMARY

Date: _____ Item No. _____
COR No. _____

Project Name: _____

Contractor Name: _____

Description of Work: _____

General Contractor Direct Costs - Breakdown No. _____

(See attached breakdown)

Total General Contractor Cost _____ %
(General Contract Direct Cost plus OH&P) (Max: 15%)

Subcontractor Cost Breakdowns

(See attached.)

Subcontractor Name	Breakdown No.	A Total Direct Cost	B OH&P (Max 15%)	C Total A+(A X B)
			%	
_____	_____	_____	_____ %	_____
_____	_____	_____	_____ %	_____
_____	_____	_____	_____ %	_____
_____	_____	_____	_____ %	_____
_____	_____	_____	_____ %	_____
_____	_____	_____	_____ %	_____
_____	_____	_____	_____ %	_____
_____	_____	_____	_____ %	_____

Subcontractor Direct Costs Total \$ -

(Sum column A)

Subcontractor Direct Costs + Subcontractor OH&P

(Sum column C)

General Contractor OH&P on Subcontractor Direct Cost at _____ %
(Sum column A times General Contractor OH&P rate.) (Max: 10%)

Total Subcontractor Costs

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

Change Order Subtotal

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

Performance and Payment Bond at _____ %
(Change Order Subtotal times Performance and Payment Bond rate)

Amount will be ☐ increased ☐ decreased ☐ unchanged by
(Sum of Change Order Subtotal and Performance and Payment Bond)

Days will be ☐ increased ☐ decreased ☐ unchanged by
(Attach supporting data such as meteorological reports)

Construction Contract Change Order BREAKDOWN

Date: _____ Breakdown No. _____
Item No. _____
COR No. _____

Project Name: _____

Contractor/Subcontractor Name: _____

Direct Cost of Work :

A. Labor	Check here if explained on the Comment Sheet	↓	Hourly Wage Rate	Hours	Total Cost
1	_____	☐	_____	_____	_____
2	_____	☐	_____	_____	_____
3	_____	☐	_____	_____	_____
4	_____	☐	_____	_____	_____
5	_____	☐	_____	_____	_____
6	_____	☐	_____	_____	_____
7	_____	☐	_____	_____	_____
			Add Labor Burden @ _____	%	_____

LABOR TOTAL

B. Material		Unit Price	Unit	Units	Total Cost
1	_____	☐	_____	_____	_____
2	_____	☐	_____	_____	_____
3	_____	☐	_____	_____	_____
4	_____	☐	_____	_____	_____
5	_____	☐	_____	_____	_____
6	_____	☐	_____	_____	_____
7	_____	☐	_____	_____	_____
(Copies of invoices may be required.)				Add Tax @ _____	%

MATERIAL TOTAL

C. Equipment		Unit Rate	Unit	Units	Total Cost
1	_____	☐	_____	_____	_____
2	_____	☐	_____	_____	_____
3	_____	☐	_____	_____	_____
4	_____	☐	_____	_____	_____
5	_____	☐	_____	_____	_____
6	_____	☐	_____	_____	_____
7	_____	☐	_____	_____	_____
(Copies of invoices may be required.)				Add Tax @ _____	%

EQUIPMENT TOTAL

TOTAL DIRECT COST FOR THIS BREAKDOWN
(Sum A, B, & C)

OH&P _____ %
(15% max, if applicable)

TOTAL COST FOR THIS BREAKDOWN

BENEFICIAL OCCUPANCY

NOT FOR RECORDATION

DATE: _____

PROJECT NAME: PHASE 8
STADIUM IMPROVEMENTS
WASHINGTON-MARION HIGH SCHOOL
2017 BOND ISSUE IMPROVEMENTS
Calcasieu Parish School Board

PROJECT NO.: _____

ARCHITECT: Ellender Architects & Associates, LLC

CONTRACTOR: _____

OWNER: Calcasieu Parish School Board

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

PORION OCCUPIED: _____

DATE OCCUPIED: _____

WARRANTY items covered by Occupancy. (See Attached List)

ARCHITECT Date

CONTRACTOR Date

OWNER Date

Punch List See Attached List _____
 None _____

NOT FOR RECORDATION PURPOSES

RECOMMENDATION OF ACCEPTANCE

TO: _____

DATE: _____

PROJECT NO: _____

PROJECT NAME: PHASE 8

STADIUM IMPROVEMENTS

WASHINGTON-MARION HIGH SCHOOL

2017 BOND ISSUE IMPROVEMENTS

Calcasieu Parish School Board

DESIGNER: Ellender Architects & Associates, LLC

CONTRACTOR: _____

OWNER: Calcasieu Parish School Board

I 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 the point where it can be used for the purpose which was intended. It is recommended that it be accepted.

DATE OF ACCEPTANCE: _____

CONTRACT DATE OF COMPLETION: _____

NUMBER OF DAYS (Overrun) (Underrun)(As of Acceptance Date): _____

LIQUIDATED DAMAGES PER DAY Stipulated in Contract \$ _____

VALUE OF PUNCH LIST (Attach Itemized List) \$ _____

Was part of project occupied prior to Acceptance: _____

PORTION OCCUPIED: Attach Beneficial Occupancy Forms

Signed:

ARCHITECT

For Use of Owner

I concur in the Acceptance of this project:

Signed:

OWNER

APPROVED APPLICATOR LETTER

TO: *Calcasieu Parish School Board*
 3310 Broad Street
 Lake Charles, Louisiana 70615

RE: PHASE 8
 STADIUM IMPROVEMENTS
 WASHINGTON-MARION HIGH SCHOOL
 2017 Bond Issue Improvements
 2802 Pineview Street – Lake Charles, Louisiana 70615
 Calcasieu Parish School Board Bid No. 2026-01PC

This letter of approval is to certify that_____

Roofing Contractor is currently an approved applicator for _____

_____ Roofing Systems,

and is authorized to install our roofing system for the PHASE 8 – STADIUM IMPROVEMENTS,

WASHINGTON-MARION HIGH SCHOOL, 2802 Pineview Street, Lake Charles, Louisiana

70615, Calcasieu Parish School Board Bid No. 2026-01 PC project.

MANUFACTURER: _____

NAME: _____

SIGNATURE: _____

TITLE: _____

DATE: _____

**THIS FORM SHALL BE SUPPLIED TO ARCHITECT WITHIN
10 DAYS OF RECEIPT OF BIDS.**

MANUFACTURER'S WARRANTY and INSPECTION LETTER

The undersigned Roofing System Manufacturer acknowledges that they have inspected the job site for

PHASE 8

STADIUM IMPROVEMENTS

WASHINGTON-MARION HIGH SCHOOL

2802 Pineview Street – Lake Charles, Louisiana 70615

Calcasieu Parish School Board Bid No. 2026-01 PC

and read the specifications in their entirety; that they approve the installation of their roofing system as specified over the specified substrate conditions and will provide the warranty as specified in Section 075216.

The undersigned also agrees that the Manufacturer will provide at no charge to the Owner, job site inspections during construction; and provide, at the annual request of the Owner, annual inspections for the duration of the warranty period as specified in Section 075216. Only full-time employees of the Manufacturer shall perform these inspections.

I, _____, certify that I am the
_____ of the below named Corporation.
(Title of Corporate Officer)

(Name of Roofing System Manufacturer)

Signature of Corporate Officer: _____

Date: _____

(Affix Corporate Seal Here)

**THIS FORM SHALL BE SUPPLIED TO ARCHITECT WITHIN
10 DAYS OF RECEIPT OF BIDS.**


**Purchases by Political Subdivisions of
the State of Louisiana**

Sales Tax Exemption Certificate
Louisiana Revised Statute 47:305.7(A)(1)

For questions about this form,
please contact:
Louisiana Department of Revenue
Phone: (855) 307- 3893
Email: Sales.Inquiries@la.gov

Purchases of tangible personal property, digital products, and taxable services, and/or leases and rentals of tangible personal property and digital products by the political subdivision referenced below are totally exempt from the sales tax levied by the State of Louisiana as provided by La. R.S. 47:305.7(A)(1). The Louisiana Constitution, Article VI, §44(2) defines a political subdivision as "a parish, municipality, and any other unit of local government, including a school board and a special district, authorized by law to perform governmental functions." Political subdivisions making purchases from vendors requiring a certified exemption certificate may apply by completing Form R-1057, *Political Subdivision Certification*.

PLEASE PRINT OR TYPE

Political Subdivision	LDR Account Number (if applicable)		
Address			
City	State	ZIP	

The above referenced entity does hereby certify that the entity is a public agency of the State of Louisiana with legal status as one of the following:

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

Purchases of tangible personal property, digital products, and taxable services, and/or leases and rentals of tangible personal property and digital products by the above referenced political subdivision are totally exempted from the sales tax levied by the State as provided by La. R.S. 47:305.7(A)(1). The Louisiana Constitution, Article VI, §44(2) defines a political subdivision as "a parish, municipality, and any other unit of local government, including a school board and a special district, authorized by law to perform governmental functions".

The authorized person for the political subdivision certifies that the entity meets the criteria for the sales tax exclusion under La. R.S. 47:305.7(A)(1), and if sales tax is later found to be due, the entity will be responsible for any tax liabilities.

Notice to Dealer: Report this sale on Schedule A of your sales tax return as an allowable deduction for sales to U.S. government and Louisiana state and local government agencies. This form is valid until December 31, 2030.

Signature of Authorized Agent	
Authorized Agent	Title
Signature	Date (mm/dd/yyyy)



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

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.

DIVISION 01

GENERAL 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.

1.2 SUMMARY

- A. Section Includes:
1. Project Information.
 2. Bid Documents.
 3. Issuance of Bid Documents (After Project Has Been Awarded)
 4. Scope of Work.
 5. Completion Time and Stipulated Damages.
 6. Construction Progress Reports
 7. Requirements.
 8. Testing Services.
 9. Field Measurements.
 10. Codes and Standards.
 11. Contractor's Field Office.
 12. Temporary On-Site Storage.
 13. Temporary Facilities and Heat.
 14. Sanitary Facilities.
 15. Provisions for Security and Protection.
 16. Responsibility for Damages.
 17. Construction Coordination.
 18. Access to site.
 19. Coordination with Occupants.
 20. Work Restrictions.
 21. Warranties and Operational & Maintenance Manuals.
 22. Final Cleaning.
 23. Project Closeout.

1.3 PROJECT INFORMATION

- A. Project Title: **PHASE 8 STADIUM IMPROVEMENTS, WASHINGTON-MARION HIGH**
- B. Architect: **ELLENDER ARCHITECTS AND ASSOCIATES, LLC, 1521 CYPRESS STREET, SULPHUR, LOUISIANA, 70663, (337-527-3603)**
- C. Project Management: **MOSS REED, INC., 3221 RYAN STREET, SUITE B, LAKE CHARLES, LOUISIANA, 70601, (337-433-8166)**
- D. Architect's Consultants: The Architect has retained the following design professionals who have prepared designated portions of the Contract Documents:

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1. M/E/P Engineers: **ADG ENGINEERING, INC., 3909 WEST CONGRESS STREET, SUITE 201, LAFAYETTE, LOUISIANA, 70506, (800-259-5710)**
2. Structural Engineers: **DUHON & PLEASANT CONSULTING ENGINEERS, LLS., 5393 BIG LAKE ROAD, LAKE CHARLES, LOUISIANA, 70605, (337-564-5918)**

1.4 BID DOCUMENTS

- A. The Bid Documents, including drawings and technical specifications, are on file and available at the office of ELLENDER ARCHITECTS & ASSOCIATES, LLC, 1521 Cypress Street, Sulphur, Louisiana 70663 (337) 527-3603, and various area plan rooms.
- B. USB flash drive type media that contains drawings and technical specifications in PDF format may be obtained from the Architect upon payment of **Twenty Dollars (\$20.00)** for each media type. This payment is non-refundable.
- C. When drawings and technical specifications are distributed via USB flash drive type media, the bidder shall be responsible for printing any paper copies he or she may need.
- D. The distribution of drawings and technical specifications via email (electronic mail), are **not** allowed.

1.5 ISSUANCE OF DOCUMENTS (AFTER PROJECT HAS BEEN AWARDED)

- A. The Architect shall issue a USB flash drive type media that contain the plans, specifications, and any addenda issued, in PDF format.
- B. The Contractor shall be responsible for printing and/or reproducing copies he or she may need for construction purposes.
- C. The Contractor shall furnish, complete with any addenda, a hard copy of the specifications and full size plan set for construction. These documents shall be present on site and maintained in legible fashion throughout the entire project. These shall be made available to the designer upon request during site visits and any scheduled meeting.
- D. The Contractor shall furnish, complete with any addenda, hard copies of specifications and full size plan set for each sub-contractor. This shall include any second tier sub-contractor and/or supplier. These documents shall be present on site and maintained in legible fashion throughout the entire project.

1.6 SCOPE OF WORK

- A. Scope of Work:
 1. This project includes providing labor and material for construction of new restroom and concessions buildings, new ticket office, new concrete paving and drainage work, and improvement work to existing facilities at the football stadium

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for Washington-Marion High School as detailed on the Bidding Documents, including any addenda issued.

2. The Contractor will be responsible for maintaining vehicle access to the parking area between the Field House and Cafeteria.
3. The Contractor will be responsible for erecting and maintaining temporary chain link construction fencing to separate the project site from the public. Coordinate with the Owner and School for fencing layouts.
4. The project must be complete and all areas available for use at the start of the 2026 football season.

B. Type of Contract:

1. Project shall be constructed under a single prime contract.

1.7 COMPLETION TIME and LIQUIDATED DAMAGES

A. Completion Time: **Two Hundred Fifty (250) Calendar Days.**

1. The Bidder hereby agrees to commence work under this contract on a date specified in a written "NOTICE TO PROCEED" by the Owner and fully complete the project within the above stated number of days or within the time as may be extended as stipulated in the Contract Documents. See "SCOPE OF WORK" section herein and in the specifications.

B. Stipulated Damages: **Five Hundred Dollars (\$500.00) Per Consecutive Calendar Day.**

1. The Bidder hereby agrees to pay as Stipulated Damages the above stated sum for each consecutive calendar day which the work is not complete beginning with the first day beyond the completion time stated above.

1.8 CONSTRUCTION PROGRESS REPORTS

- A. If requested by the Architect, Architect's Representative, Member of the Design Team, Owner, or Owner's Representative, the Contractor shall present a construction progress report. The report shall be typewritten and submitted at the OAC construction meeting. A copy of the report shall be emailed to members listed above.
- B. Frequency of such report shall be on a weekly basis. Said report shall describe, in detail, all work performed for that week. Also included shall be descriptions of work that are scheduled to be performed in the upcoming week.

1.9 REQUIREMENTS

- A. Unless otherwise specified, Contractor shall supply all labor, transportation, apparatus, materials, fuel, energy, lights, water, scaffolding, and tools necessary for the entire

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construction project and completion of the project as shown on the drawings and described in these specifications.

- B. Contractor shall install, maintain and remove all construction equipment and auxiliary devices and shall be responsible for the safe, proper and lawful maintenance and use of same.
- C. Bidders are requested to visit the site, compare the drawings and specifications including other work, if any being performed. Failure to do so will in no way relieve the successful bidder from furnishing any materials or performing any work that may be required to complete the work in accordance with the drawings and specifications without additional cost to the Owner.
- D. Copies of Standards: Each entity engaged on this project shall be familiar with standards applicable to that activity. Copies of applicable standards are not bound to the contract documents.
- E. At the pre-construction meeting, the Contractor shall provide the Schedule of Values, List of Sub-Contractors and Material Suppliers, and the Construction Schedule.

1.10 TESTING SERVICES

- A. The Owner will select a testing laboratory to perform all required tests during construction and will contract for and pay for all such services. It will be the Construction Contractor's responsibility to pay for all required re-tests due to initial failure results in the first test. The Designer will ensure that the Construction Contractor is aware of this requirement.

1.11 FIELD MEASUREMENTS

- A. The contractor shall perform field measurements prior to fabrication of items as related to this project. The contractor shall check and verify all lines, levels, and measurements as he will be entirely responsible for the proper laying out and the construction of the work included in this contract.
- B. No extra charge of compensation will be allowed on account of difference between actual dimensions and the measurements indicated on the drawings; any difference which may be found shall be submitted to the Project Architect/Engineer for consideration before proceeding with the work.

1.12 CODES and STANDARDS

- A. Each contractor shall comply with all applicable current and ANSI standards, in particular, provisions of ANSI A-10 Series Standards on construction safety, including A-10.3 thru A-10.15 and A-10.17, A-10.18, and A-10.22.

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- B. Each contractor shall comply with the latest and adopted 2021 editions of the IBC Building Code, IBC Plumbing Code, IBC Mechanical Code, and any other applicable IBC code as related to the requirements of this contract.
- C. Each contractor shall comply with all current and adopted NFPA codes, in particular, NFPA Code 241 “Building Construction and Demolition Operations”.
- D. Each contractor shall comply with the latest OSHA requirements and OSHA’s Hazard Communication Standard (HCS).
- E. Each contractor shall comply with all requirements set forth in the latest adopted ADA standard, including any ADA addenda. Comply with mounting heights and locations, clearances, slopes, etc. All products and any associated part or component, apparatus, and control feature, etc. installed for this project shall meet and comply with the latest ADA standard. This shall include components, apparatus, and control features provided and installed by the Contractor or the manufacturer. All controls, control apparatus devices, switches, components shall be accessible and meet the latest ADA edition, included any ADA addenda.

1.13 CONTRACTOR’S FIELD OFFICE

- A. The General Contractor must provide a field office. This is a project requirement. The General Contractor’s field office shall be of sufficient size to hold weekly meetings scheduled by the Architect between the Architect, Architect’s representative, General Contractor (General Contractor AND Job Superintendent) and all Sub-Contractors, as required, with proper seating and tables, and utility power service. The field office shall be kept neat and clean in appearance and be climate controlled (air-conditioned and heated). The field office must be on site and ready for use at the first weekly meeting. The field office shall be removed from site upon project completion.
- B. The field office shall be provided with communications and internet. The aforementioned communications equipment and services must be maintained for the duration of this project.

1.14 PROJECT SUPERINTENDENT

- A. A full-time project superintendent (8+ hours daily) shall be present on this project site as the General Contractor’s Project Superintendent. This project shall be the **sole responsibility** assigned to this Superintendent for the duration of this project. **No work shall be done** on/at this project site without the Project Superintendent on this project site. The proposed Project Superintendent’s name and qualifications shall be submitted to the Architect prior to signing of the contract for the Architect’s review and approval.
- B. The Contractor/Project Superintendent shall keep an orderly file of the plans and specifications as well as shop drawings on the job site for the Architect’s and Engineer’s use.

1.15 TEMPORARY ON-SITE STORAGE

- A. Each contractor shall provide their own temporary on-site apparatus for storing, securing, fabrication, and similar purposes and shall locate such in accordance with the contractor for general works coordinated plan for site utilization.
- B. The storage shall protect building materials and equipment as would be damaged by exposure to the weather. The storage shall be adequate for the purpose and shall be removed after project is complete.
- C. All construction and material storage shall be coordinated with the Owner and the Architect. All construction and materials for construction shall be handled such that no hazard shall exist.

1.16 TEMPORARY FACILITIES and HEAT

- A. Each Contractor shall establish and initiate use of each temporary facility at time first reasonably required for proper performance of the total work of project. Terminate use and remove facilities at earliest reasonable time, when no longer needed or when permanent facilities have, with authorized use, replaced the need.
- B. Conditions of Use: Each contractor shall install, operate, maintain and protect temporary facilities in manner and at locations which will be safe, non-hazardous, sanitary and protective of persons and property, free of deleterious effects.
- C. If temporary heat is required for the protection the work, the contractor shall provide approved heat producing devices; he shall provide adequate and proper fuel and power as needed to maintain the heating devices as required for the protection and drying out of the work.

1.17 SANITARY FACILITIES

- A. Provide either piped (wet) toilet facilities or self-contained toilet units of type acceptable to governing authorities, adequate for use of personnel at project site. Provide separate facilities for male and female personnel when both sexes are working at project site. Provide piped (wet) wash facilities during construction and remove promptly after project is complete.

1.18 PROVISIONS for SECURITY and PROTECTION

- A. Types of temporary security and protection provisions required includes, but are not limited to, fire protection, barricades, warning signs/lights, and similar provisions intended to minimize property losses, personal injuries, and claims for damages at site.

1.19 RESPONSIBILITY for DAMAGES

- A. The Contractor shall be responsible for replacement of all glass of every character broken until the Completion and Acceptance of this Project; he shall be responsible for the proper repair of damage to structure unless he can prove and sustain his claim to damages or destruction by other specified agencies or groups.

1.20 CONSTRUCTION COORDINATION

- A. The General Contractor shall coordinate the handling of all products, materials, etc. Coordinate any space requirements, access, clearances, etc. prior to submitting shop drawings and installation.
- B. Layout work prior to installation, refer to architectural, structural, mechanical, plumbing, fire protection, and electrical drawings at all times in order to avoid interference, conflicts, and undue delays in the progress of work.
- C. The General Contractor shall be responsible for and ensure that work of all trades is installed without interferences. In the event of possible interference with piping, ductwork, or equipment, items that require set grade, elevation, fire protection piping, and lighting fixture locations shall have precedence over other items. Should any **major** interference develop, immediately notify the Architect/Engineer.
- D. Coordinate and properly relate all work required to the building structure and work of all other trades.
- E. Work shall be installed to meet any existing conditions found at the project site.
- F. Do not rough-in for any item or equipment furnished by others or noted “**Not In Contract**”, until receiving rough-in information from the other trades and/or the Architect/Engineer.

1.21 ACCESS TO SITE

- A. General: Contractor shall have use of Project site for construction operations as indicated on Drawings by the Contract limits and as indicated by requirements of this Section.
- B. Use of Site: Limit use of Project site to work in areas as indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.
 - 1. Driveways, Walkways and Entrances: Keep driveways, loading areas, and entrances serving premises clear and available to Patrons, Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.
 - a. Provide temporary barriers, barricades, or other protective measures at all building/premise entrances and access points to protect persons entering

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and exiting the building/premise. All exits shall remain open and passable during hours of operation to allow for free unimpeded egress.

- b. Scheduled deliveries for construction operations shall minimize use of driveways and entrances that have been allowed by the Owner for such use.
 - c. These deliveries shall minimize space and time requirements for storage of materials and equipment on-site.
- C. Condition of Existing Building: Maintain portions of existing building affected by construction operations in a weathertight condition throughout construction period. Repair damage caused by construction operations.

1.22 COORDINATION WITH OCCUPANTS

- A. Full Owner Occupancy: Owner will occupy site and existing adjacent building(s) during entire construction period, with the exception of areas under construction. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's day-to-day operations. Maintain existing exits unless otherwise indicated.
- 1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and approval of authorities having jurisdiction.
 - 2. Notify Owner not less than **72** hours in advance of activities that will affect Owner's operations.

1.23 WORK RESTRICTIONS

- A. Work Restrictions, General: Comply with restrictions on construction operations.
- 1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.
- B. Special Security Requirements: Comply with the following directives to maintain on-site security measures.
- 1. Hand and power tools may be kept and stored on site when not in use. This method of storage shall require the Contractor to provide locked job boxes. If lockable job boxes are not provided, the Contractor shall remove all hand and power tools from the site when not in use.
- C. On-Site Work Hours: Limit work in the building to normal working hours of 7:00 a.m. to 3:30 p.m., Monday through Friday, unless otherwise indicated.
- 1. Weekend Hours: Permissible, 48 hour notice required.
 - 2. Early Morning or Late Evening Hours: Permissible during daylight hours only, final approval given by Architect, Owner, and Facility Staff.
 - 3. Nighttime Hours: Not Permitted.

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4. Hours for Utility Shutdowns: See Below.
 5. Hours for Noisy and Vibratory Type Operations: See Below.
- D. Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:
1. Notify Architect and Owner not less than four days in advance of proposed utility interruptions.
 2. Interruptions shall take place during off hours and be scheduled with the Owner.
- E. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Owner.
1. Notify Architect and Owner not less than two days in advance of proposed disruptive operations.
- F. Nonsmoking: Smoking is not permitted on site or on Owner's property.
- G. Controlled Substances: Use of tobacco products and other controlled substances are not permitted on site or on Owner's property.
- H. Profanity: The use of profanity, obscene gestures, and discussions of improper subject matter, are prohibited on site or on Owner's property.
- I. Dress Code: Proper footwear, pants, and shirt shall be worn by personnel working on site or on Owner's property.
- J. Employee Identification: Provide identification tags for Contractor personnel working on Project site. Require personnel to use identification tags at all times.
- K. Employee Screening: Comply with Owner's requirements for drug and background screening of Contractor personnel working on Project site.
1. Maintain list of approved screened personnel with Owner's representative.

1.24 WARRANTIES and OPERATIONAL & MAINTENANCE MANUAL

- A. The General Contractor shall submit one (1) hard copy of the operational and maintenance manual to the Designer for review. Submit at least two (2) weeks after the project has been formally accepted by the Owner. Submission of such in multiple parts and/or sections will not be accepted. Copies of shop drawings are not acceptable. This manual is for the Owner's operations, maintenance, and warranty information.
- B. After review by the Designer, the hard copy will be returned to the Contractor for corrections, if any. The Contractor shall then convert the hard copy to an electronically bookmarked PDF file. The PDF file shall be optimized to reduce size and "burned" onto CD type media. The CD disk media shall be delivered to the Designer for final review.

- C. The front cover page shall identify the Project Title, Owner, Architect, Consulting Engineers, General Contractor, and all Sub-Contractors. Contact information for each shall be placed on the second page. The Table of Contents shall occupy the third page. The electronically bookmarked PDF shall contain the following, if utilized:
1. Fire Marshal and/or Municipality-District Completion Certificates
 2. Fire Marshal and/or Municipality-District Inspection Reports
 3. Fire Alarm and/or Municipality-District Completion Certificate
 4. Sprinkler System Completion and Test Certificates (Above & Below Ground)
 5. Warranty Certificates (Dated Originals with Signatures in "BLUE" ink)
 6. Roofing Manufacturer's Warranties (Including Certifications As Related To Wind Uplift Pressure Requirements, See Paragraph "E" Below)
 7. Product/Part Information on Systems and Components (Copies of Shop Drawings Are Not Allowed)
 8. Operational Manuals for Systems and Components
 9. Spare Parts List For All Products and Components (Including, But Not Limited To, Hardware, Plumbing Fixtures, etc.)
 10. Inspection Procedures for Systems and Components
 11. Emergency Instructions and Procedures for Systems and Components
 12. Fixture Lamping and Ballast and/or Driver Schedule (Include Listing of Fixtures and Lamps-LEDs-Drivers Required for Each)
 13. Listing of HVAC Filter Sizes For Each Unit and Replacement Schedule for Each
 14. Color and Finish Selection Schedule for Each Room, Space, and Item Being Provided with Finishes (Include Type, Manufacturer, Make and/or Model Number, Series Name and Number, Color Name and Number, Special Blend or Mix Number(s), Brick Series and Color, Roofing Series and Color, etc.). This shall include all interior and exterior finishes.
- D. Certain equipment and product items in other sections of this specification shall be furnished and installed under the General Contractor's responsibility for the standard one (1) year warranty **plus** an additional one (1) year warranty.
- E. Refer to other specification sections as related to roofing warranties.
- F. Refer to other specification sections for requirements as related to furnishing of spare/extra materials. This includes, but is not limited to, fixture lamps, HVAC filters, paint and finishing materials, ceiling tiles, etc. The Contractor shall submit a list of all spare materials to the Designer for review and verification.

1.25 FINAL CLEANING

- A. Special cleaning for specific units of work is specified in sections of Division 2 - 33. General cleaning during progress of work is specified in General Conditions. Provide final cleaning of the work to normal clean condition accepted for a first class building cleaning maintenance program. Comply with manufacturer's instructions for cleaning operations. Final touch up type cleaning shall be performed at the time of project acceptance.
- B. The following are examples of items to be cleaned but does not limit the cleaning levels to overall project by the Contractor:

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1. Remove labels which are not required as permanent labels. Clean transparent materials, including mirrors and window/door glass. All broken glass and damaged transparent material shall be replaced and all painted surfaces shall be in first class conditions.
 2. Clean concrete floors, vacuum clean carpets, clean plumbing fixtures to sanitary condition, free of stains, including those resulting from water exposure. Clean and wipe surfaces of mechanical and electrical equipment, remove excess lubrication and other substances.
 3. Clean overall project site of all litter and foreign substances.
 4. Comply with safety standards and governing regulations for cleaning operations. Do not burn materials at site or bury debris or excess materials on Owner's property; remove waste materials from site and dispose of in a lawful manner.
 5. Final touch up cleaning shall be performed at the time of project acceptance of the Owner. This shall include, but is not limited to, cleaning of glass, mirrors, plumbing fixtures, flooring, stained or soiled items, etc. for a final finished appearance at the time of the Owner's acceptance.
- C. Areas of work are surrounded by lawn and paved areas. Paved areas include concrete and/or asphalt. The Contractor shall prevent damage to and maintain existing lawn and paved (concrete and/or asphalt) areas for the duration of the project. Any damaged lawn and/or paved area as a result of construction operations shall be restored to its original condition as documented at the start of the project as well as restoring/replacing any paved area (concrete and/or asphalt) damaged. Damage includes, but is not limited to, marring, broken, rutted, stained/soiled, etc.

1.26 PROJECT CLOSEOUT AND RECORD AS-BUILT DRAWING SET

- A. The General Contractor shall keep and maintain at least one (1) set of project drawings in the job shack for the sole purpose of marking up any changes to the work. This set shall become the record "As Built" set of drawings for project closeout. The set shall be maintained clear and legible for viewing and interpretation. Markup changes shall be made in "RED" ink and initialed by the person responsible for the change.
- B. These drawings will be subject to review by the Architect on a weekly basis. Failure by the General Contractor and the Subcontractors to properly document changes on the drawings could result in the Architect withholding payment on the monthly draw request.
- C. At the end of the project, the General Contractor shall be responsible for completing and verifying the accuracy of the record "As Built" drawings. The General Contractor shall review the set with the Architect present to make sure all changes are properly delineated. All delineated changes made to these drawings shall be neat, precise, and legible manner as stated above and approved by the Architect. This delineation shall be completed prior to the Contractor being paid the retainage on this project.
- D. The General Contractor shall have the final set of record "As Built" drawings scanned and converted to electronic PDF file format. All sheets shall be combined into one (1) electronic PDF file. This file shall be optimized for file size reduction and burned onto CD

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type media. The CD disk media shall be delivered to the Designer for final review. At the Contractor's option, this PDF file may be burned onto the same CD media being used for the Operational and Maintenance Manual...but, as a separate PDF file.

- E. List of items required by specifications to be submitted to Architect's office prior to recommendation of acceptance:
1. Submit statement showing final accounting of changes to Contract Sum.
 2. Advise Owner of pending insurance change-over requirements.
 3. Submit record drawings, maintenance manuals and similar final record information as called for.
 4. Advise Owner's Personnel of change over in security provisions.
 5. Complete start-up testing of systems and instruction of Owner's operating/maintenance personnel.
 6. Remove temporary facilities and services and similar elements from site.
 7. Complete final cleaning.
 8. Touch-up or otherwise repair and restore all marred and unsatisfactory finishes.
 9. Submit Warranties, and Operational Maintenance documentation as called for.

PART 2 - PRODUCTS (Not Used)**PART 3 - EXECUTION (Not Used)****END OF SECTION 011000**

SECTION 011011 – CONSTRUCTION SITE SIGN

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including the General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SCOPE OF WORK

- A. The Contractor shall furnish one (1) 4' x 8' x ¾" construction site sign as detailed herein and located on site where directed by the Architect. The sign shall be two (2) sided.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 CONSTRUCTION SITE SIGN

- A. The construction site sign shall be installed prior to beginning construction and placed on site where directed by the Architect.

3.2 COLOR REQUIREMENTS

- A. The two 4x4 treated posts, the 2x6 bottom support, and the painted band adjacent to the 2x4 edge frame shall be "Pantone Cool Gray 7C" or equal.
- B. The 2x4 edge frame and the ½" wide painted bands shall be "Pantone 326C" or equal.
- C. The plywood sign field areas (containing the text and graphics) shall be "Pantone Cool Gray 3C" or equal.
- D. The Ellender Architects logo and all text shall be "Black".

3.3 SHOP DRAWING

- A. Submit shop drawing of construction sign for review.
- B. Shop drawing of sign shall be to scale and illustrated in accurate colors as called for herein.

SECTION 012100 – ALLOWANCES

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements governing allowances.
 - 1. Certain items are specified in the Contract Documents by allowances. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when direction will be provided to Contractor.
- B. Types of allowances include the following:
 - 1. Contingency allowance.

1.3 SELECTION AND PURCHASE

- A. At Architect's request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.
- B. Purchase products and systems selected by Architect from the designated supplier.

1.4 ACTION SUBMITTALS

- A. Submit proposals for purchase of products or systems included in allowances, in the form specified for Change Orders.

1.5 INFORMATIONAL SUBMITTALS

- A. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.
- B. Submit time sheets and other documentation to show labor time and cost for installation of allowance items that include installation as part of the allowance.
- C. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

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1.6 COORDINATION

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

1.7 CONTINGENCY ALLOWANCE

- A. Use the contingency allowance only as directed by Architect for Owner's purposes and document amounts to be charged to the allowance by field order(s).
- B. Overhead, profit, and related costs for products and equipment ordered by the Architect are included in the allowance without further markup by the General Contractor.
- C. This amount **shall be** used in preparing the bid.
- D. At Project closeout, credit unused amounts remaining in the contingency allowance to Owner by Change Order.

PART 2 - PRODUCTS (Not Applicable)

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 or supplier 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.

3.3 SCHEDULE OF ALLOWANCES

- A. Contingency Allowance: Include the sum of **\$75,000.00 dollars** for use according to the Owner's and Architect's written instructions.
 - 1. This allowance includes material and labor costs, delivery, receiving, handling, and installation, taxes if applicable, equipment rental, and similar costs.

END OF SECTION 012100

SECTION 013300 – SUBMITTAL PROCEDURES

Phase 8 Stadium Improvements – Washington-Marion High

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including the General and Supplementary Conditions and other Division 01 Specification sections, apply to this section.

1.2 SUMMARY

- A. This section specifies administrative and procedural requirements for submittals required for performance of the work, including:
 - 1. Contractor's Construction Schedule
 - 2. Shop Drawings
 - 3. Product Data
 - 4. Samples
- B. Administrative Submittals: Refer to other Division 01 Sections and/or other Contract Documents for requirements for administrative submittals which include, but are not limited to:
 - 1. Permits
 - 2. Applications for Payment
 - 3. Insurance Certificates
 - 4. List of Subcontractors
 - 5. Name & Qualifications of Job Superintendent

1.3 DEFINITIONS

- A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."
- B. Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."
- C. File Transfer Protocol (FTP): Communications protocol that enables transfer of files to and from another computer over a network and that serves as the basis for standard Internet protocols. An FTP site is a portion of a network located outside of network firewalls within which internal and external users are able to access files.
- D. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format.

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1.4 ELECTRONIC SUBMITTAL PROCEDURES

- A. Coordination: Coordinate preparation and processing of submittals with performance of construction activities. Transmit each submittal sufficiently in advance of performance of related construction activities to avoid delay.
- B. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals and related activities that require sequential activity.
- C. Coordinate transmittal of different types of submittals for related elements of the work so processing will not be delayed by need to review submittals concurrently for coordination.
- D. The Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- E. Processing: Allow sufficient review time that installation will not be delayed as a result of time required to process submittals, including time for resubmittals.
 - 1. Allow two (2) weeks for initial review. Allow additional time if processing must be delayed to permit coordination with subsequent submittals. Architect will promptly advise Contractor when a submittal being processed must be delayed for coordination.
 - 2. If an intermediate submittal is necessary, process the same as the initial submittal.
 - 3. Allow two (2) weeks for reprocessing each submittal.
 - 4. No extension of contract time will be authorized due to failure to transmit submittals to the Architect sufficiently in advance of the work to permit processing.
- F. Submittal Preparation: Identify and incorporate information in each electronic submittal file as follows:
 - 1. Assemble each submittal package, complete, into a single electronic PDF file.
 - 2. Name file with description, revision identifier, and date.
 - a. Example: Wood Doors – R0 – 20140101
 - 3. Revision identifiers shall be as R0, R1, R2, etc.
 - 4. All submittals shall be provided with a cover page. Submittals without the proper cover page will be returned for correction with no action taken.
 - 5. Provide cover page for each submittal and include the following information for processing and recording action taken:
 - a. Project Name.
 - b. Date.
 - c. Name of Architect.
 - d. Name of Contractor.
 - e. Name & Address of Sub-Contractor.
 - f. Name & Address of Supplier.
 - g. Name of Manufacturer.
 - h. Number & Title of Appropriate Specification Section(s).

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- i. Drawing Number & Detail References, as appropriate.
 - j. On the cover page, provide a space approximately 4" x 5" to record the Architect's review stamp, approval markings, and action taken. **This space shall be free and clear of text and graphics. Failure to do will render the submittal unacceptable.**
- G. Submittal Transmittal Form: Package each submittal appropriately for transmittal and handling using a transmittal form. A transmittal form shall be used for each submittal. This form shall be integrated into and become the cover for the PDF submittal. Submittals received from sources other than General Contractor will be returned without action. Transmittals shall be assigned a number as follows:
 - 1. Transmittal: Consecutively Numbered.
 - 2. Transmittal for Resubmittals: Use previously assigned number for the resubmitted product followed by an R0, R1, R2, etc. as the revision identifier.
- H. On the transmittal, record relevant information and requests for data. On the form or separate sheet, record deviation from Contract Document requirements, including minor variation and limitations. Include the Contractor's Certification that information complies with the Contract Document requirements.
- I. Resubmittals: Make resubmittals in same form as the initial submittal, electronic PDF format.

PART 2 - PRODUCTS

2.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Bar-Chart Schedule: Prepare a fully developed, horizontal bar-chart type Contractor's Construction Schedule. Submit with thirty (30) days of date established for "Commencement of the Work".
 - 1. Indicate completion in advance of the date established for Substantial Completion/Recommendation of Acceptance. Indicate Substantial Completion on schedule to allow time for Architect's procedures necessary for certification of Substantial Completion.
 - 2. Distribution: Following response to initial submittal, print three (3) copies for the Architect. Print and distribute copies to all subcontractors and other parties required to comply with scheduled dates. Post copy in the job shack or temporary field office.
 - 3. Revise the schedule after each meeting or activity, where revisions have been recognized or made. When revisions are made, distribute to same parties and post in same locations.

2.2 SHOP DRAWINGS

- A. Submit shop drawings via email as a single electronic PDF file.

SECTION 013300 – SUBMITTAL PROCEDURES

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1. Action Submittals: Architect will return annotated electronic PDF file. Annotate and retain one copy as an electronic project "Record Document" file.
 2. Informational Submittals: Refer to 1.3 (B) and 3.3 (B).
 3. Certificates and Certification Submittals: Provide a 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.
 - a. Provide a digital signature with digital certificate on electronically submitted certificates and certifications where indicated.
 - b. Provide a notarized statement on original paper copy certificates and certifications where indicated.
- B. Submit newly prepared information, drawn accurate to scale. **Shop drawings shall be not be electronic reproductions of the Contract Drawings.** Highlight, encircle or otherwise indicate deviations from Contract Documents. Standard information prepared without specific reference to project is not considered Shop Drawings.
- C. Shop Drawings include fabrication and installation drawings, setting diagrams, schedules, patterns, templates and similar drawings. Include the following information:
1. Dimensions.
 2. Identification of Products & Materials Included.
 3. Compliance with Specified Standards.
 4. Notation of Coordination Requirements.
 5. Notation of Dimensions Established by Field Measurements
 6. Signature of General Contractor or his representative indicating that submittals have been reviewed by him prior to submittal to Architect
 7. **Sheet Size:** Except for templates, patterns and similar full-size drawings, submit shop drawings on sheets at least 8 - 1/2" x 11" but no larger than 36" x 24".
 8. Do not use shop drawings without an appropriate final stamp indicating action taken in connection with construction.
- D. Coordination drawings are special type shop drawings showing the relationship and integration of different construction elements that require careful coordination during fabrication or installation to fit in space provided or function as intended.
1. Submit coordination drawings for integration of different construction elements. Show sequences and relationships of separate components to avoid conflicts in use of space.

PART 3 - EXECUTION

- A. Collect product data into single submittal for each element of construction or system. Product data shall include information such as manufacturer's installation instructions, catalog cuts, standard color charts, rough-in diagrams and templates, standard wiring diagrams and performance curves.

SECTION 013300 – SUBMITTAL PROCEDURES

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- B. Mark products to show applicable choices and options. Where product data includes information on several products, some of which are not required, mark selections to indicate the applicable information. Include the following information:
 - 1. Manufacturer's Recommendations
 - 2. Compliance with Recognized Trade Association Standards
 - 3. Compliance with Recognized Testing Agency Standards
 - 4. Application of Testing Agency Labels & Seals
 - 5. Notation of Dimensions verified by field measurement
 - 6. Notation of Coordination Requirements
 - 7. Signature of General Contractor or his representative that submittals have been reviewed by him prior to submittal to Architect.
- C. Do not submit product data until compliance with requirements of the contract documents have been confirmed.
- D. Preliminary Submittal: Submit preliminary product data where selection of options is required.
- E. Submittals: Submit one (1) single electronic PDF file for each required submittal. Architect will retain one (1) annotated electronic PDF file and return one (1) annotated electronic PDF file marked with action taken and corrections or modifications required.
 - 1. Do not proceed with installation until an applicable copy of product data applicable is in installer's possession.
 - 2. Do not permit use of product data in connection with construction without the Architect's Approval Stamp.

3.2 SAMPLES

- A. Submit full-size, fully fabricated samples cured and finished as specified and physically identical with material or product proposed. Samples include partial sections of manufactured or fabricated components, cuts or containers of materials, color range sets, and swatches showing color, texture and pattern.
 - 1. Where variation in color, pattern, texture or other characteristics are inherent in material or product represented, submit multiple units (not less than 3), that show approximate limits of the variations.
 - 2. Submit manufacturer's full color charts and samples. **Color charts printed from websites is strictly prohibited.**
- B. Field samples specified in individual sections are special types of sample. Field samples are full-size examples erected on site to illustrate finishes, coating, or finish materials and to establish standard by which the work will be judged.
 - 1. Comply with submittal requirements to the fullest extent possible. Process transmittal forms to provide a record of activity.

SECTION 013300 – SUBMITTAL PROCEDURES

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3.3 ARCHITECT'S ACTION

- A. Except for submittals for record, information or similar purposes, where action and return is required to requested, Architect will review each submittal, mark to indicate action taken, and return promptly to the General Contractor.
- B. Informational Submittals: The Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. The Architect will forward each submittal to appropriate party.
- C. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.
- D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.
- E. Submittals not required by the Contract Documents may be returned by the Architect without action.
- F. Compliance with specified characteristics is the Contractor's responsibility.

END OF SECTION 013300

SECTION 013350 – PROCUREMENT SUBSTITUTION PROCEDURES

Phase 8 Stadium Improvements – Washington-Marion High

1.1 DEFINITIONS

- A. Procurement Substitution Requests: Requests for changes in products, materials, equipment, and methods of construction from those indicated in the Procurement and Contracting Documents, submitted prior to receipt of bids.

1.2 PROCUREMENT SUBSTITUTIONS

- A. Procurement Substitutions, General: By submitting a bid, the Bidder represents that its bid is based on materials and equipment described in the Procurement and Contracting Documents, including Addenda. Bidders are encouraged to request approval of qualifying substitute materials and equipment when the Specifications Sections list materials and equipment by product or manufacturer name.
- B. Procurement Substitution Requests will be received and considered by the Architect when the following conditions are satisfied; otherwise requests will be returned without action:
 - 1. Extensive revisions to the Contract Documents are not required.
 - 2. Proposed changes are in keeping with the general intent of the Contract Documents, including the level of quality of the Work represented by the requirements therein.
 - 3. The request is fully documented and properly submitted.

1.3 SUBMITTALS

- A. Procurement Substitution Request: Submit to Architect and/or Engineer. Procurement Substitution Request shall be made in writing and in compliance with the following requirements:
 - 1. Requests for substitution of materials and equipment will be considered if received no later than **7** days prior to date of bid opening.
 - 2. Submittal Format: Submit via mail, fax, or email. Email submissions shall be made in PDF format. Sheet size shall be no larger than 8½ inch x 11 inch.
 - 3. Required Information: Submit the following information:
 - a. Identify the product and/or material to be substituted.
 - b. When submitting multiple items, submit each separately.
 - c. Include related Specifications Sections and drawing number.
 - d. Provide complete documentation on both the product specified and the proposed substitute, include the following information as appropriate:
 - 1) Point-by-point comparison of specified and proposed substitute product data, fabrication drawings, and installation procedures.
 - 2) Copies of current, independent third-party test data of salient product or system characteristics.
 - 3) Samples where applicable or when requested by Architect.

SECTION 013350 – PROCUREMENT SUBSTITUTION PROCEDURES

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- 4) Detailed comparison of significant qualities of the proposed substitute with those of the Work specified. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
 - 5) Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
 - 6) Research reports, where applicable, evidencing compliance with building code in effect for Project.
 - 7) Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors, which will become necessary to accommodate the proposed substitute.
- e. Provide certification by manufacturer that the substitute proposed is equal to or superior to that required by the Procurement and Contracting Documents, and that its in-place performance will be equal to or superior to the product or equipment specified in the application indicated.
 - f. Bidder, in submitting the Procurement Substitution Request, waives the right to additional payment or an extension of Contract Time because of the failure of the substitute to perform as represented in the Procurement Substitution Request.

B. Architect's Action:

1. Architect may request additional information or documentation necessary for evaluation of the Procurement Substitution Request. Architect will notify all bidders of acceptance of the proposed substitute by means of an Addendum to the Procurement and Contracting Documents.
- C. Architect's approval of a substitute during bidding does not relieve Contractor of the responsibility to submit required shop drawings and to comply with all other requirements of the Contract Documents.
- D. Architect's approval of a particular manufacturer does not suggest or imply any deviation from the Contract Documents. All products shall comply with the drawings and specifications. The Contractor shall note that prior approval will be by manufacturer's name only. The Contractor shall ensure that the products used in preparation of his proposal and proposed to be used on this project, is equivalent to that specified in all aspects. Any material, product, or component found to not be equivalent to that specified will be rejected. Prior approval of one manufacturer does not automatically prior approve any subsidiary, parent, and/or sister company, and their associated products.

END OF SECTION 013350

DIVISION 02

**TECHNICAL
SPECIFICATIONS**

EXISTING CONDITIONS

SECTION 024119 – SELECTIVE DEMOLITION

Phase 8 Stadium Improvements – Washington-Marion High

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 portions of building or structure.
- B. Related Requirements:
 - 1. Section 311000 "Site Clearing" for site clearing and removal of above- and below-grade improvements.

1.3 DEFINITIONS

- A. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged or removed and reinstalled.
- B. Remove and Reinstall: Detach items from existing construction, prepare for reuse, and reinstall where indicated.
- C. Existing to Remain: Existing items of construction that are not to be permanently removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and 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. Pre-demolition Conference: Conduct conference at Project site.

SECTION 024119 – SELECTIVE DEMOLITION

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1. Inspect and discuss condition of construction to be selectively demolished.
2. Review structural load limitations of existing structure.
3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
5. Review areas where existing construction is to remain and requires protection.

1.6 INFORMATIONAL SUBMITTALS

- A. Proposed Protection Measures: Submit report, including drawings, that indicates the measures proposed for protecting individuals and property. 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 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. Use of elevator and stairs.
 5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.
- C. Inventory: Submit a list of items to be removed and salvaged and deliver to Owner prior to start of demolition.
- D. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.
- E. Warranties: Documentation indicated that existing warranties are still in effect after completion of selective demolition.

1.7 CLOSEOUT SUBMITTALS

- A. Inventory: Submit a list of items that have been removed and salvaged.
- B. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

1.8 QUALITY ASSURANCE

- A. Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.

SECTION 024119 – SELECTIVE DEMOLITION

Phase 8 Stadium Improvements – Washington-Marion High

1.9 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.

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 ANSI/ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting selective demolition operations.
- B. Review record documents of existing construction provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in record documents.

SECTION 024119 – SELECTIVE DEMOLITION

Phase 8 Stadium Improvements – Washington-Marion High

- C. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
- D. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.

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.
 - 1. Comply with requirements for existing services/systems interruptions specified in Section 011000 "Summary."
- B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.
 - 1. Owner will arrange to shut off indicated services/systems when requested by Contractor.
 - 2. Arrange to shut off indicated utilities with utility companies.
 - 3. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
 - 4. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated to be removed.
 - a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
 - b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.
 - c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
 - d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
 - e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
 - f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
 - g. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material.
- C. Refrigerant: Remove refrigerant from mechanical equipment to be selectively demolished according to 40 CFR 82 and regulations of authorities having jurisdiction.

SECTION 024119 – SELECTIVE DEMOLITION

Phase 8 Stadium Improvements – Washington-Marion High

3.3 PREPARATION

- A. 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.
- B. Temporary Facilities: 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.
- C. Temporary Shoring: 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.

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. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
 - 2. 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, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
 - 3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
 - 4. 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, and fire watch if required by the local authority having jurisdiction, and portable fire-suppression devices during flame-cutting operations.
 - 5. Maintain adequate ventilation when using cutting torches.

SECTION 024119 – SELECTIVE DEMOLITION

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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. Send materials to properly licensed and permitted construction waste facility.
- B. Reuse of Building Elements: Do not demolish building elements beyond what is indicated on Drawings without Architect's approval.
- C. Removed and Salvaged Items:
1. Clean salvaged items.
 2. Store items in a secure area until delivery to Owner.
 3. Transport items to Owner's storage area designated by Owner.
 4. Protect items from damage during transport and storage.
- D. Removed and Reinstalled Items:
1. Clean and repair items to functional condition adequate for intended reuse.
 2. Protect items from damage during transport and storage.
 3. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.
- E. 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 if necessary, and reinstalled in their original locations after selective demolition operations are complete.

3.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

- A. Concrete: Demolish in small sections. Using power-driven saw, cut concrete to a depth of at least 3/4 inch at junctures with construction to remain. Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete. Neatly trim openings to dimensions indicated.
- B. Concrete or Asphalt: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals using power-driven saw, then remove concrete between saw cuts.
- C. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw. Remove masonry between saw cuts.
- D. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, then break up and remove.

SECTION 024119 – SELECTIVE DEMOLITION

Phase 8 Stadium Improvements – Washington-Marion High

- E. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI's "Recommended Work Practices for the Removal of Resilient Floor Coverings." Do not use methods requiring solvent-based adhesive strippers.
- F. Roofing: Remove no more existing roofing than what can be covered in one day by new roofing and so that building interior remains watertight and weathertight. See Section 070150 for new roofing requirements.
 - 1. Remove existing roof membrane, flashings, copings, and roof accessories.
 - 2. Remove existing roofing system down to substrate.

3.6 DISPOSAL OF DEMOLISHED MATERIALS

- A. General: Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.
 - 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.
 - 3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
- B. Burning: Do not burn demolished materials.
- C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

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

DIVISION 03

**TECHNICAL
SPECIFICATIONS**

CONCRETE

SECTION 032000 – CONCRETE REINFORCING

Phase 8 Stadium Improvements – Washington-Marion High

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.
- 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.

SECTION 032000 – CONCRETE REINFORCING

Phase 8 Stadium Improvements – Washington-Marion High

1.3 INFORMATIONAL SUBMITTALS

- A. Qualification Statements: For testing and inspection agency.
- B. Field quality-control reports.

1.4 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent agency, qualified in accordance with ASTM C1077 and ASTM E329 for testing indicated.

1.5 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 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A615, Grade 60, deformed.
- B. Deformed-Steel Welded-Wire Reinforcement: ASTM A1064, flat sheet.

2.2 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.

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- C. Steel Tie Wire: ASTM A1064, annealed steel, not less than 0.0508 inch in diameter.

- 1. Finish: Plain.

2.3 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.

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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

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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. Concrete standards.
 - 2. Concrete materials.
 - 3. Admixtures.
 - 4. Vapor retarders.
 - 5. Curing materials.
 - 6. Accessories.
 - 7. Repair materials.
 - 8. Concrete mixture materials.
 - 9. Concrete mixture class types.
 - 10. Concrete mixing.
 - 11. Work identified in S series drawings (only)
- B. Related Requirements:
 - 1. Section 032000 "Concrete Reinforcing"
 - 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.

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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. Placement location
 3. Minimum 28-day compressive strength.
 4. Maximum w/cm.
 5. Slump limit or slump flow 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. As specified in Section 032000 "Concrete Reinforcing".
 2. Construction Joint Layout: If not shown on Drawings, indicate proposed construction joints required to construct the structure.
 - a. Location of construction joints is subject to approval of the Engineer.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For the following:
1. Installer: Include copies of applicable ACI certificates.
 2. Ready-mixed concrete manufacturer.

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3. Testing agency: Include documentation indicating compliance with ASTM E329 or ASTM C1077 and copies of applicable ACI certificates for testing technicians or ACI Concrete Construction Special Inspector - MH, ASCC.
- B. Material Certificates: For each of the following, signed by manufacturers:
1. Cementitious materials.
 2. Admixtures.
 3. Curing compounds.
 4. Floor and slab treatments
 5. Bonding agents.
 6. Adhesives
 7. Vapor retarders.
 8. Semirigid joint filler.
 9. Joint-filler strips.
 10. 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.
- C. Field Quality Control Testing Agency Qualifications: An independent agency, acceptable to owner, qualified in accordance with ASTM C1077 and ASTM E329 for testing indicated.
1. Personnel conducting field tests shall be qualified as an ACI Concrete Field Testing Technician, Grade 1, in accordance with ACI CPP 610.1 or an equivalent certification program.

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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 if 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.

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- B. Cementitious Materials:
 - 1. Portland Cement: ASTM C150, Type I/II, IL gray.
 - 2. Fly Ash: ASTM C618, Class C.
- 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.

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- 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. Basis of Design: W.R. Meadows, 1100
 - 2. Alternatives that are shown to meet or exceed specifications of the basis of design product will be acceptable.

2.5 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler: Nomaflex polypropylene joint filler. Locations, width and details as indicated on drawings.
- 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.
 - 1. Basis of Design: MM-80 by Metzger McGuire
- 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.

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2.6 REPAIR MATERIALS

- A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations. To be used at slab areas to receive floor coverings.
 - 1. Cement Binder: ASTM C150 portland cement or hydraulic or blended hydraulic cement, as defined in ASTM C219.
 - 2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
 - 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand, as recommended by underlayment manufacturer.
 - 4. Compressive Strength: Not less than 4000 psi at 28 days when tested in accordance with ASTM C109.
- B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch and that can be filled in over a scarified surface to match adjacent floor elevations. To be used at exposed slab surfaces.
 - 1. Cement Binder: ASTM C150 portland cement or hydraulic or blended hydraulic cement, as defined in ASTM C219.
 - 2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
 - 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by topping manufacturer.
 - 4. Compressive Strength: Not less than 5000 psi at 28 days when tested in accordance with ASTM C109.

2.7 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: Class C, 15 percent by mass. The use of fly ash is an option, not a requirement.

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- 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.

2.8 CONCRETE MIXTURES

- A. Normal-weight concrete.
 - 1. Minimum Compressive Strength: 3000 psi at 28 days.
 - 2. Maximum w/cm:
 - a. 0.68 (non-air entrained 3000 psi concrete)
 - 3. 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.
 - 4. Air Content:
 - a. No entrained air
 - 5. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.
 - 6. "Performance" type mixes with variances in the (above) parameters of 2 and 3 (only) submitted with satisfactory testing and performance documentation will be considered.

2.9 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:

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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 TOLERANCES

- A. Comply with ACI 117.

3.4 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.

3.5 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."

3.6 JOINTS

- A. Construct joints true to line, with faces perpendicular to surface plane of concrete.

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- B. Contraction Joints in Slabs-on-Grade: Form weakened-plane control joints, sectioning concrete into areas as indicated. Contraction joints to be a depth equal to at least one-fourth of concrete thickness as follows:
 - 1. 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 duration.
 - 2. Construction joints, as specified above, may be used as contraction joints at Contractor's option.

3.7 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 Engineer 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.

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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. Consolidate concrete during placement operations, so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
 2. Maintain reinforcement in position on chairs during concrete placement.
 3. Screed slab surfaces with a straightedge and strike off to correct elevations.
 4. Level concrete, cut high areas, and fill low areas.
 5. Slope surfaces uniformly to drains where required.
 6. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface.
 7. Do not further disturb slab surfaces before starting finishing operations.

3.8 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.

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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.

3.9 FINISHING FLOORS AND SLABS

A. Verify all finishes with architectural drawings prior to placement of concrete.

B. Comply with ACI 302.1R recommendations for screeding, re-straightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

C. 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.

D. 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.

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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.

E. Trowel Finish:

1. After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel.
2. Continue troweling passes and restraighen 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 unveled, 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.

F. 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.

G. 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.

3.10 INSTALLATION OF MISCELLANEOUS CONCRETE ITEMS

A. Filling In:

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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.

3.11 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.

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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 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.

3.12 TOLERANCES

A. Conform to ACI 117.

3.13 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 one 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 as indicated on drawings at formed or keyed joints.
- D. Overfill joint, and trim joint filler flush with top of joint after hardening.
- E. Joint filler installation to comply with manufacturer's printed directions; consult manufacturer as required for specific technical questions and additional required instruction.

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3.14 CONCRETE SURFACE REPAIRS**A. Defective Concrete:**

1. Repair and patch defective areas when approved by Engineer.
2. Remove and replace concrete that cannot be repaired and patched to Engineer'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 Engineer.

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.

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- 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.

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- 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.

3.15 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, Engineer, 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.

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- 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:

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- 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 Engineer.
 - 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.

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3.16 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 033053 – MISCELLANEOUS CAST IN PLACE CONCRETE

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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 cast-in-place concrete, including reinforcement, concrete materials, mixture design, placement procedures, and finishes.
 - 1. Catch Basins.
 - 2. Trench Drains.
 - 3. Equipment Pads.
- B. Related Sections:
 - 1. Section 312000 "Earth Moving" for drainage fill under slabs-on-grade.
 - 2. Section 321313 "Concrete Paving" for concrete pavement and walks.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Other Action Submittal:
 - 1. Design Mixtures: For each concrete mixture.

1.4 QUALITY ASSURANCE

- A. Ready-Mix-Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94 requirements for production facilities and equipment.
- B. Comply with the following sections of ACI 301, unless modified by requirements in the Contract Documents:
 - 1. "General Requirements."
 - 2. "Formwork and Formwork Accessories."
 - 3. "Reinforcement and Reinforcement Supports."
 - 4. "Concrete Mixtures."
 - 5. "Handling, Placing, and Constructing."
 - 6. "Lightweight Concrete."

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- C. Comply with ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

PART 2 - PRODUCTS**2.1 FORMWORK**

- A. Furnish formwork and formwork accessories according to ACI 301.

2.2 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615, Grade 60, deformed.
- B. Plain-Steel Wire: ASTM A 82, as drawn.
- C. Plain-Steel Welded Wire Reinforcement: ASTM A 185, fabricated from as-drawn steel wire into flat sheets.
- D. Deformed-Steel Welded Wire Reinforcement: ASTM A 497, flat sheet.

2.3 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source throughout Project:
 - 1. Portland Cement: ASTM C 150, Type I/II. Supplement with the following:
 - a. Fly Ash: ASTM C 618, Class C or F. Maximum 15% by volume.
- B. Normal-Weight Aggregate: ASTM C 33, graded, 1-inch nominal maximum aggregate size.
- C. Water: ASTM C 94.

2.4 ADMIXTURES

- A. Air-Entraining Admixture: ASTM C 260.
- B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and to contain no more than 0.1 percent water-soluble chloride ions by mass of cementitious material. Do not use calcium chloride or admixtures containing calcium chloride.
 - 1. Water-Reducing Admixture: ASTM C 494, Type A.
 - 2. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.
 - 3. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.

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2.5 RELATED MATERIALS

- A. Vapor Retarder: Plastic sheet, ASTM E 1745, Class A or B.
- B. Vapor Retarder: Polyethylene sheet, ASTM D 4397, not less than 10 mils thick; or plastic sheet, ASTM E 1745, Class C.
- C. Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.

2.6 CURING MATERIALS

- A. Absorptive Cover: AASHTO M 182, Class 3, burlap cloth or cotton mats.
- B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- C. Water: Potable.
- D. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.

2.7 CONCRETE MIXTURES

- A. Comply with ACI 301 requirements for concrete mixtures.
- B. Normal-Weight Concrete: Prepare design mixes, proportioned according to ACI 301, as follows:
 - 1. Minimum Compressive Strength: 3000 psi at 28 days.
 - 2. Maximum Water-Cementitious Materials Ratio: 0.50.
 - 3. Slump Limit: 4 inches, plus or minus 1 inch.

2.8 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94, and furnish batch ticket information.
 - 1. When air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION**3.1 FORMWORK**

- A. Design, construct, erect, brace, and maintain formwork according to ACI 301.

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3.2 EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining work attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

3.3 VAPOR RETARDERS

- A. Install, protect, and repair vapor retarders according to ASTM E 1643; place sheets in position with longest dimension parallel with direction of pour.
 - 1. Lap joints 6 inches and seal with manufacturer's recommended adhesive or joint tape.

3.4 STEEL REINFORCEMENT

- A. Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
 - 1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

3.5 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Locate and install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
- C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness, as follows:
 - 1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint with groover tool to a radius of 1/8 inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover marks on concrete surfaces.
 - 2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch-wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
- D. Isolation Joints: Install joint-filler strips at junctions with slabs-on-grade and vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

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1. Extend joint fillers full width and depth of joint, terminating flush with finished concrete surface, unless otherwise indicated.

3.6 CONCRETE PLACEMENT

- A. Comply with ACI 301 for placing concrete.
- B. Do not add water to concrete during delivery, at Project site, or during placement.
- C. Consolidate concrete with mechanical vibrating equipment.

3.7 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defective areas repaired and patched. Remove fins and other projections exceeding 1/2 inch.
 1. Apply to concrete surfaces not exposed to public view.
- B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defective areas. Remove fins and other projections exceeding 1/8 inch.
 1. 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.
- C. Rubbed Finish: Apply the following rubbed finish, defined in ACI 301, to smooth-formed finished as-cast concrete where indicated:
 1. Smooth-rubbed finish.
 2. Grout-cleaned finish.
- D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.8 FINISHING UNFORMED SURFACES

- A. General: Comply with ACI 302.1R for screeding, re-straightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Scream surfaces with a straightedge and strike off. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane before excess moisture or bleedwater appears on surface.
 1. Do not further disturb surfaces before starting finishing operations.

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- C. Scratch Finish: Apply scratch finish to surfaces indicated and surfaces to receive concrete floor topping or mortar setting beds for ceramic or quarry tile, Portland cement terrazzo, and other bonded cementitious floor finishes, unless otherwise indicated.
- D. Float Finish: Apply float finish to surfaces indicated, to surfaces to receive trowel finish, and to floor and slab surfaces to be covered with fluid-applied or sheet waterproofing, fluid-applied or direct-to-deck-applied membrane roofing, or sand-bed terrazzo.
- E. Trowel Finish: Apply a hard trowel finish to surfaces indicated and to floor and slab 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.
- F. Trowel and Fine-Broom Finish: Apply a partial trowel finish, stopping after second troweling, to surfaces indicated and to surfaces where ceramic or quarry tile is to be installed by either thickset or thin-set methods. Immediately after second troweling, and when concrete is still plastic, slightly scarify surface with a fine broom.
- G. Nonslip Broom Finish: Apply a nonslip broom finish to surfaces indicated and to exterior concrete platforms, steps, and ramps. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route.

3.9 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
- B. Comply with ACI 306.1 for cold-weather protection and with ACI 301 for hot-weather protection during curing.
- C. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- D. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.
- E. Curing Methods: Cure formed and unformed concrete for at least seven days by one or a combination of the following methods:
 - 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.

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2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

3.10 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Tests: Perform according to ACI 301.
 1. Testing Frequency: One composite sample shall be obtained for each day's pour of each concrete mix exceeding 5 cu. yd. but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.

3.11 REPAIRS

- A. Remove and replace concrete that does not comply with requirements in this Section.

END OF SECTION 033053

DIVISION 04

**TECHNICAL
SPECIFICATIONS**

MASONRY

SECTION 042113 – BRICK MASONRY

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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. Face brick.
 - 2. Mortar and grout.
 - 3. Ties and anchors.
 - 4. Masonry Accessories.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For the following:
 - 1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
- C. Samples for Initial Selection:
 - 1. Submit samples of specified materials.

1.4 QUALITY ASSURANCE

- A. 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, from single source from single manufacturer for each product required.
- B. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.
- C. Masonry Standard: Comply with ACI 530.1/ASCE 6/TMS 602 unless modified by requirements in the Contract Documents.
- D. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Where masonry is to match existing, erect mockups adjacent and parallel to existing surface.

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2. Approval of mockups is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; and aesthetic qualities of workmanship.
 - a. Approval of mockups is also for other material and construction qualities specifically approved by Architect in writing.
 - b. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless such deviations are specifically approved by Architect in writing.
3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.5 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 pre-blended, dry mortar mix in moisture-resistant containers designed for use with dispensing silos. Store pre-blended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in covered weatherproof dispensing silos.
- E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.6 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.
 1. Extend cover a minimum of 24 inches down both sides of walls and hold cover securely in place.
 2. Where one wythe of multiwythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches down face next to unconstructed wythe and hold cover in place.
- B. 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.

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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.
- C. 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.
1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and higher and will remain so until masonry has dried, but not less than seven days after completing cleaning.
- D. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

PART 2 - PRODUCTS

2.1 MASONRY UNITS, GENERAL

- A. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not use units where such defects will be exposed in the completed Work.

2.2 BRICK

- A. General: Where indicated, provide shapes indicated and as follows, with exposed surfaces matching finish and color of exposed faces of adjacent units.
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.
- B. Face Brick: Facing brick complying with ASTM C 216.
1. Grade: MW except SW where indicated ASTM C 216 requirements for applicable weathering index and exposure.
 2. Type: FBS, nominal size and color variations.

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3. Initial Rate of Absorption: Less than 30 g/30 sq. in. per minute when tested per ASTM C 67.
4. Efflorescence: Provide brick that has been tested according to ASTM C 67 and is rated "not effloresced."
5. Size (Actual Dimensions): Modular, 3-5/8 inches wide by 2-1/4 inches high by 7-5/8 inches.
6. Application: Use where brick is exposed unless otherwise indicated.
7. Brick Veneer: Brick veneer used for this project shall be ACME modular, velour, no substitute, to match existing brick.
 - a. Color: Glacier White.

2.3 MORTAR MATERIALS

- A. Mortar Cement: ASTM C 1329.
 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. Lafarge; Lafarge Mortar Cement, Type MCS.
- B. Aggregate for Mortar: ASTM C 144.
 1. For joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.
- C. Water: Clean and potable.

2.4 REINFORCEMENT

- A. Masonry Joint Reinforcement, General: ASTM A 951.

2.5 TIES AND ANCHORS

- A. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated:
 1. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82; with ASTM A 153, Class B-2 coating.
- B. Truss Type: Three (3) or four (4) longitudinal rods, 9-gauge, side and cross rods welded at 16" on center. Standard section length of 10 feet.
 1. Manufacturers: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

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- a. Hohmann & Barnard, Inc.; 130 Truss Mesh.
- b. Hohmann & Barnard, Inc.; 140 Truss Twin Mesh.
 - 1) 130 Truss for brick veneers.
 - 2) 140 Truss for double wythe CMU.

2.6 EMBEDDED FLASHING MATERIALS

- 1. Elastomeric Thermoplastic Flashing: Composite flashing product consisting of a polyester-reinforced ethylene interpolymers alloy.
 - a. Products: Subject to compliance with requirements, provide one of the following:
 - 1) DuPont; Thru-Wall Flashing.
 - 2) Hohmann & Barnard, Inc.; Flex-Flash.
 - 3) Hyload, Inc.; Hyload Cloaked Flashing System.
 - 4) Mortar Net USA, Ltd.; Total Flash.
 - b. Monolithic Sheet: Elastomeric thermoplastic flashing, 0.040 inch thick.
 - c. Accessories: Provide preformed corners, end dams, other special shapes, and seaming materials produced by flashing manufacturer.

2.7 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: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Diedrich Technologies, Inc.
 - b. ProSoCo, Inc.

2.8 MORTAR 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.
 - 2. Use mortar cement type mortar unless otherwise indicated.

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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. Colored-Aggregate Mortar: Produce required mortar color by using colored aggregates and natural color or white cement as necessary to produce required mortar color.
 1. Mix to match Architect's sample.
 2. Application: Use colored aggregate mortar for exposed mortar joints with the following units:
 - a. Face brick.

2.9 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.
- B. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).
- C. Weep/Vent Products: Use one of the following unless otherwise indicated:
 1. Cellular Plastic Weep/Vent: One-piece, flexible extrusion made from UV-resistant polypropylene copolymer, full height and width of head joint and depth 1/8 inch less than depth of outer wythe, in color selected from manufacturer's standard.
 - a. Products: Subject to compliance with requirements, provide one of the following:
 - 1) Advanced Building Products Inc.; Mortar Maze weep vent.
 - 2) Blok-Lok Limited; Cell-Vent.
 - 3) Dayton Superior Corporation, Dur-O-Wal Division; Cell Vents.
 - 4) Heckmann Building Products Inc.; No. 85 Cell Vent.
 - 5) Hohmann & Barnard, Inc.; Quadro-Vent.
 - 6) Wire-Bond; Cell Vent.
- D. Cavity Drainage Material: Free-draining mesh, made from polymer strands that will not degrade within the wall cavity.
 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Advanced Building Products Inc.; Mortar Break II.
 - b. Archovations, Inc.; CavClear Masonry Mat.
 - c. Mortar Net USA, Ltd.; Mortar Net.
 2. Provide the following configurations:

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- a. Strips, full-depth of cavity and 10 inches high minimum.

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 the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to opening.
- B. 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.
- C. 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.
- D. Matching Existing Masonry: Match coursing, bonding, color, and texture of existing masonry.
- E. 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.
- F. Cut brick masonry using motor driven saws to provide clean, sharp, unchipped edges. Cut units as required to provide continuous pattern and to fit adjoining work. Use full-size units without cutting where possible.

3.3 TOLERANCES

- A. Dimensions and Locations of Elements:
 1. For dimensions in cross section or elevation do not vary by more than plus 1/2 inch or minus 1/4 inch.
 2. For location of elements in plan do not vary from that indicated by more than plus or minus 1/2 inch.

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3. For location of elements in elevation do not vary from that indicated by more than plus or minus 1/4 inch in a story height or 1/2 inch total.

B. Lines and Levels:

1. For bed joints and top surfaces of bearing walls do not vary from level by more than 1/4 inch in 10 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.
3. For vertical lines and surfaces do not vary from plumb by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch maximum.
4. 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.
5. For lines and surfaces do not vary from straight by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch maximum.
6. 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.
7. 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.

C. Joints:

1. For 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.
2. 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.
3. 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.

3.4 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.
- 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.

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- 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. Protect steel framework, hollow metal frames, etc. from mortar by wrapping with material suitable for jobsite conditions and masonry work being performed.

3.5 MORTAR BEDDING AND JOINTING

- A. Lay hollow brick as follows:
 - 1. With face shells fully bedded in mortar and with head joints of depth equal to bed joints.
 - 2. With entire units, including areas under cells, fully bedded in mortar at starting course on footings.
- B. Lay solid masonry units with a 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.

3.6 ANCHORING MASONRY VENEERS

- A. Anchor masonry veneers to unit masonry with masonry-veneer anchors to comply with the following requirements:
 - 1. Embed truss mesh type reinforcing in masonry joints. Provide air space between back of masonry veneer and face of sheathing as indicated on drawings.

3.7 EXPANSION JOINTS

- A. General: Install expansion joint materials in unit masonry as masonry progresses. Do not allow materials to span expansion joints without provision to allow for in-plane wall or partition movement.
- B. Form expansion joints in brick as follows:
 - 1. 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 Section 079200 "Joint Sealants."
- C. 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 Section 079200 "Joint Sealants," but not less than 3/8 inch.

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1. Locate horizontal, pressure-relieving joints beneath shelf angles supporting masonry.

3.8 LINTELS

- A. Install steel lintels where indicated. All steel lintels are to be painted as specified.
- B. Provide minimum bearing of 8 inches at each jamb unless otherwise indicated.

3.9 FLASHING AND WEEP HOLES

- 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 masonry-veneer walls, extend flashing through veneer, across air space behind veneer, and up the wall at least 8 inches; with upper edge tucked into first mortar joint of unit masonry.
 3. Cut flexible flashing off flush with face of wall after masonry wall construction is completed.
- C. Install weep holes in exterior wythes of first course of masonry immediately above embedded flashing and as follows:
 1. Use open brick joints to form weep holes.
 2. Space weep holes 48 inches on center unless otherwise indicated.

3.10 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.

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- 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 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."

3.11 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.

END OF SECTION 042113

SECTION 0422000 – CONCRETE UNIT MASONRY

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. All concrete unit masonry construction shall conform to the requirements of "*Specification for Masonry Structures (TMS 602-16)*" except as specifically modified by the contract documents.

1.2 SUMMARY

- A. Section Includes:
 - 1. Concrete masonry units.
 - 2. Mortar and grout.
 - 3. Steel reinforcing bars.
 - 4. Masonry-joint reinforcement.
 - 5. Miscellaneous masonry accessories.

1.3 DEFINITIONS

- A. CMU(s): Concrete masonry unit(s).
- B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.
- C. Exposed: Weather-exposed side of a constructed wall.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For the following:
 - 1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
 - 2. Reinforcing Steel: Detail bending, lap lengths, and placement of unit masonry reinforcing bars.
 - a. Comply with ACI 315.
 - b. Show full height and full length elevations of all reinforced walls.

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- c. Shop drawing shall include locations of control joints.
 - d. Shop drawings not complying these requirements will be rejected.
- C. Material Certificates: For each type and size of the following:
 - 1. Masonry units.
 - a. Include data on material properties and material test reports substantiating compliance with requirements.
 - b. For masonry units used in structural masonry, include data and calculations establishing average net-area compressive strength of units.
 - 2. Cementitious materials. Include name of manufacturer, brand name, and type.
 - 3. Mortar admixtures.
 - 4. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
 - 5. Grout mixes. Include description of type and proportions of ingredients.
 - 6. Reinforcing bars.
 - 7. Joint reinforcement.
 - 8. Anchors, ties, and metal accessories.
- D. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.
 - 1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C 109 for compressive strength, ASTM C 1506 for water retention, and ASTM C 91 for air content. Not required if proportion method of ASTM C 270 is used.
 - 2. Include test reports, according to ASTM C 1019, for grout mixes required to comply with compressive strength requirement.
 - 3. Proposed work and quality control / quality assurance plan, produced in conjunction with testing agency to ensure compliance with the above, as well with ASTM C 270. Contractor's option to use either "proportion" or "property" method of ASTM C 270.
- E. Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units, mortar type, and resulting net-area compressive strength of masonry determined according to TMS 402/602-16.
- F. Qualification Data: For testing agency, indicating appropriate qualifications and experience to satisfy project testing and inspection requirements.

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1.5 INFORMATIONAL SUBMITTALS

- A. Cold-Weather and Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM C 1093 for testing indicated.

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. Store preblended, dry mortar mix in delivery containers on elevated platforms in a dry location or in covered weatherproof dispensing silos.
- E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.8 FIELD 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.
 - 1. Extend cover a minimum of 24 inches down both sides of walls, and hold cover securely in place.
- B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least three 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.

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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. 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 TMS 602/ACI 530.1/ASCE 6.
1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and higher and will remain so until masonry has dried, but not less than seven days after completing cleaning.
- E. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 402/602-16.

PART 2 - PRODUCTS**2.1 MANUFACTURERS**

- A. 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, from single source from single manufacturer for each product required.
- B. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.
- C. Limitations for Integral Water Repellent: Obtain integral water-repellent units from CMU and mortar manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Provide structural unit masonry that develops indicated net-area compressive strengths at 28 days.
1. Determine net-area compressive strength of masonry from average net-area compressive strengths of masonry units and mortar types (unit-strength method) according to TMS 602-16.

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- B. Regulatory Requirements: Comply with the provisions of the following codes, specifications, and standards, except as otherwise shown or specified:

- 1. TMS 402/602-16:

- a. Maintain one copy of the standard in Project field office at all times during construction. Contractor's supervisory personnel are to be thoroughly familiar with this material as it applies to Project.

2.3 CONCRETE UNIT MASONRY, GENERAL

- A. Masonry Standard: Comply with TMS 402/602-16 except as modified by requirements in the Contract Documents.
- B. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated. Do not use units where such defects are exposed in the completed Work:

2.4 CONCRETE MASONRY UNITS

- A. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.
 - 1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
 - 2. Provide bullnose units only where indicated by Architect.
- B. CMUs: Load-bearing ASTM C 90.
 - 1. Density Classification: Light weight, Medium weight, or Normal weight.
 - 2. Size (Width): Manufactured to dimensions 3/8 inch less-than-nominal dimensions.

2.5 MASONRY LINTELS

- A. General: Provide one of the following:
- B. Masonry Lintels: Built-in-place masonry lintels made from bond beam CMUs matching adjacent CMUs in color, texture, and density classification, with reinforcing bars placed as indicated and filled with coarse grout. Temporarily support built-in-place lintels until cured. Knockout blocks will not be acceptable.

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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.
 - 1. Alkali content shall not be more than 0.1 percent when tested according to ASTM C 114.
- B. Masonry Cement: ASTM C 91.
 - 1. Manufacturers: Subject to compliance with requirements, providers include, but are not limited to, the following:
 - a. Holcim (US) Inc.
 - b. Lafarge North America Inc.
- C. 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.
- D. Aggregate for Grout: ASTM C 404.
- E. Water: Potable.

2.7 REINFORCEMENT

- A. Uncoated Steel Reinforcing Bars: ASTM A 615, Grade 60.
- B. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells and to hold reinforcing bars in center of cells. Units are formed from 0.148-inch steel wire, hot-dip galvanized after fabrication. Provide units designed for number of bars indicated.
 - 1. Manufacturers: Subject to compliance with requirements, providers include, but are not limited to, the following:
 - a. Dur-O-Wal; a Hohmann & Barnard company.
 - b. Heckmann Building Products, Inc.
 - c. Hohmann & Barnard, Inc.
- C. Masonry-Joint Reinforcement, General: Truss or Ladder type as indicated complying with ASTM A 951.
 - 1. All Locations: Hot-dip galvanized carbon steel.

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2. Wire Size for Side Rods: 0.148-inch diameter.
3. Wire Size for Cross Rods: 0.148-inch diameter.
4. Spacing of Cross Rods: Not more than 16 inches o.c.
5. Provide in lengths of not less than 10 feet, with prefabricated corner and tee units.

2.8 TIES AND ANCHORS

- A. General: Ties and anchors shall extend at least 1-1/2 inches into masonry but with at least a 5/8-inch cover on outside face.
- B. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated:
 1. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82, with ASTM A 153, Class B-2 coating.
 2. Steel Plates, Shapes, and Bars: ASTM A 36, Hot Dip Galvanized.
 3. Corrosion Protection: Hot-dip galvanized to comply with ASTM A 153.

2.9 MISCELLANEOUS MASONRY ACCESSORIES

- A. 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.
- B. Refer to architectural specifications for joint sealant product(s).

2.10 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. Use masonry cement unless otherwise indicated.
- 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.

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1. For reinforced masonry, use Type N.
- D. 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 TMS 602-16 for dimensions of grout spaces and pour height.
 2. Proportion grout in accordance with ASTM C 476, Table 1 for specified 28-day compressive strength indicated.
 3. Provide grout with a slump of 10 to 11 inches as measured according to ASTM C 143.

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 the Work.
 1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
 2. Verify that foundations are within tolerances specified.
 3. Verify that reinforcing dowels are properly placed.
 4. Verify that substrates are free of substances that would impair mortar bond.
- B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Build chases and recesses to accommodate items specified in this and other Sections.
- B. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match construction immediately adjacent to opening.
- C. 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.

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3.3 TOLERANCES**A. Dimensions and Locations of Elements:**

1. For dimensions in cross section or elevation, do not vary by more than plus 1/2 inch or minus 1/4 inch.
2. For location of elements in plan, do not vary from that indicated by more than plus or minus 1/2 inch .
3. For location of elements in elevation, do not vary from that indicated by more than plus or minus 1/4 inch in a story height or 1/2 inch total.

B. Lines and Levels:

1. For bed joints and top surfaces of bearing walls, do not vary from level by more than 1/4 inch in 10 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.
3. For vertical lines and surfaces do not vary from plumb by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2-inch maximum.
4. 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.
5. For lines and surfaces, do not vary from straight by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2-inch maximum.
6. 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.
7. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch.

C. Joints:

1. For 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.
2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.
3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch or minus 1/4 inch.
4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch.

3.4 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.

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- 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.
- C. Lay concealed masonry with all units in a wythe in running bond. Bond and interlock each course of each wythe at corners. Do not use units with less-than-nominal 4-inch horizontal face dimensions at corners or jambs.
- D. Stopping and Resuming Work: Stop work by stepping 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.
- E. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.
- 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 CMUs with grout 24 inches under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.

3.5 MORTAR BEDDING AND JOINTING

- A. Lay hollow CMUs as follows:
 - 1. Bed face shells in mortar and make head joints of depth equal to bed joints.
 - 2. Bed webs in mortar in all courses of piers, columns, and pilasters.
 - 3. Bed webs in mortar in grouted masonry, including starting course on footings.
 - 4. Fully bed entire units, including areas under cells, at starting course on footings where cells are not grouted.
- B. Lay solid CMUs 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. Where applicable, set masonry trim units in full bed of mortar with full vertical joints. Fill dowel, anchor, and similar holes.
 - 1. Clean soiled surfaces with fiber brush and soap powder and rinse thoroughly with clear water.
 - 2. Wet joint surfaces thoroughly before applying mortar.
 - 3. Rake out mortar joints for pointing with sealant.

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- D. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

3.6 MASONRY-CELL FILL

- A. As specified by Architect.

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 16 inches beyond openings 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 JOINTS

- A. General: Install control 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 as follows:
 - 1. Install preformed control-joint gaskets designed to fit standard sash block.
- C. Joint location to be by masonry sub-contractor; center to center spacing of joints shall not exceed 20'. Submit plan to engineer for review during shop drawing review process.

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3.9 LINTELS

- A. Provide masonry lintels where shown and where openings of more than 24 inches for block-size units are shown without structural steel or other supporting lintels.
- B. Provide minimum bearing of 16 inches at each jamb unless otherwise indicated.

3.10 FLASHING

- A. General: Install embedded flashing at ledges and other obstructions to downward flow of water in wall where indicated.
- B. 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.

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 loads that may be placed on them during construction.
- B. Placing Reinforcement: Comply with requirements in TMS 402/602-16.
- 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 TMS 402/602-16 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 or distance to next bond beams, whichever is smaller.

SECTION 0422000 – CONCRETE UNIT MASONRY

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3.12 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas as needed to perform tests and inspections. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense. Compressive strength determination will be as per requirements of TMS 402-602-16 Unit Strength Method.
 - 1. General Contractor responsible for timely and appropriate distribution of testing and observation reports.
- B. Inspections: Special inspections according to Level B in TMS 402/602-16.
 - 1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
 - 2. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
 - 3. Place grout only after inspectors have verified proportions of site-prepared grout.
- C. Testing Prior to Construction: One set of tests.
- D. Concrete Masonry Unit Test: For each type of unit provided, according to ASTM C 140 for compressive strength.
- E. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C 780.
- F. Grout Test (Compressive Strength): For each mix provided, according to 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.

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- 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. Clean concrete masonry by applicable cleaning methods indicated in NCMA TEK 8-4A.

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. Excess Masonry Waste: Remove excess clean masonry waste, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION 042200

DIVISION 05

**TECHNICAL
SPECIFICATIONS**

METALS

SECTION 053100 – STEEL DECKING

Phase 8 Stadium Improvements – Washington-Marion High

PART 1 - GENERAL**1.1 SUMMARY**

A. Section Includes:

1. Roof deck.

B. Related Requirements:

1. Section 054000 "Cold-Formed Metal Trusses"

1.2 ACTION SUBMITTALS

A. Product Data:

1. Roof 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.

SECTION 053100 – STEEL DECKING

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- 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 ROOF DECK

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Epic Metals Corporation.
 - 2. New Millennium Building Systems, LLC.
 - 3. Vulcraft Group; Division of Nucor Corp.
 - 4. CSM Metal Deck (metaldecking.com) Houston, TX
- B. Fabrication of Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with SDI RD and with the following:
 - 1. Galvanized-Steel Sheet: ASTM A653/A653M, Structural Steel (SS), Grade 80, G90 zinc coating.
 - 2. Deck Profile: Type WR, wide rib ("B" Deck)
 - a. Profile Depth: 1-1/2 inches

SECTION 053100 – STEEL DECKING

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- b. Design Uncoated-Steel Thickness: 0.0295 inch (22 gauge)
- c. Span Condition: Triple span or more.
- d. 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. Column Closures, End Closures, Z-Closures, and Cover Plates: Steel sheet, of same material, finish, and thickness as deck unless otherwise indicated.
- G. Piercing Hanger Tabs: Piercing steel sheet hanger attachment devices for use with floor deck.
- H. Weld Washers: Uncoated steel sheet, shaped to fit deck rib, 0.0598 inch thick (16 gauge), with factory-punched hole of 3/8-inch minimum diameter. For use only with decks thicker than 0.0295 inch (22 gauge).
- I. 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.
- J. Galvanizing Repair Paint: ASTM A780.

SECTION 053100 – STEEL DECKING

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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.

SECTION 053100 – STEEL DECKING

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3.3 INSTALLATION OF ROOF DECK

- A. Fasten roof-deck panels to supporting light gauge steel truss members by mechanical fasteners (#12-14 tek screws) spaced as indicated.
- 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-third of the span or 18 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 2 inches minimum.
- D. Roof Sump Pans and Sump Plates: Install over openings provided in roof deck and mechanically fasten flanges to top of deck. Space mechanical fasteners not more than 12 inches apart with at least one weld fastener at each corner.
 - 1. Install reinforcing channels or zees in ribs to span between supports and mechanically fasten.
- E. Miscellaneous Roof-Deck Accessories: Install ridge and valley plates, finish strips, end closures, and reinforcing channels in accordance with deck manufacturer's written instructions. Weld or mechanically fasten to substrate to provide a complete deck installation.
 - 1. Weld or mechanically fasten cover plates at changes in direction of roof-deck panels unless otherwise indicated.

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:

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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 054100 – LIGHT WEIGHT COLD FORMED STEEL FRAMING

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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. Miscellaneous ~~interior~~exterior wall and soffit framing.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of cold formed steel framing product and accessory.

1.4 QUALITY ASSURANCE

- A. All structural members shall be designed in accordance with the latest edition of AISC Specification for the Design of Cold Formed Structural Members.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Protect cold formed steel framing from corrosion, moisture staining, deformation, and other damage during delivery, storage, and handling.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with requirements, provide products by one of the following:
 - 1. ClarkDietrich Building Systems, Inc.
 - 2. Nuconsteel; a Nucor Company.
- B. Substitutions: Submit procurement substitution requests per Section 013350.
- C. Source Limitations: Obtain light weight cold formed metal framing products from single source and from a single manufacturer.

SECTION 054100 – LIGHT WEIGHT COLD FORMED STEEL FRAMING

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2.2 PERFORMANCE REQUIREMENTS

- A. Cold-Formed Steel Framing Design Standards:
 - 1. Floor and Roof Systems: AISI S210.
 - 2. Wall Studs: AISI S211.
 - 3. Headers: AISI S212.
 - 4. Lateral Design: AISI S213.
- B. AISI Specifications and Standards: Unless more stringent requirements are indicated, comply with AISI S100 and AISI S200.
- C. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.3 COLD-FORMED STEEL FRAMING, GENERAL

- A. Steel Sheet: ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of grade and coating weight as follows:
 - 1. Grade: ST50H.
 - 2. Coating: G60.
- B. Steel Sheet for Vertical Deflection and Drift Clips: ASTM A 653/A 653M, structural steel, zinc coated, of grade and coating as follows:
 - 1. Grade: 50, Class 1.
 - 2. Coating: G60.

2.4 NON-LOAD-BEARING WALL FRAMING

- A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
 - 1. Minimum Base-Metal Thickness: 0.0538 inches, 16 gauge.
 - 2. Flange Width: 1-5/8 inches.
- B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, un-punched, with unstiffened flanges, and as follows:
 - 1. Minimum Base-Metal Thickness: 0.0538 inches, 16 gauge.
 - 2. Flange Width: 1-1/4 inches.
- C. All steel studs shall be pre-punched for electrical wiring, plumbing piping, etc.
- D. Refer to drawings and section details for studs sizes. Track sizes shall match stud sizes.

SECTION 054100 – LIGHT WEIGHT COLD FORMED STEEL FRAMING

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2.5 SOFFIT FRAMING

- A. Exterior Soffit Frame: Manufacturer's standard C-shaped steel sections, of web depths indicated, with stiffened flanges, and as follows:
 - 1. Minimum Base-Metal Thickness: 0.0538 inches, 16 gauge.
 - 2. Height: 7/8 inches, minimum.

2.6 FRAMING ACCESSORIES

- A. Fabricate steel-framing accessories from steel sheet, ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of same grade and coating weight used for framing members.
- B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:
 - 1. Supplementary framing.
 - 2. Bracing, bridging, and solid blocking.
 - 3. Web stiffeners.
 - 4. Anchor clips.
 - 5. End clips.
 - 6. Foundation clips.
 - 7. Gusset plates.
 - 8. Stud kickers and knee braces.
 - 9. Joist hangers and end closures.
 - 10. Hole reinforcing plates.
 - 11. Backer plates.

2.7 ANCHORS, CLIPS, AND FASTENERS

- A. Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123/A 123M.
- B. Anchor Bolts: ASTM F 1554, Grade 36, threaded carbon-steel headless bolts, with encased end threaded, and carbon-steel nuts; and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A 153/A 153M, Class C.
- C. Expansion Anchors: Fabricated from corrosion-resistant materials, with allowable load or strength design capacities calculated according to ICC-ES AC193 and ACI 318 greater than or equal to the design load, as determined by testing per ASTM E 488 conducted by a qualified testing agency.
- D. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with allowable load capacities calculated according to ICC-ES AC70, greater than or equal to the design load, as determined by testing per ASTM E 1190 conducted by a qualified testing agency.

SECTION 054100 – LIGHT WEIGHT COLD FORMED STEEL FRAMING

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- E. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping, steel drill screws.
 - 1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.
- F. Welding Electrodes: Comply with AWS standards.

2.8 MISCELLANEOUS MATERIALS

- A. Galvanizing Repair Paint: ASTM A 780.
- B. Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to match width of bottom track or rim track members.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine supporting substrates and abutting structural framing 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 cold-formed steel framing according to AISI S200 and to manufacturer's written instructions unless more stringent requirements are indicated.
- B. Install cold-formed framing securely anchored to the supporting structure.
- C. Install cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened.
 - 1. Cut framing members by sawing or shearing; do not torch cut.
 - 2. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted.
 - a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
 - b. Locate mechanical fasteners and install according to Shop Drawings, and complying with requirements for spacing, edge distances, and screw penetration.

SECTION 054100 – LIGHT WEIGHT COLD FORMED STEEL FRAMING

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- D. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.
- E. Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.
- F. Do not bridge building expansion joints with cold-formed steel framing. Independently frame both sides of joints.
- G. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's approved or standard punched openings.
- H. Erection Tolerances: Install cold-formed steel framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:
 - 1. Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.3 FRAMING & INSTALLATION

- A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure as indicated. Complete, uniform and level bearing support shall be provided for the bottom track. Abutting lengths of track shall each be securely anchored to a common structural element.
- B. Fasten both flanges of studs to top and bottom track unless otherwise indicated. Space studs as follows:
 - 1. Stud Spacing: 16 inches, unless noted otherwise.
- C. Top and bottom tracks shall be securely anchored to the supporting structure. Studs shall be plumbed, aligned, and securely attached to the flanges of the top and bottom tracks.
- D. For exterior locations, set bottom track in continuous bed of mastic waterproofing. For interior wall locations, set bottom track continuous run of sealer gasket as specified.
- E. Splices in studs are not permitted.
- F. Double studs around all openings such as doors and windows for a rigid header and jamb condition.
- G. Provide bridging for stud walls.
- H. Set studs plumb, except as needed for diagonal bracing or required for non-plumb walls or warped surfaces and similar requirements.

SECTION 054100 – LIGHT WEIGHT COLD FORMED STEEL FRAMING

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- I. Fastening of all components shall be with self-drilling screws or welding. Galvanized or cadmium screws shall be of sufficient size and number to ensure the strength of the connection.
- J. Wire tying of components is not permitted.
- K. Isolate non-load-bearing steel framing from building structure, where applicable, to prevent transfer of vertical loads while providing lateral support.
 - 1. Install single deep-leg deflection tracks and anchor to building structure.
- L. Install horizontal bridging in wall studs, spaced vertically in rows indicated on Shop Drawings but not more than 48 inches apart. Fasten at each stud intersection.
 - 1. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 12 inches of single deflection track. Install a combination of bridging and stud or stud-track solid blocking of width and thickness matching studs, secured to stud webs or flanges.
 - a. Install solid blocking at 96 inch centers.
 - 2. Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.
 - 3. Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
- M. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.4 REPAIRS AND PROTECTION

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed steel framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
- B. All welds shall be touched up with galvanized coatings as per ASTM A 780.
- C. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer that ensure that cold-formed steel framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION 054100

SECTION 054400 – COLD-FORMED METAL TRUSSES

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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 cold-formed steel framing in the form of the following:
 - 1. Cold-formed steel trusses for roofs.
- B. Related Requirements:
 - 1. Section 053100 "Steel Decking"
 - 2. Section 054000 "Cold-Formed Metal Framing"

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Product Data Submittals:
 - 1. Cold-formed steel truss materials.
 - 2. Anchor bolts.
 - 3. Post-installed anchors.
 - 4. Power-actuated fasteners.
 - 5. Mechanical fasteners.
- C. Shop Drawings:
 - 1. Include layout, spacings, sizes, thicknesses, and types of cold-formed steel trusses; fabrication; and fastening and anchorage details, including mechanical fasteners.
 - 2. Indicate reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.
 - 3. Indicate truss layout and bearing points have been coordinated with suggested truss layout and framing members on Drawings.

SECTION 054400 – COLD-FORMED METAL TRUSSES

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- D. Delegated-Design Submittal: For cold-formed steel trusses and connections to support members.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agency.
- B. Welding certificates.
- C. Field quality-control reports.

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM E329 for testing indicated.
- B. Product Tests: Mill certificates or data from a qualified independent testing agency, or in-house testing with calibrated test equipment, indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.
- C. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1, "Structural Welding Code - Steel."
 - 2. AWS D1.3, "Structural Welding Code - Sheet Steel."
- D. DELIVERY, STORAGE, AND HANDLING
 - 1. Protect trusses and accessories from corrosion, deformation, and other damage during delivery, storage, and handling.

PART 2 - PRODUCTS**2.1 MANUFACTURERS**

- A. Manufacturers: Subject to compliance with requirements, providers include, but are not limited to, the following:
 - 1. Aegis Metal Framing.
 - 2. MarinoWARE.
 - 3. TrusSteel; an ITW company.
 - 4. USA Frametek.

SECTION 054400 – COLD-FORMED METAL TRUSSES

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5. WESTCO Steel Systems, Inc.

2.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, licensed in the state of Louisiana, to design cold-formed steel trusses.
- B. Structural Performance: Provide cold-formed steel trusses capable of withstanding design loads within limits and under conditions indicated.
 1. Design Loads and Load Combinations:
 - a. per IBC 2021 and ASCE 7-16
 - b. Roof dead loads due to roof assembly shall be a minimum of twelve (12) pounds per square foot.
 - c. Ceiling and collateral loads at bottom chord shall be a minimum of five (5) pounds per square foot.
 2. Deflection Limits: Design trusses to withstand design loads without deflections greater than the following:
 - a. Roof Trusses: Vertical deflection of 1/360 of the span.
 3. Design trusses to provide for movement of truss members located outside the insulated building envelope without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 120 deg F.
- C. Cold-Formed Steel Truss Standards: Unless more stringent requirements are indicated, trusses shall comply with the following:
 1. Floor and Roof Systems: AISI S210.
 2. Lateral Design: AISI S213.
 3. Roof Trusses: AISI S214.

2.3 COLD-FORMED STEEL TRUSS MATERIALS

- A. Steel Sheet: ASTM A1003, Structural Grade, Type H, metallic coated, of grade and coating designation as follows:
 1. Grade: ST50H.
 2. Coating: G90-or equivalent.

SECTION 054400 – COLD-FORMED METAL TRUSSES

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2.4 ROOF TRUSSES

- A. Roof Truss Members: Manufacturer's standard steel sections.
 - 1. Connecting Flange Width: 1-5/8 inches, minimum at top and bottom chords connecting to sheathing or other directly fastened construction.
 - 1. Minimum Base-Metal Thickness: 0.0538 inch (16 gauge) at top and bottom chords and 0.0329 inch (20 gauge) material at truss web members.
 - 2. Section Properties: Truss web member profile shall be a minimum of 3-5/8 inches x 1-5/8 inches.
 - 3. Ensure compatibility of truss fastening points with conditions indicated on drawings. Provide additional members / accessories as required to achieve conditions indicated on drawings.

2.5 TRUSS ACCESSORIES

- A. Fabricate steel-truss accessories from steel sheet, ASTM A1003/A1003M, Structural Grade, Type H, metallic coated steel sheet, of same grade and coating designation used for truss members.
- B. Provide accessories of manufacturer's standard thickness and configuration unless otherwise indicated.

2.6 ANCHORS, CLIPS, AND FASTENERS

- A. Steel Shapes and Clips: ASTM A36, zinc coated by hot-dip process according to ASTM A123.
- B. Mechanical Fasteners: ASTM C1513, corrosion-resistant-coated, self-drilling, self-tapping steel drill screws.
 - 1. Head Type: Low-profile head beneath sheathing; manufacturer's standard elsewhere.
- C. Welding Electrodes: Comply with AWS standards.

2.7 MISCELLANEOUS MATERIALS

- A. Galvanizing Repair Paint: ASTM A780.
- B. Shims: Load-bearing, high-density multimonomer, nonleaching plastic; or cold-formed steel of same grade and metallic coating as truss members supported by shims.

SECTION 054400 – COLD-FORMED METAL TRUSSES

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2.8 FABRICATION

- A. Fabricate cold-formed steel trusses and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.
 - 1. Fabricate trusses using jigs or templates.
 - 2. Cut truss members by sawing or shearing; do not torch cut.
 - 3. Fasten cold-formed steel truss members by welding, screw fastening, clinch fastening, pneumatic pin fastening, or riveting as standard with fabricator.
 - a. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
 - 4. Fasten other materials to cold-formed steel trusses by welding, bolting, pneumatic pin fastening, or screw fastening, according to Shop Drawings.
- B. Reinforce, stiffen, and brace trusses to withstand handling, delivery, and erection stresses. Lift fabricated trusses by means that prevent damage or permanent distortion.
- C. Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable variation of 1/8 inch in 10 feet (1:960) and as follows:
 - 1. Spacing: Space individual truss members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
 - 2. Squareness: Fabricate each cold-formed steel truss to a maximum out-of-square tolerance of 1/8 inch.

PART 3 - EXECUTION**3.1 EXAMINATION**

- A. Examine substrates, areas, conditions, and abutting trusses and framing 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.

SECTION 054400 – COLD-FORMED METAL TRUSSES

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3.2 INSTALLATION

- A. Install bridging and brace cold-formed steel trusses according to AISI S200, AISI S202, AISI S214, and manufacturer's written instructions unless more stringent requirements are indicated.
 - 1. Anchor trusses securely at all bearing points.
 - 2. Install continuous bridging and permanently brace trusses as indicated on Shop Drawings and designed according to CFSEI's Technical Note 551e, "Design Guide: Permanent Bracing of Cold-Formed Steel Trusses."
- B. Install cold-formed steel trusses and accessories true to line and location, and with connections securely fastened.
 - 1. Erect trusses with plane of truss webs plumb and parallel to each other. Align and accurately position trusses at required spacings.
 - 2. Erect trusses without damaging truss members or connections.
 - 3. Fasten cold-formed steel trusses by welding or mechanical fasteners.
 - a. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
 - b. Locate mechanical fasteners, install according to Shop Drawings, and comply with requirements for spacing, edge distances, and screw penetration.
- C. Install temporary bracing and supports to secure trusses and support loads equal to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to trusses are secured.
- D. Truss Spacing: As indicated on Drawings. Actual truss layout, including additional of girder trusses or other special members not indicated on drawings is responsibility of truss manufacturer. Truss layout to incorporate structural members shown on drawings and achieve roof slopes, hip, valley, ridge, eave, etc. conditions indicated on drawings.
- E. Do not alter, cut, or remove truss members or connections of trusses.

3.3 ERECTION TOLERANCES

- A. Install cold-formed steel trusses level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet (1:960) and as follows:
 - 1. Space individual trusses no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

SECTION 054400 – COLD-FORMED METAL TRUSSES

Phase 8 Stadium Improvements – Washington-Marion High

3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Cold-formed metal trusses will be considered defective if they do not pass tests and inspections.
- C. Prepare test and inspection reports.

3.5 REPAIRS AND PROTECTION

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed steel trusses with galvanized repair paint according to ASTM A780 and manufacturer's written instructions.
- B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that cold-formed steel trusses are without damage or deterioration at time of Substantial Completion.

END OF SECTION 054400

DIVISION 06

**TECHNICAL
SPECIFICATIONS**

**WOOD, PLASTICS, and
COMPOSITES**

SECTION 06100 – ROUGH CARPENTRY

Phase 8 Stadium Improvements – Washington-Marion High

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the contract, including the General and Supplementary Conditions and Division No. 1 Specification sections, apply to work of this section.

1.2 DESCRIPTION OF WORK

- A. Rough Carpentry includes carpentry work not specified as part of sections and which is generally not exposed, except as otherwise indicated.
- B. Types of work in this section include rough carpentry for:
 - 1. Wood Grounds, Nailers & Blocking.
 - 2. All nails shall be galvanized.
- C. For all wood structural framing, provide the following grade and species:
 - 1. Douglas Fir graded under WCLIB or WWPA rules.
 - 2. Hem Fir graded under WWPA rules.
 - 3. Southern Pine graded under SPIB rules.
 - 4. Any species and grade which meets or exceeds the following values:
 - a. Fb (min. extreme fiber stress in bending); 1,500 psi
 - b. E (min. modulus of elasticity); 1,500,000 psi
 - 5. All lumber shall be wolmanized.

1.3 PRODUCT HANDLING

- A. Delivery & Storage: Keep materials under cover and dry. Protect against exposure to weather and contact with damp or wet surfaces. Stack lumber as well as plywood and other panels; provide for air circulation within and around stacks and under temporary coverings including polyethylene and similar material.
- B. For lumber and plywood pressure treated with waterborne chemicals, sticker between each course to provide air circulation.

1.4 PROJECT CONDITIONS

- A. Coordination: Fit carpentry work to other work; scribe and cope nailers, blocking, grounds and similar supports to allow attachment of other work.

SECTION 06100 – ROUGH CARPENTRY

Phase 8 Stadium Improvements – Washington-Marion High

PART 2 - PRODUCTS**2.1 LUMBER - GENERAL**

- A. Provide dressed lumber, S4S, unless otherwise indicated.
- B. Provide seasoned lumber with 19% maximum moisture content (max) at time of dressing and shipment for sizes 2" or less in nominal thickness, unless otherwise indicated.
- C. Provide lumber with 15% maximum moisture content at time of dressing and shipment for sizes 2" or less in nominal thickness unless otherwise indicated.

END OF SECTION 060110

SECTION 061600 – SHEATHING

Phase 8 Stadium Improvements – Washington-Marion High

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. Wall sheathing.
 - 2. Sheathing joint and penetration treatment.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1.4 QUALITY ASSURANCE

- A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant-treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Stack panels flat with spacers beneath and between each bundle to provide air circulation. Protect sheathing from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: For assemblies with fire-resistance ratings, provide materials and construction identical to those of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory."

SECTION 061600 – SHEATHING

Phase 8 Stadium Improvements – Washington-Marion High

2.2 WALL SHEATHING

- A. Extruded-Polystyrene-Foam Wall Sheathing: ASTM C 578, Type IV, in manufacturer's standard lengths and widths.
 - 1. Subject to compliance with requirements, provide products by one of the following:
 - a. DiversiFoam Products.
 - b. Dow Chemical Company (The).
 - c. Owens Corning.
 - d. Pactiv, Inc.
 - 2. Thickness: As indicated.
 - 3. Width: 16" or 24", fit between wall ties or light gauge furring channels.
 - 4. R-Value: No less than 5.0 per inch.
 - 5. Surface Burning Characteristics (ASTM E 84):
 - a. Flame Spread: Less than 25.
 - b. Smoke Development: Less than 450.

2.3 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
 - 1. For wall sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A 153.
- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Power-Driven Fasteners: NES NER-272.

2.4 SHEATHING JOINT-AND-PENETRATION TREATMENT MATERIALS

- A. Adhesive or Mastic Sealant for Foam Sheathing: Adhesive or mastic as recommended by the sheathing manufacturer.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.

SECTION 061600 – SHEATHING

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- C. Coordinate wall sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.
- D. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.
- E. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

3.2 FOAM-PLASTIC SHEATHING INSTALLATION

- A. Comply with manufacturer's written instructions.
- B. Foam-Plastic Wall Sheathing: Install vapor-relief strips or equivalent for permitting escape of moisture vapor that otherwise would be trapped in stud cavity behind sheathing.
- C. Apply adhesive or mastic sealant to joints and edges to seal each board tightly as boards are pressed into place. Fill voids and around penetrations and all items that penetrate with adhesive or mastic. Complete work in accordance with manufacturer's instructions. Overlap flashings and sheathing.

END OF SECTION 061600

SECTION 064116 – PLASTIC LAMINATE FACED ARCHITECTURAL CABINETS

Phase 8 Stadium Improvements – Washington-Marion High

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. Plastic-laminate-faced architectural cabinets.
 2. Wood furring, blocking, shims, and hanging strips for installing plastic-laminate-faced architectural cabinets unless concealed within other construction before cabinet installation.
- B. Related Requirements:
1. Section 061000 "Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing cabinets and concealed within other construction before cabinet installation.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product, including panel products, high pressure decorative laminate, and cabinet hardware and accessories.
1. Include data for fire-retardant treatment from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements.
- B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.
1. Show details full size.
 2. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
 3. Show locations and sizes of cutouts and holes for all items installed in architectural plastic-laminate cabinets.
 4. Apply AWI Quality Certification Program label to Shop Drawings.
- C. Samples for Initial Selection:
1. Plastic laminates.
 2. Thermoset decorative panels.

SECTION 064116 – PLASTIC LAMINATE FACED ARCHITECTURAL CABINETS

Phase 8 Stadium Improvements – Washington-Marion High

1.4 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.
- B. Installer Qualifications: An experienced installer who has completed architectural cabinetwork similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver cabinets until painting and similar operations that could damage woodwork have been completed in installation areas. If cabinets must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

1.6 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install cabinets until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F and relative humidity between 43 and 70 percent during the remainder of the construction period.
- B. Field Measurements: Where cabinets are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
 - 1. Locate concealed framing, blocking, and reinforcements that support cabinets by field measurements before being enclosed, and indicate measurements on Shop Drawings.
- C. Established Dimensions: Where cabinets are indicated to fit to other construction, establish dimensions for areas where cabinets are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.7 COORDINATION

- A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that cabinets can be supported and installed as indicated.

SECTION 064116 – PLASTIC LAMINATE FACED ARCHITECTURAL CABINETS

Phase 8 Stadium Improvements – Washington-Marion High

PART 2 - PRODUCTS**2.1 PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS**

- A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of architectural plastic-laminate cabinets indicated for construction, finishes, installation, and other requirements.
- B. Grade: Custom.
- C. Type of Construction: Frameless or Euro.
- D. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or if not indicated, as required by woodwork quality standard.
 - 1. Subject to compliance with requirements, provide products by one of the following with the exception being Decotone and Pionite. Decotone and Pionite colors listed below are currently being used at Washington Marion High School:
 - a. Decotone Surfaces.
 - b. Formica Corporation.
 - c. Nevamar Company, LLC; Decorative Products Div.
 - d. Wilsonart International; Div. of Premark International, Inc.
 - 2. Formica #7897 Spectrum Green. This laminate supplier shall be used for Washington Marion's "Green" laminate color, no substitute.
 - 3. Decotone Surfaces #LT-2316 Golden. This laminate supplier shall be used for Washington Marion's "Golden" laminate color, no substitute.
- E. Laminate Cladding for Exposed Surfaces:
 - 1. Horizontal Surfaces: Grade HGS.
 - 2. Post-formed Surfaces: Grade HGP.
 - 3. Vertical Surfaces: Grade HGS.
 - 4. Edges: Grade HGS.
- F. Stainless Steel Countertops, Edges, Splashes, Fascia:
 - 1. Refer to interior elevations and millwork sections for extent and location of stainless steel surfacing.
 - a. Type 304, #3 Satin, 14 gauge. Refer to millwork construction notes.
- G. Materials for Semi-exposed Surfaces:
 - 1. Surfaces Other Than Drawer Bodies: High-pressure decorative laminate, NEMA LD 3, Grade CLS.

SECTION 064116 – PLASTIC LAMINATE FACED ARCHITECTURAL CABINETS

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- a. For semi-exposed backs of panels with exposed plastic-laminate surfaces, provide surface of high-pressure decorative laminate, NEMA LD 3, Grade CLS.
- H. Dust Panels: 1/4-inch plywood or tempered hardboard above compartments.
- I. Concealed Backs of Panels with Exposed Plastic-Laminate Surfaces: High-pressure decorative laminate, NEMA LD 3, Grade BKL.
- J. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:
 - 1. As selected by Architect from laminate manufacturer's full range in the following categories:
 - a. Solid colors, matte finish.
 - b. Solid colors with core same color as surface, matte finish.
 - c. Wood grains, matte finish.
 - d. Patterns, matte finish.

2.2 WOOD MATERIALS

- A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.
 - 1. Wood Moisture Content: 8 to 13 percent.
- B. Composite Wood and Agrifiber Products: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.
 - 1. Medium-Density Fiberboard: ANSI A208.2, Grade 130, made with binder containing no urea formaldehyde, 3/4 inch.
 - 2. Thermoset Decorative Panels: Particleboard or medium-density fiberboard finished with thermally fused, melamine-impregnated decorative paper and complying with requirements of NEMA LD 3, Grade VGL, for test methods 3.3, 3.4, 3.6, 3.8, and 3.10.

2.3 CABINET HARDWARE AND ACCESSORIES

- A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets except for items specified in Section 087111 "Door Hardware (Descriptive Specification)."
- B. Adjustable Shelf Supports: Plastic, double pin 5mm bores at 32mm centers, dual size locking clip for use with 3/4" or 1" shelves, extra heavy duty, 500# capacity for (4) clips.

SECTION 064116 – PLASTIC LAMINATE FACED ARCHITECTURAL CABINETS

Phase 8 Stadium Improvements – Washington-Marion High

- C. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.
 - 1. Satin Chrome Plated: BHMA 626 for brass or bronze base; BHMA 652 for steel base.
- D. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.

2.4 MISCELLANEOUS MATERIALS

- A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber or fire-retardant-treated softwood lumber as required for installations in fire rated construction, kiln dried to less than 15 percent moisture content.
- B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.
- C. Adhesives: Do not use adhesives that contain urea formaldehyde.
- D. Adhesive for Bonding Plastic Laminate: Un-pigmented contact cement.

2.5 FABRICATION

- A. Fabricate cabinets to dimensions, profiles, and details indicated.
- B. Complete fabrication, including assembly and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
 - 1. In-field laminated is strictly prohibited.
 - 2. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements before disassembling for shipment.
- C. Shop-cut openings to maximum extent possible to receive hardware, appliances, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

PART 3 - EXECUTION**3.1 PREPARATION**

- A. Before installation, condition cabinets to average prevailing humidity conditions in installation areas.
- B. Before installing cabinets, examine shop-fabricated work for completion and complete work as required.

3.2 INSTALLATION

- A. Grade: Install cabinets to comply with same grade as item to be installed.
- B. Install cabinets after all finish painting work is complete.
- C. Assemble cabinets and complete fabrication at Project site to the extent that it was not completed in the shop.
- D. Install cabinets level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches.
- E. Scribe and cut cabinets to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- F. Anchor cabinets to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with woodwork.
 - 1. Use filler matching finish of items being installed.
- G. Cabinets: Install without distortion so shelves fit openings properly and are accurately aligned. Adjust shelving hardware to center in openings and to provide unencumbered adjustment. Complete installation of hardware and accessory items as indicated.
 - 1. Install cabinets with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
 - 2. Fasten wall cabinets through back, near top and bottom, and at ends not more than 16 inches o.c.
- H. Wood grain laminates for all exposed faces of cabinets, doors, and drawer fronts shall be installed with the grain in a vertical direction.

SECTION 064116 – PLASTIC LAMINATE FACED ARCHITECTURAL CABINETS

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3.3 ADJUSTING AND CLEANING

- A. Repair damaged and defective cabinets, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.
- B. Clean and adjust hardware.
- C. Clean cabinets on exposed and semi-exposed surfaces.

END OF SECTION 064116

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. Plastic-laminate-faced shelving.
 - 2. Wood furring, blocking, shims, and hanging strips for installing plastic-laminate-faced shelving unless concealed within other construction before shelving installation.
- B. Related Requirements:
 - 1. Section 061000 "Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing cabinets and concealed within other construction before cabinet installation.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product, including panel products, high-pressure decorative laminate, and cabinet hardware and accessories.
- B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.
 - 1. Show details full size.
 - 2. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
 - 3. Apply AWI Quality Certification Program label to Shop Drawings.
- C. Samples for Initial Selection:
 - 1. Plastic laminates and thermoset colors.

1.4 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.

- B. Installer Qualifications: An experienced installer who has completed shelving similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver shelving units until painting and similar operations that could damage woodwork have been completed in installation areas. If shelving must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

1.6 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install shelving until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F and relative humidity between 43 and 70 percent during the remainder of the construction period.
- B. Field Measurements: Where shelving units are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
 - 1. Locate concealed framing, blocking, and reinforcements that support shelving by field measurements before being enclosed, and indicate measurements on Shop Drawings.
- C. Established Dimensions: Where shelving units are indicated to fit to other construction, establish dimensions for areas where shelving units are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.7 COORDINATION

- A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that shelving units can be supported and installed as indicated.

PART 2 - PRODUCTS**2.1 PLASTIC-LAMINATE-FACED SHELVING**

- A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of architectural plastic-laminate shelving indicated for construction, finishes, installation, and other requirements.
- B. Grade: Custom.
- C. Type of Construction: Frameless or Euro.
- D. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or if not indicated, as required by woodwork quality standard.
 - 1. Subject to compliance with requirements, provide products by one of the following with the exception being Decotone and Pionite. Decotone and Pionite colors listed below are currently being used at Washington Marion High School.
 - a. Decotone Surfaces.
 - b. Formica Corporation.
 - c. Nevamar Company, LLC; Decorative Products Div.
 - d. Wilsonart International; Div. of Premark International, Inc.
 - 2. Formica #7897 Spectrum Green. This laminate supplier shall be used for Washington Marion's "Green" laminate color, no substitute.
 - 3. Decotone Surfaces #LT-2316 Golden. This laminate supplier shall be used for Washington Marion's "Golden" laminate color, no substitute.
- E. Laminate Cladding for Exposed Surfaces:
 - 1. Horizontal Surfaces: Grade HGS.
 - 2. Post-formed Surfaces: Grade HGP.
 - 3. Vertical Surfaces: Grade HGS.
 - 4. Edges: Grade HGS.
- F. Materials for Semi-exposed Surfaces:
 - 1. Surfaces Other Than Drawer Bodies: High-pressure decorative laminate, NEMA LD 3, Grade CLS.
 - a. For semi-exposed backs of panels with exposed plastic-laminate surfaces, provide surface of high-pressure decorative laminate, NEMA LD 3, Grade CLS.
- G. Dust Panels: 1/4-inch plywood or tempered hardboard above compartments and drawers unless located directly under tops.

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- H. Concealed Backs of Panels with Exposed Plastic-Laminate Surfaces: High-pressure decorative laminate, NEMA LD 3, Grade BKL.
- I. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:
 - 1. Special laminate colors shall be utilized as stated herein. All other laminates will be as selected by Architect from laminate manufacturer's full range in the following categories:
 - a. Solid colors, matte finish.
 - b. Solid colors with core same color as surface, matte finish.
 - c. Wood grains, matte finish.
 - d. Patterns, matte finish.

2.2 WOOD MATERIALS

- A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.
 - 1. Wood Moisture Content: 8 to 13 percent.
- B. Composite Wood and Agrifiber Products: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.
 - 1. Medium-Density Fiberboard: ANSI A208.2, Grade 130, made with binder containing no urea formaldehyde, 3/4 inch.
 - 2. Thermoset Decorative Panels: Medium-density fiberboard finished with thermally fused, melamine-impregnated decorative paper and complying with requirements of NEMA LD 3, Grade VGL, for test methods 3.3, 3.4, 3.6, 3.8, and 3.10.

2.3 SHELVING HARDWARE AND ACCESSORIES

- A. General: Provide shelving hardware and accessory materials associated with architectural shelving.
- B. Adjustable Shelf Supports: Plastic, double pin 5mm bores at 32mm centers, dual size locking clip for use with 3/4" or 1" shelves, extra heavy duty, 500# capacity for (4) clips.
- C. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.
 - 1. Satin Stainless Steel: BHMA 630.

- D. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.

2.4 MISCELLANEOUS MATERIALS

- A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber or fire-retardant-treated softwood lumber as required for installations in fire rated construction, kiln dried to less than 15 percent moisture content.
- B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.
- C. Adhesives: Do not use adhesives that contain urea formaldehyde.
- D. Adhesive for Bonding Plastic Laminate: Un-pigmented contact cement.

2.5 FABRICATION

- A. Sand fire-retardant-treated wood lightly to remove raised grain on exposed surfaces before fabrication.
- B. Fabricate shelving to dimensions, profiles, and details indicated.
- C. Complete fabrication, including assembly and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
 - 1. In-field laminated is strictly prohibited.
 - 2. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements before disassembling for shipment.
- D. Shop-cut openings to maximum extent possible to receive hardware, appliances, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

PART 3 - EXECUTION**3.1 PREPARATION**

- A. Before installation, condition shelving to average prevailing humidity conditions in installation areas.
- B. Before installing shelving, examine shop-fabricated work for completion and complete work as required.

3.2 INSTALLATION

- A. Grade: Install shelving to comply with same grade as item to be installed.
- B. Install shelving after all finish painting work is complete.
- C. Assemble shelving and complete fabrication at Project site to the extent that it was not completed in the shop.
- D. Install shelving level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches.
- E. Scribe and cut shelving to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- F. Anchor shelving to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with woodwork.
 - 1. Use filler matching finish of items being installed.
- G. Shelving: Install without distortion so shelving fits properly and are accurately aligned. Adjust brackets to center shelves vertically and level and to provide unencumbered shelf removal and adjustment. Complete installation of hardware and accessory items as indicated.
 - 1. Install shelving with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
 - 2. Fasten shelving through back, near top and bottom, and at ends not more than 16 inches o.c. with No. 10 wafer-head screws sized for not less than 1-1/2-inch penetration into wood framing, blocking, or hanging strips.
- H. Wood grain laminates for all exposed faces of cabinets, doors, and drawer fronts shall be installed with the grain in a vertical direction.
- I. Where installed shelving units create a void or blind/concealed corner in a room or space, close off top corner with laminate clad panel. Match color of shelving unit top.

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3.3 ADJUSTING AND CLEANING

- A. Repair damaged and defective shelving, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.
- B. Clean, lubricate, and adjust hardware.
- C. Clean shelving units on exposed and semi-exposed surfaces.

END OF SECTION 064118

DIVISION 07

**TECHNICAL
SPECIFICATIONS**

**THERMAL & MOISTURE
PROTECTION**

SECTION 071113 – BITUMINOUS DAMPPROOFING

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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. Cold-applied, emulsified-asphalt dampproofing.
- B. Related Requirements:
 - 1. Section 042200 "Concrete Unit Masonry" for mortar parge coat on masonry surfaces.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.4 FIELD CONDITIONS

- A. Weather Limitations: Proceed with application only when existing and forecasted weather conditions permit dampproofing to be performed according to manufacturers' written instructions.
- B. Ventilation: Provide adequate ventilation during application of dampproofing in enclosed spaces. Maintain ventilation until dampproofing has cured.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Source Limitations: Obtain primary dampproofing materials and primers from single source from single manufacturer. Provide auxiliary materials recommended in writing by manufacturer of primary materials.
- B. VOC Content: Products shall comply with VOC content limits of authorities having jurisdiction unless otherwise required.

SECTION 071113 – BITUMINOUS DAMPPROOFING

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2.2 COLD-APPLIED, EMULSIFIED-ASPHALT DAMPPROOFING

- A. Subject to compliance with requirements, provide one of the following products:
 - 1. Henry Company; No. 789.
 - 2. Meadows, W. R., Inc.; Sealmastic.
- B. Fibered Brush and Spray Coats: ASTM D 1227, Type II, Class 1.
- C. VOC Content: Zero.

2.3 AUXILIARY MATERIALS

- A. General: Furnish auxiliary materials recommended in writing by dampproofing manufacturer for intended use and compatible with bituminous dampproofing.
- B. Emulsified-Asphalt Primer: ASTM D 1227, Type III, Class 1, except diluted with water as recommended in writing by manufacturer.
- C. Asphalt-Coated Glass Fabric: ASTM D 1668, Type I.
- D. Patching Compound: Asbestos-free fibered mastic of type recommended in writing by dampproofing manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions with Applicator present, for compliance with requirements for surface smoothness, surface moisture, and other conditions affecting performance of bituminous dampproofing work.
- B. Proceed with application only after substrate construction and penetrating work have been completed and unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Mask or otherwise protect adjoining exposed surfaces from being stained, spotted, or coated with dampproofing. Prevent dampproofing materials from entering and clogging weep holes and drains.
- B. Clean substrates of projections and substances detrimental to the dampproofing work; fill voids, seal joints, and remove bond breakers if any, as recommended in writing by prime material manufacturer.

SECTION 071113 – BITUMINOUS DAMPPROOFING

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- C. Apply patching compound to patch and fill tie-holes, honeycombs, reveals, and other imperfections; excessive imperfections shall be covered with asphalt-coated glass fabric.

3.3 APPLICATION, GENERAL

- A. Comply with manufacturer's written instructions for dampproofing application, cure time between coats, and drying time before backfilling unless more stringent requirements are indicated.
 - 1. Apply dampproofing to provide continuous plane of protection.
 - 2. Apply additional coats if recommended in writing by manufacturer or to achieve a smooth surface and uninterrupted coverage.
- B. Where dampproofing exterior face of inner wythe of exterior masonry cavity walls, lap dampproofing at least 1/4 inch onto flashing, masonry reinforcement, veneer ties, and other items that penetrate inner wythe.
 - 1. Extend dampproofing over outer face of structural members and concrete slabs that interrupt inner wythe.
 - 2. Lap dampproofing at least 1/4 inch onto shelf angles supporting veneer.

3.4 COLD-APPLIED, EMULSIFIED-ASPHALT DAMPPROOFING

- A. Exterior Face of Inner Wythe of Cavity Walls: Apply primer and one brush or spray coat at not less than 1 gal./100 sq. ft.

3.5 CLEANING

- A. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended in writing by manufacturer of affected construction.

END OF SECTION 071113

SECTION 071326 – SELF-ADHERING SHEET WATERPROOFING

Phase 8 Stadium Improvements – Washington-Marion High

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. Modified bituminous sheet waterproofing.
- B. Related Sections include the following:
 - 1. Division 7 Section "Roof and Deck Insulation".

1.3 SUBMITTALS

- A. Product Data: Include manufacturer's written instructions for evaluating, preparing, and treating substrate, technical data, and tested physical and performance properties of waterproofing.
- B. Samples: For the following products:
 - 1. 12-by-12-inch square of waterproofing sheet.
 - 2. Qualification Data: For Installer.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: A firm that is acceptable to waterproofing manufacturer for installation of waterproofing required for this Project.
- B. Source Limitations: Obtain waterproofing materials through one source from a single manufacturer.
- C. Pre-installation Conference: Conduct conference at Project site.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in original packages with seals unbroken, labeled with manufacturer's name, product brand name and type, date of manufacture, and directions for storing.
- B. Store rolls according to manufacturer's written instructions.

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- C. Protect stored materials from direct sunlight.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Apply waterproofing within the range of ambient and substrate temperatures recommended by waterproofing manufacturer. Do not apply waterproofing to a damp or wet substrate.
 - 1. Do not apply waterproofing in snow, rain, fog, or mist.

1.7 WARRANTY

- A. Manufacturer's Warranty: Manufacturer's standard form in which manufacturer agrees to replace waterproofing material that does not comply with requirements or that fails to remain watertight within specified warranty period.
 - 1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MODIFIED BITUMINOUS SHEET WATERPROOFING

- A. Modified Bituminous Sheet: Not less than 40-mil thick, self-adhering sheet consisting of rubberized asphalt laminated to a polymer surface film with release liner on the adhesive side.
 - 1. Subject to compliance with requirements, provide one of the following:
 - a. The Garland Company; HPR Aqua Shield.
 - b. Tamko Roofing Products, Inc.; TW Underlayment.
 - 2. Physical Properties:
 - a. Verify that products retained meet physical properties in subparagraphs below. Revise to suit project requirements.
 - b. Tear Resistance: 35 lbf, ASTM D 1970.
 - c. Elongation: 125 percent minimum; ASTM D 1970.
 - d. Low-Temperature Flexibility: Pass at minus 15 deg F; ASTM D 1970.
 - e. Exposure: 90 days.
 - f. High Temperature Resistance: 250 deg F.

SECTION 071326 – SELF-ADHERING SHEET WATERPROOFING

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PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 SURFACE PREPARATION

- A. Clean, prepare, and treat substrates according to manufacturer's written instructions. Provide clean, dust-free, and dry substrates for waterproofing application.
- B. Bridge and cover joints and discontinuous deck-to-wall and deck-to-deck joints with overlapping sheet strips.

3.3 MODIFIED BITUMINOUS SHEET WATERPROOFING APPLICATION

- A. Install modified bituminous sheets according to waterproofing manufacturer's written instructions and according to recommendations.
- B. Apply and firmly adhere sheets over area to receive waterproofing. Apply only when ambient temperatures are above 40 deg F.
- C. Horizontal Application:
 - 1. Apply sheets from low point to high point of decks to ensure that laps shed water.
 - 2. Overlap edge seams 4". End seams should be lapped 6" and staggered.
- D. Apply continuous sheets over sheet strips bridging substrate cracks, construction, and contraction joints.
- E. Seal exposed edges of sheets at terminations not concealed by metal counter-flashings or ending in reglets with mastic.
- F. Install sheet waterproofing and auxiliary materials to tie into adjacent waterproofing.
- G. Repair tears, voids, and lapped seams in waterproofing not complying with requirements. Slit and flatten fish-mouths and blisters. Patch with sheet waterproofing extending 12 inches beyond repaired areas in all directions.
- H. Correct deficiencies in or remove sheet waterproofing that does not comply with requirements; repair substrates, reapply waterproofing, and repair sheet flashings.

SECTION 071326 – SELF-ADHERING SHEET WATERPROOFING

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- I. If exposure to weathering elements exceed the manufacturer's recommended and stated time period for any area(s), the Contractor shall replace the material for subject area(s) at no additional cost to the Owner.

3.4 PROTECTION

- A. Protect waterproofing from damage and wear during construction period.

END OF SECTION 071326

SECTION 072100 – THERMAL INSULATION

Phase 8 Stadium Improvements – Washington-Marion High

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. Glass-fiber blanket insulation.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

1.4 QUALITY ASSURANCE

- A. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
- B. Source Limitations: Obtain all insulation products from single source from single manufacturer.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

PART 2 - PRODUCTS

2.1 GLASS-FIBER BLANKET INSULATION

- A. Manufacturers: Subject to compliance with requirements, provide one of the following products:
 - 1. Johns Manville; JM Formaldehyde Free, Un-faced.
 - 2. Owens Corning; Eco-Touch Pink, Un-faced.

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- B. R-Values: Provide the following insulation R-Values.
 - 1. Above ceiling thermal barrier within ceiling joist spaces: R30.
- C. Un-faced, Glass-Fiber Blanket Insulation: ASTM C 665, Type I; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.
- D. Sustainability Requirements: Provide glass-fiber blanket insulation as follows:
 - 1. Free of Formaldehyde: Insulation manufactured with 100 percent acrylic binders and no formaldehyde.
 - 2. Low Emitting: Insulation tested according to ASTM D 5116 and shown to emit less than 0.05-ppm formaldehyde.

PART 3 - EXECUTION**3.1 PREPARATION**

- A. Clean substrates of substances that are harmful to insulation.
- B. Proceed only after deficiencies are corrected.

3.2 INSTALLATION, GENERAL

- A. Comply with insulation manufacturer's written instructions applicable to products and applications indicated.
- B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, moisture, or deleterious components.
- C. Extend insulation to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- D. Provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

3.3 INSTALLATION OF INSULATION FOR FRAMED CONSTRUCTION

- A. Glass-Fiber Blanket Insulation: Install in cavities formed by framing members according to the following requirements:

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1. Install blanket insulation to completely cover the building envelope, where indicated and shown on building section drawings. This includes above the thermal barrier within the attic space and/or between ceiling joists.
2. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
3. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
4. Maintain 3-inch clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.

3.4 PROTECTION

- A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION 072100

SECTION 072119 – FOAMED IN PLACE MASONRY WALL INSULATION

Phase 8 Stadium Improvements – Washington-Marion High

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. Foamed in place masonry wall insulation for thermal, sound, and fire resistance values.

1.3 SUBMITTALS

- A. Product and technical information as provided by the manufacturer.
- B. Certified Test Reports: Product data, with copies of certified test reports showing compliance with specified performance values, including R-values, fire performance, and sound abatement characteristics.
- C. MSDS Documents: Submit Material Safety Data Sheets complying with OSHA Hazard Communication Standard, 29 CFR 1910 1200.

1.4 QUALITY ASSURANCE

- A. Manufacturing Standards: Provide insulation produced by a single and approved manufacturer. The product must come from the manufacturer pre-mixed to ensure consistency.
- B. Installer Qualifications for Foamed In Place Masonry Insulation: Engage an experienced dealer/applicator who has been trained and licensed by the product manufacturer and which has not less than three years direct experience in the installation of the product used.
- C. Warranty: One (1) year product and installation warranty will be issued by both the manufacturer and installer.
- D. Fire Performance Characteristics: Provide insulation materials which are identical to those whose fire performance characteristics, as listed for each material or assembly of which insulation is a part, have been determined by testing, per methods indicated below, by a testing agency acceptable to authorities having jurisdiction.
 - 1. Surface Burning Characteristics: ASTM F 84.

SECTION 072119 – FOAMED IN PLACE MASONRY WALL INSULATION

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PART 2 - PRODUCTS

- A. Subject to compliance with requirements, available manufacturers and their products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Applegate; C-Foam.
 - 2. Core Fill; Core-Fill 500.
- B. Source Limitations: Obtain all foamed in place masonry wall insulation from single source manufacturer.
- C. Substitutions: Submit substitution requests in accordance with Section 013350 Procurement Substitution Procedures.

2.2 INSULATING MATERIALS

- A. General: Provide insulating materials which comply with requirements indicated for materials, compliance with referenced standards, and other characteristics.
- B. Foamed-In-Place Masonry Insulation: Two component thermal insulation produced by combining a plastic resin and catalyst foaming agent surfactant which, when properly ratioed and mixed, together with compressed air produce a cold-setting foam insulation in the hollow cores of hollow unit masonry walls.
 - 1. Surface Burning Characteristics: Maximum flame spread, smoke development, and fuel contribution of 0, 5, and 0 respectively.
 - 2. Combustion Characteristics: Non-combustible, Class A.
 - 3. Thermal R-Value: 4.9 per inch.
 - 4. Sound Abatement: Minimum STS of 53 and minimum STS of 44 for an 8-inch wall assembly.

PART 3 - EXECUTION

3.1 INSPECTION AND PREPARATION

- A. Application Assemblies:
 - 1. CMU Masonry Walls: 6", 8", 10", or 12" masonry units.
 - 2. Cavity Walls: 2" cavity and greater.

3.2 INSTALLATION OF FOAMED IN PLACE MASONRY WALL INSULATION

- A. General: Install foamed in place masonry wall insulation from interior, or as specified, prior to installation of interior finish work and after all masonry and structural concrete work is in place. Comply with all manufacturer's instructions.
- B. Fill all open cells of CMU and voids in hollow CMU walls as indicated and called for on the drawings. The foam insulation shall be pressure injected through a series of 5/8-inch

SECTION 072119 – FOAMED IN PLACE MASONRY WALL INSULATION

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to 7/8-inch holes drilled into every vertical column of block cells, every 8 inches on center, beginning at an approximate height of four (4) feet from finished floor level. Repeat this process/procedure at an approximate height of ten (10) feet above the first horizontal row of holes, or as needed, until the void is completely filled. Patch holes with mortar and score to resemble adjacent surfaces.

END OF SECTION 072119

SECTION 072200 – ROOF DECK INSULATION

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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. Polyisocyanurate Roof Insulation.
- B. Related sections:
 - 1. Division 07 Section "Self-Adhering Sheet Waterproofing".

1.3 REFERENCES

- 1. American Society for Testing and Materials (ASTM):
- 2. ASTM C1289 Standard Specification for Faced Rigid Polyisocyanurate Thermal Insulation
- 3. ASTM D5 Standard Test Method for Penetration of Bituminous Materials.
- 4. ASTM D5147 Standard Sampling and Testing Modified Bituminous Sheet Material.
- 5. Factory Mutual Research (FM):
 - a. Roof Assembly Classifications.
- 6. National Roofing Contractors Association (NRCA):
 - a. Roofing and Waterproofing Manual.
- 7. Underwriters Laboratories, Inc. (UL):
 - a. Fire Hazard Classifications.
- 8. Warnock Hersey (WH):
 - a. Fire Hazard Classifications.
- 9. Sheet Metal and Air Conditioning Contractors National Association (SMACNA)
- 10. Steel Deck Institute, St. Louis, Missouri (SDI)
- 11. Insulation Board, Polyisocyanurate (FS HH-I-1972)

1.4 SUBMITTALS

- A. Product Data: Provide manufacturer's specification data sheets for each product in accordance with Division 01 Section 013300 requirements.
- B. Provide a sample of each insulation type.

SECTION 072200 – ROOF DECK INSULATION

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C. Certification:

1. Submit insulation fasteners, fastening pattern layout, and deck/substrate penetration depth that resist the uplift pressures associated with the wind speeds stated in the Standing Seam Metal Roofing System and SBS Modified Roofing System specification section.

1.5 SHOP DRAWINGS

A. Submit manufacturer's shop drawings per Division 1 requirements.

B. Certification:

1. Submit roof manufacturer's certification that insulation fasteners furnished, are acceptable to roof manufacturer.
2. Submit insulation fasteners, fastening pattern layout, and deck/substrate penetration depth(s) that resist the uplift pressures as per the specified Standing Seam Metal Roofing system.
3. Submit roof manufacturer's certification that insulation furnished and installed is acceptable to roofing manufacturer as a component of roofing system and is eligible for roof manufacturer's system warranty.
4. Submit written certification that the roof deck insulation is acceptable for use as a component of the Standing Seam Metal Roofing system.
5. Submit written certification that the roof deck insulation, used in conjunction with the Standing Seam Metal Roofing systems, passes the UL1256 test for a fire rated assembly, if required.

1.6 QUALITY ASSURANCE

A. Fire Classification, ASTM E-108.

B. Pre-installation Meeting: Refer to Division 07 roofing specifications for pre-installation meeting requirements.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Deliver products to site with seals and labels intact, in manufacturer's original containers, dry and undamaged.
- B. Store all insulation materials in a manner to protect them from the wind, sun and moisture damage prior to and during installation. Any insulation that has been exposed to any moisture shall be removed from the project site.
- C. Keep materials enclosed in a watertight, ventilated enclosure (i.e. tarpaulins).
- D. Store materials above the ground. Any warped, broken or wet insulation boards shall be removed from the site.

SECTION 072200 – ROOF DECK INSULATION

Phase 8 Stadium Improvements – Washington-Marion High

PART 2 - PRODUCTS

2.1 ROOF DECK INSULATION

- A. Polyisocyanurate Board Insulation (SLOPED METAL: ASTM C 1289, Type II, Class 1, Grade 2, felt or glass-fiber mat facer on both major surfaces.
 - a. Qualities: Rigid, closed cell polyisocyanurate foam core bonded to heavy duty glass fiber mat facers, both sides.
 - b. Thickness: 1" minimum.
 - c. R-Value: 5.7 minimum.
 - d. Size: 48 inches x 96 inches maximum size when installed using mechanical fasteners, 36 fasteners per 48 x 96 board.
- 1. Subject to compliance with requirements, provide one of the following:
 - a. Atlas Roofing Corporation; AC Foam III.
 - b. Hunter Panels; H-Shield.

2.2 RELATED MATERIALS

- A. Fasteners: Corrosion resistant screw fastener as recommended and approved by the standing seam roofing system manufacturer.
 - 1. Approved with three (3) inches galvanized coated disc to resist the specified uplift pressures.

PART 3 - EXECUTION

3.1 EXECUTION, GENERAL

- A. Comply with requirements of Division 01 Section and all project requirements.
- B. Mechanically fasten to substrate using fastening pattern to resist uplift pressures associated with the stated wind speed in the Standing Seam Metal Roof System specification section.
- C. Install insulation with long joints of insulation in a continuous straight line, with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4 inch with insulation.
 - 1. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.

SECTION 072200 – ROOF DECK INSULATION

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3.2 INSPECTION OF SURFACES

- A. Roofing contractor shall be responsible for preparing an adequate substrate to receive insulation.
- B. Verify that work which penetrates roof deck has been completed.
- C. Examine surfaces for defects, rough spots, ridges, depressions, foreign material, moisture, and unevenness. Do not proceed until defects are corrected.
- D. Do not apply insulation until substrate is sufficiently dry.
- E. Broom clean substrate immediately prior to application.
- F. Verify that temporary roof, if required, has been completed.
- G. Proceeding with installation means acceptance of substrate.

3.3 PROTECTION

- A. During execution of work covered in this section, the Contractor shall provide protections for the roof insulation from water and wind penetration at the end of each day's work.
- B. Protect the roof insulation in areas that will receive excessive traffic.
- C. All personnel shall wear clean, soft rubber soled shoes for any application work where they may be walking on insulation boards.

3.4 INSTALLATION

- A. Attachment with Mechanical Fasteners:
 - 1. Approved insulation board shall be fully attached to the metal deck with an approved mechanical fastening system. Fastening shall be 36 per 48 x 96 board and in accordance with a pattern that will resist uplift pressures associated with the wind speed stated in the Standing Seam Metal Roofing System specification system at corners, perimeter, and field of roof.
 - 2. Fastener penetration depth into deck shall meet or exceed the depth established for the for uplift pressure resistance.
 - 3. Install no more insulation at one time than can be roofed on the same day.

3.5 CLEANING

- A. Remove debris and cartons from roof deck. Leave insulation clean and dry, ready to receive roofing membrane or roof deck board.

SECTION 072200 – ROOF DECK INSULATION

Phase 8 Stadium Improvements – Washington-Marion High

3.6 CONSTRUCTION WASTE MANAGEMENT

- A. Remove and properly dispose of waste products generated during installation. Comply with requirements of authorities having jurisdiction.

END OF SECTION 072200

SECTION 072600 – UNDER SLAB VAPOR BARRIER

Phase 8 Stadium Improvements – Washington-Marion High

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 indicating 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.

SECTION 072600 – UNDER SLAB VAPOR BARRIER

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- 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

SECTION 072600 – UNDER SLAB VAPOR BARRIER

Phase 8 Stadium Improvements – Washington-Marion High

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 074113.16 – STANDING SEAM METAL ROOF SYSTEM

Phase 8 Stadium Improvements – Washington-Marion High

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. Standing Seam Metal Roof Panels.
 - 2. Gutters.
 - 3. Downspouts.
- B. Related sections:
 - 1. Division 07 Section "Self-Adhering Sheet Waterproofing".
 - 2. Division 07 Section "Roof Deck Insulation".

1.3 REFERENCED STANDARDS

- A. American Architectural Manufacturer Association (AAMA):
 - 1. AAMA 501.1, Standard Test Method for Metal Curtain Walls for Water Penetration using Dynamic Pressure.
- B. American Iron and Steel Institute (AISI):
 - 1. 2008 Edition, Specification for the Design of Cold-Formed Steel Structural Members.
- C. American Society of Civil Engineers (ASCE):
 - 1. ASCE 7 Latest Edition, Minimum Design Loads for Buildings and Other Structures.
- D. American Society for Testing and Materials (ASTM):
 - 1. A792-10, Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
 - 2. B209-10, Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
 - 3. D1056-91, Specification for Flexible Cellular Materials - Sponge or Expanded Rubber.
 - 4. D3575-08, Test Methods for Flexible Cellular Materials made from Olefin Polymers.
 - 5. E283-12, Standard Test Method for Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
 - 6. E331-09, Standard Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.

SECTION 074113.16 – STANDING SEAM METAL ROOF SYSTEM

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7. E1592-12, Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference.
 8. E1646-11, Standard Test Method for Water Penetration of Exterior Metal Roof Panel Systems by Uniform Static Air Pressure Difference.
 9. E1680-11, Standard Test Method for Rate of Air Leakage Through Exterior Metal Roof Panel Systems.
- E. Sheet Metal and Air Conditioning Contractors National Association (SMACNA):
1. 2012, Architectural Sheet Metal Manual, 7th edition.
- F. Underwriters' Laboratories (UL):
1. UL-263, Fire Tests of Building Constructions and Materials.
 2. UL-580, Tests for Uplift Resistance of Roof Assemblies.
 3. UL-790, Tests for Fire Resistance of Roof Covering Materials.

1.4 SUBMITTALS

- A. Shop Drawings: Show roofing system with flashings and accessories in plan, sections and details. Include metal thickness' and finishes, panel lengths, joining details, anchorage details, flashings and special fabrication provisions for termination and penetrations; thermal expansion provisions and special supports. Indicate relationships with adjacent and interfacing work. Indicate fastener types and spacing; and provide fastener pullout values. Shop drawings must be completed by the metal panel manufacturer's engineering department. Any and/or all changes recommended by the successful bidder must be approved by the manufacturer in writing prior to submittal.
- B. Product Data: Include manufacturer's detailed material and system description, sealant and closure installation instructions, engineering performance data and finish specifications. Indicate fastener types and spacing; and required fastener pullout values.
- C. Design Loads: Submit copy of manufacturer's minimum design load calculations according to ASCE 7 Latest Edition, Method 2 for Components and Cladding. Design load calculations shall be sealed by a registered professional engineer employed by the system manufacturer as a full-time staff engineer. In no case shall the design loads be taken to be less than those detailed in this specification.
- D. Design Test Reports: Provide certified test reports from an independent testing laboratory that bear the seal of a registered professional engineer to show compliance with the performance criteria specified. Each of the following test reports must be submitted:
1. ASTM E1592-12: Test results must clearly demonstrate compliance with the following requirements:
 2. The ultimate test failure load shall be reduced by the safety factor specified to determine the allowable working load for the panel system.

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3. The proposed system has been tested to insure that the allowable working load of the panel system meets or exceeds the specified negative wind uplift pressures listed in this specification for all roof zones.
 4. The test results are applicable for the panel material, grade, thickness, width, and profile specified. Results are not applicable for systems that are thinner, wider, lower grade, or different material/profile than the system which was tested.
 5. The results must clearly show that the allowable clip spacing meets or exceeds the requirements specified for all roof areas. Clip spacing shall not be reduced for any roof zone from that which is specified.
 6. ASTM E283-12 & E331-09: Test results must clearly demonstrate compliance with the performance requirements specified.
 7. ASTM E1646-11 & E1680-11: Test results must clearly demonstrate compliance with the performance requirements specified. Results are not applicable for systems that are thinner, wider, lower grade, or different material/profile than the system which was tested. The differential test pressures must be equal to those specified.
 8. UL 790: The test report shall clearly show a rating of Class A roofing material.
 9. UL 263: The panel system shall clearly be shown as approved for use in an UL Construction Assembly which conforms to the construction of this project.
- E. Samples: Provide full scale samples of the following materials and system components. Samples shall be of identical material type, thickness, panel width, and material grade/alloy/temper as the system specified for this project. Except for item 2, samples may be of any of the manufacturer's standard colors.
1. Submit a 12" long by actual width sample of panel showing seam profile and stiffening mesas across the flat pan of the panel. Also include separate snap on cap with factory applied hot melt sealant beads.
 2. Provide a 6" x 6" sample of the color selected for this project. The sample shall be the actual specified coating system on a metal substrate.
 - a. Provide samples of actual system components, including: each type of anchor/clip required, head closure assembly, roll goods (if specified), bearing plates and/or framing (if specified).
- F. Site Formed Panels: Bidder will not be allowed to supply panels formed at the job-site on portable roll formers; metal panels must be pre-manufactured from the factory and engineered for this project.

1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain ALL components specified within this section from the same manufacturer.

1.6 INSTALLER QUALIFICATIONS

- A. Engage an experienced metal roofing contractor (erector) to install standing seam system who has a minimum of three (3) years of experience specializing in the installation of structural standing seam metal roof systems.

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- B. Contractor must be certified by manufacturer specified as supplier of structural standing seam system and obtain written certification from manufacturer that installer is approved for installation of specified system. If requested, contractor must supply owner with a copy of this certification.
- C. Successful contractor is required to maintain a full-time supervisor/foreman who is on the job-site at all times during installation of new roof system. Foreman must have a minimum of five (5) years of experience with the installation of system similar to that specified.
- D. Successful contractor must obtain all components of roof system from a single manufacturer including any roll good materials if required. Any secondary products that are required which cannot be supplied by the specified manufacturer must be recommended and approved in writing by primary manufacturer prior to bidding.
- E. If required, fabricator/installer shall submit work experience and evidence of adequate financial responsibility. The Owner's representative reserves the right to inspect fabrication facilities in determining qualifications.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Protect components during fabrication and packing from mechanical abuse, stains, discoloration, and corrosion.
- B. Provide protective interleaving between contact areas of exposed surfaces to prevent abrasion during shipment, storage, and handling.
- C. Store materials off ground providing for drainage; under cover providing for air circulation; and protected from wind movement, foreign material contamination, mechanical damage, cement, lime or other corrosive substances.
- D. Handle materials to prevent damage to surfaces, edges and ends of roofing sheets and sheet metal items. Damaged material shall be rejected and removed from the site.
- E. Protect panels from wind-related damages.
- F. Inspect materials upon delivery. Reject and remove physically damaged or marred material from project site.

1.8 JOB CONDITIONS

- A. Determine that work of other trades will not hamper or conflict with necessary fabrication and storage requirements for pre-formed metal roofing system.
- B. Provide protection or avoid traffic on completed roof surfaces.
- C. Do not overload roof with stored materials.
- D. Support no roof-mounted equipment directly on roofing system.

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- E. Ascertain that work of other trades which penetrates the roof or is to be made watertight by the roof is in place and approved prior to installation of roofing.

1.9 DESIGN AND PERFORMANCE CRITERIA

A. Thermal Expansion and Contraction.

1. Completed metal roofing and flashing system shall be capable of withstanding expansion and contraction of components caused by changes in temperature without buckling, producing excess stress on structure, anchors or fasteners, or reducing performance ability.
2. The design temperature differential shall be not less than 200 degrees F.
3. Interface between panel and clip shall provide for unlimited thermal movement in each direction along the longitudinal direction.
4. Location of metal roofing rigid connector shall be at roof ridge unless otherwise approved by the project architect and designed per job conditions by specified manufacturer.

B. Uniform Wind Uplift Load Capacity

1. Installed roof system shall withstand negative (uplift) design wind loading pressures complying with the following criteria. Anchor clip spacings shall be in accordance with the stamped engineering design provided for by the panel manufacturer. The engineer shall be registered in the State of Louisiana.
 - a. Design Code: ASCE 7 Latest Edition, Method 2 for Components and Cladding.
 - b. Safety Factor: 1.670 after any load reduction or material stress increase.
 - c. Importance Category: III.
 - d. Importance Factor: 1.15.
 - e. Wind Speed: 141 mph.
 - f. Exposure Category: B.
 - g. Design Roof Height: 16 feet.
 - h. Minimum Building Width: 74 feet.
 - i. Roof Pitch: 18.42 degrees, 4:12.

- C. Capacity shall be determined using pleated airbag method in accordance with ASTM E 1592, testing of sheet metal roof panels. Allowable safe working loads shall be determined by dividing the ultimate test load by the safety factor specified above.

D. Uniform Positive Load Capacity

1. The installed roof system shall be capable of resisting the following positive uniform roof loads: Roof Live Load of 20 psf.
2. Capacity to resist positive loads shall be determined by empirical calculations in accordance with AISI. Calculation shall be sealed by a registered professional engineer.
3. Installed roof system shall carry positive uniform design loads with a maximum system deflection of L/180 as measured at the rib (web) of the panel.
4. Underwriters' Laboratories, Inc., (UL) Class A fire rating per UL 790.

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5. ASTM E283: Static pressure air infiltration (doors, windows, curtain walls):
 - a. Pressure and Leakage Rate
 - 1) 1.57 psf at 0.0007 cfm/sq.ft.
 - 2) 6.24 psf at 0.0002 cfm/sq.ft.
 - 3) 20.0 psf at 0.0036 cfm/sq.ft.
6. ASTM E331: Static pressure water infiltration (doors, windows, curtain walls):
 - a. Pressure and Result
 - 1) 5 gallons per hour per square foot with no static leakage.
 - 2) Pressure of 20.0 psf for 15 minutes.
7. ASTM E1680: Static pressure air infiltration (roof panels):
 - a. Pressure and Leakage Rate
 - 1) 1.57 psf at 0.0012 cfm/sq.ft.
 - 2) 6.24 psf at 0.0001 cfm/sq.ft.
 - 3) 20.0 psf at 0.0011 cfm/sq.ft.
8. ASTM E1646: Static pressure water infiltration (roof panels):
 - a. Pressure and Result
 - 1) 5 gallons per hour per square foot with no static leakage.
 - 2) Pressure of 20.0 psf for 15 minutes.
- E. Water penetration (dynamic pressure): No water penetration, other than condensation, when exposed to dynamic rain and 70 mph wind velocities for not less than five minutes duration, when tested in accord with principles of AAMA 501.1.
- F. Capacities for metal gauge, span, or loading other than those tested may be determined by interpolation of test results within the range of test data. Extrapolations for conditions outside test range are not acceptable.

1.10 WARRANTIES

- A. Owner shall receive ONE (1) JOINT WARRANTY from manufacturer of roof panels, wall panels, and soffit panels covering ALL of the following criteria. Multiple warranties are NOT acceptable.
 1. 30 year watertight warranty, including coverage for all trim, flashings, and penetrations associated with the standing seam roof area.
 2. 20 year coverage on finish including checking, crazing, peeling, chalking, fading and/or adhesion.
 3. Warranty shall commence on date of substantial completion.
 4. Installer shall provide manufacturer with 5 year warranty covering roofing system installation and watertightness.

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1.11 MANUFACTURER'S INSPECTIONS

- A. When the project is in progress, the roofing system manufacturer shall inspect the work not less than 2 days per week. In addition, the manufacturer will:
 - 1. Keep the Architect or Owner informed as to the progress and quality of the work as observed.
 - 2. Report to the Architect in writing any failure or refusal of the Contractor to correct unacceptable practices called to the Contractor's attention.
 - 3. Confirm after completion that manufacturer has observed no applications procedures in conflict with the specifications other than those that may have been previously reported and corrected.

PART 2 - PRODUCTS

2.1 STANDING SEAM METAL ROOF SYSTEM

- A. Manufacturers: Subject to compliance with requirements of this Section, provide one of the following products:
 - 1. IMETCO, Inc.; Series 300.
 - 2. Tremco; Tremlock T-238.
- B. Substitutions: Submit procurement substitution requests per Section 013350.
- C. Panel material: 24 gauge Galvalume steel, type AZ-55, grade 50B, smooth as per ASTM A792-96.
- D. Flashing and flat stock material: Fabricate in profiles indicated on drawings of same material, thickness, and finish as roof system, unless indicated otherwise.
- E. Finish on exposed surfaces for coated panels: Two coat coil-applied, baked-on full-strength (70% resin) fluorocarbon coating system (PVF2), applied by manufacturer's approved applicator.
 - 1. Coating system: Provide nominal 1.0 mil dry film thickness, consisting of primer and color coat.
 - 2. Color: As selected by the Architect from the following:
 - a. IMETCO, Inc.; Designer Colors.
 - b. Tremco; Premium Color Chart.
- F. Finish on unexposed surfaces for coated panels: Baked-on polyester coating with .20 - .30 dry film thickness (TDF).
- G. Characteristics: The same panel profile from a single manufacturer shall be used for ALL standing seam roof areas.

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- H. Configuration: Standing seams incorporating mechanically interlocked, concealed anchor clips allowing unlimited thermal movement, and of configuration which will prevent entrance or passage of water.
- I. Panel/Cap configuration must have a total of four (4) layers of steel surrounding anchor clip for prevention of water infiltration and increased system strength designed to limit potential for panel blow-off.
- J. Profile of panel shall have 3 continuous pencil rolls throughout panel. These will absorb thermal stresses, reduce oil canning, and increase load carrying capacity.
- K. Exposed fasteners, screws and/or roofing mastic are unacceptable and will be rejected. System configuration only allows for exposed fasteners at panel overlap (if required) and trim details (as per manufacturer's guidelines).
- L. Panels must be furnished in continuous lengths from ridge to eave with no overlaps unless approved by manufacturer to length of run.
- M. Panels lengths which exceed maximum shipping lengths shall be field rolled on equipment owned by the panel manufacturer. Equipment shall have at least 12 rolling stations and provide a product identical to factory manufactured product. The equipment shall be operated by a trained full time experienced technician. Seam caps shall be manufactured in the factory and may be installed with end-laps. Seam sealant must be factory applied!
- N. Seam must be 2-3/8" minimum height for added upward pressures and aesthetic appeal. Seam shall have continuous anchor reveals to allow anchor clips to resist positive and negative loading and allow unlimited expansion and contraction of panels due to thermal changes. Integral (not mechanically sealed) seams are not acceptable.
- O. Concealed Standard Anchor Clips: Clips must be 16 gauge Galvalume steel, grade 50 B, with projecting legs for additional panel alignment and provision for unlimited thermal movement in each direction along the longitudinal dimension.
 - 1. Clip design must isolate sealant in panel cap from clip to insure that no sealant damage occurs from the clip during expansion and contraction.
 - 2. Clip must maintain a clearance of a minimum of 3/8" between panel and substrate for proper ventilation to help prevent condensation on underside of panel and eliminate the contact of panel fastener head to panel.
- P. Seam cap: Snap-on cap shall be a minimum of 1" wide "T" shaped of continuous length up to 45 feet according to job conditions and field seamed by means of manufacturer's standard seaming machine.
 - 1. Cap shall be designed to receive four (4) beads of continuous hot applied gasket sealant which will not come in contact with the anchor clip to allow unlimited thermal movement of panel without damage to cap sealant.
 - 2. Sealant shall be a SIS (Styrene-Isoprene-Styrene) block copolymer type thermoplastic rubber adhesive, non-fatigue water barrier.

SECTION 074113.16 – STANDING SEAM METAL ROOF SYSTEM

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- Q. Standing Seam Panel Width: 16 inches.
 - 1. Stiffening ribs: Located in flat of panel to minimize oil canning and telegraphing of structural members.
 - 2. Replaceability: Panels shall be of a symmetrical design with snap on cap configuration such that individual panels may be removable for replacement without removing adjacent panels.
 - 3. Panel ends shall be panned at ridge, headwall, and hip conditions where applicable.
 - 4. Panel length: Full length without joints, including bends.
- R. Ridge Cap: Continuous, vented.
- S. Accessories.
 - 1. Gable anchor clips: Standing Seam style 16 gauge Galvalume steel, grade 50 B.
- T. Fasteners:
 - 1. Concealed fasteners: Corrosion resistant steel screws (zinc plated or equal) designed to meet structural loading requirements. The normal minimum screw size shall be #14.
 - 2. Exposed fasteners: Series 410 stainless steel screws or 1/8" diameter stainless steel waterproof rivets. All exposed fasteners shall be factory painted to match the color of the standing seam panels.
- U. Closures: Factory precut closed cell foam meeting ASTM D1056 and/or D3575, enclosed in metal channel matching panels when used at hip, ridge, rake, and jamb.

2.2 ACCESSORY PRODUCTS

- A. Sealant
 - 1. Concealed Application: PT1-707 or Bostik Chem-Calk butyl sealant or equal.
 - 2. Exposed Application: General Electric Co., SILGLAZE II 2800 or equal.
 - 3. Colors: As selected by Architect from sealant manufacturer's standard colors.

2.3 GUTTERS AND DOWNSPOUTS

- A. Manufacturers: Subject to compliance with requirements of this Section, provide products from one of the following:
 - 1. IMETCO, Inc.
 - 2. Tremco.
- B. Source Limitations: Gutter and downspout components shall be furnished by the standing seam metal roof system supplier.

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- C. Panel material: 24 gauge Galvalume steel, type AZ-55, grade 50B, smooth as per ASTM A792-96.
- D. Size: Refer to Contract Drawings (plans, elevations, and sections).
- E. Color: As selected by the Architect from the following:
 - 1. IMETCO, Inc.; Designer Colors.
 - 2. Tremco; Premium Color Chart.
- F. Gutter Spacer: 16 gauge, 1-inch wide, 304 stainless steel, 2D annealed finish. ASTM A67; commercial quality.
 - 1. Spacing: As determined by the roofing system manufacturer, but no less than 36 inches center to center.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Inspection: Examine the alignment and placement of the building structure and substrate. Correct any objectionable warp, waves or buckles in the substrate before proceeding with installation of the pre-formed metal roofing. The installed roof panels will follow the contour of the structure and may appear irregular if not corrected.
- B. Establish straight side and crosswise benchmarks.
- C. Use proper size and length fastener for strength requirements. Approximately 5/16" is allowable for maximum fastener head size beneath the panel.
- D. Rectangular roofs shall be checked for square and straightness. Gable ends may not be straight; set a true line for the gable clips and flashing with string line.
- E. Measure the roof lengthwise to confirm panel lengths, overhangs, coverage of flashings at eaves and ridges and verify clearances for thermal movement.
- F. Pre-roofing conference: Prior to beginning metal roofing work, a pre-roofing conference shall be held to review work to be accomplished.
 - 1. Architect, contractor, metal roofing subcontractor, metal roofing system manufacturer's representative and all other subcontractors who have equipment penetrating roof or whose work involves access to roof shall be present.

3.2 FABRICATION

- A. Shop fabricate metal roofing and flashing components to the maximum extent possible, forming metal work with clear, sharp, straight, and uniform bends and rises. Hem exposed edges of flashings.

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- B. Form flashing components from full single width sheet in minimum 10'-0" sections. Provide mitered corners, joined using closed end pop rivets and joint sealant.
- C. Fabricate roofing and related sheet metal work in accord with approved shop drawings and applicable standards.

3.3 ROOFING AND FLASHING INSTALLATION

- A. All details will be shown on manufacturer's shop drawings to successful bidder; install roofing and flashings in accordance with approved shop drawings and manufacturer's product data, within specified erection tolerances.
- B. Prepare roof for the installation of standing seam panels, including:
 - 1. Install all framing, and/or furring members as indicated in this specification and bid documents.
 - 2. Install all insulation and/or air infiltration barriers as indicated in this specification and bid documents.
- C. Directly over the completed roof substrate, install panel anchor clips.
- D. Clip Spacing: All anchor clips will be fastened into the structural roof substrate based on the spacing pattern and type/size of fasteners as determined by the panel manufacturer's engineer as stated in Design Loads of the Submittals paragraph in the specification section.
- E. Roof panels can be installed by starting from either end and working towards the opposite end. Due to the symmetrical design of the specified panel system, it is also acceptable to start from the middle of the roof and work toward each end.
- F. A stainless steel pop rivet shall be secured through the anchor reveal of the panel leg and extend into the arms of the panel clip located at the ridge of the system. This is done at each arm of the clip along the ridge. The panel is then anchored at both sides of the clip.
- G. Be sure to capture all drilling debris during this operation with a rag or cloth placed on the panels at the drilling operation.
- H. Panels are not securely attached to the roof until fixed to the anchor clip. To avoid damage and injury, all panels shall be fixed to the anchor clip immediately as they are installed.
- I. The seam caps are shipped with four (4) beads of factory applied hot melt sealant located inside the caps. To install the caps, hook one side of the cap over the panel edge and rotate over the opposite panel leg. For ease of installation, start at one end of the panel and work toward the opposite end.
- J. A hand crimping tool is used to crimp the cap around the top of two adjacent panels
- K. Caps shall then be permanently seamed with manufacturer's mechanical seamer.

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- L. At the end of each day's work, seam caps shall be mechanically seamed or hand crimped (crimp 4 inches every 8 feet) to reduce the possibility of wind damage prior to completion of the project.
- M. Un-installed panels which are temporarily stored on the ground or roof shall be secured in place at the end of each day's work to prevent possible damage or injury.
- N. Isolate dissimilar metals and masonry or concrete from metals with bituminous coating. Use gasketed fasteners where required to prevent corrosive action between fastener, substrate, and panels.
- O. Limit exposed fasteners to extent indicated on shop drawings.
- P. Anchorage shall allow for temperature expansion/contraction movement without stress or elongation of panels, clips, or anchors. Attach clips to structural substrate using fasteners of size and spacing as determined by manufacturer's design analysis to resist specified uplift and thermal movement forces.
- Q. Seal laps and joints in accordance with roofing system manufacturer's product data.
- R. Coordinate flashing and sheet metal work to provide weathertight conditions at roof terminations. Fabricate and install in accordance with standards of SMACNA Manual.
- S. Provide for temperature expansion/contraction movement of panels at roof penetrations and roof mounted equipment in accordance with system manufacturer's product data and design calculations.
- T. Installed system shall be true to line and plane and free of dents, and physical defects. In light gauge panels with wide flat surfaces, some oil canning may be present. Oil canning does not affect the finish or structural integrity of the panel and is therefore not cause for rejection.
- U. Maximum variation from true planes or lines shall be 1/4" in 20 feet and 3/8" in 40 feet or more.
- V. Form joints in linear sheet metal to allow for 1/4" minimum expansion at 20'-0" on center maximum and 8'-0" from corners.
- W. At joints in linear sheet metal items, set sheet metal items in two 1/4" beads of butyl sealant. Extend sealant over all metal surfaces. Mate components for positive seal. Allow no sealant to migrate onto exposed surfaces.

3.4 PROTECTION AND CLEANING

- A. Remove damaged work and replace with new, undamaged components.
- B. Touch up exposed fasteners using paint furnished by roofing panel manufacturer and matching exposed panel surface finish.

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- C. Clean exposed surfaces of roofing and accessories after completion of installation. Leave in clean condition at date of substantial completion. Touch up minor abrasions and scratches in finish.

3.5 DEMONSTRATION AND TRAINING

- A. At a time and date agreed to by the Owner, instruct the Owner's facility manager, or other representative designated by the Owner, on the following procedures:
 - 1. Roof troubleshooting procedures.
 - 2. Notification procedures for reporting leaks or other apparent roofing problems.
 - 3. Roofing maintenance.
 - 4. The Owner's obligations for maintaining the roofing warranty in effect and force.
 - 5. The Manufacturer's obligations for maintaining the roofing warranty in effect and force.

END OF SECTION 074113.16

SECTION 074213.13 – FORMED METAL WALL AND SOFFIT PANELS

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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. Concealed-fastener, metal wall panels.
 - 2. Concealed-fastener, metal soffit panels.

1.3 PREINSTALLATION MEETINGS

- A. Pre-installation Conference: Conduct conference at Project site.
 - 1. Meet with Owner, Architect, metal panel Installer, metal panel manufacturer's representative, structural-support Installer, and installers whose work interfaces with or affects metal panels, including installers of doors, windows, and louvers.
 - 2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - 3. Review methods and procedures related to metal panel installation, including manufacturer's written instructions.
 - 4. Examine support conditions for compliance with requirements, including alignment between and attachment to structural members.
 - 5. Review flashings, special siding details, wall penetrations, openings, and condition of other construction that affect metal panels.
 - 6. Review governing regulations and requirements for insurance, certificates, tests, and inspections if applicable.
 - 7. Review temporary protection requirements for metal panel assembly during and after installation.
 - 8. Review of procedures for repair of metal panels damaged after installation.
 - 9. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.
- B. Shop Drawings:

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1. Include stamped engineering calculations for concealed clip fastening patterns to resist pressures associated with the stated wind speed.
 2. Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.
 3. Accessories: Include details of the flashing, trim, and anchorage systems, at a scale of not less than 1-1/2 inches per 12 inches.
- C. Samples for Initial Selection: For each type of metal panel indicated with factory-applied finishes.
1. Include Samples of trim and accessories involving color selection.
- D. Samples for Verification: For each type of exposed finish, prepared on Samples of size indicated below:
1. Metal Panels: 12 inches long by actual panel width. Include fasteners, closures, and other metal panel accessories.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For metal panels to include in maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
- B. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver components, metal panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.
- B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.
- C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.
- D. Retain strippable protective covering on metal panels during installation.

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1.8 FIELD CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal panels to be performed according to manufacturers' written instructions and warranty requirements.

1.9 COORDINATION

- A. Coordinate metal panel installation with rain drainage work, flashing, trim, construction of soffits, and other adjoining work to provide a leak-proof, secure, and noncorrosive installation.

1.10 WARRANTY

- A. Owner shall receive ONE (1) WARRANTY from manufacturer of wall panels covering ALL of the following criteria. Multiple warranties are NOT acceptable.
 - 1. 20 year watertight warranty, including coverage for all trim and flashings.
 - 2. Warranty shall commence on date of substantial completion.
 - 3. Installer shall provide manufacturer with 5 year warranty covering wall panel system installation and watertightness, see below.
- B. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including rupturing, cracking, or puncturing.
 - b. Deterioration of metals and other materials beyond normal weathering.
 - 2. Warranty Period: 5 years from date of Substantial Completion.
- C. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 - 2. Finish Warranty Period: 20 years from date of Substantial Completion.

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PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Uniform Wind Uplift Load Capacity
 - 1. Installed wall panel system shall withstand negative (uplift) design wind loading pressures complying with the following criteria. Anchor clip spacings shall be in accordance with the stamped engineering design provided for by the panel manufacturer. The engineer shall be registered in the State of Louisiana.
 - a. Design Code: ASCE 7 Latest Edition, Method 2 for Components and Cladding.
 - b. Safety Factor: 1.670 after any load reduction or material stress increase.
 - c. Importance Category: III.
 - d. Importance Factor: 1.15.
 - e. Wind Speed: 141 mph.
 - f. Exposure Category: B.
 - g. Design Roof Height: 16 feet.
- B. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E 1592:
 - 1. Wind Loads: Pressures associated with wind speed of 141 miles per hour.
- C. Air Infiltration: Air leakage of not more than 0.06 cfm/sq. ft. when tested according to ASTM E 283 at the following test-pressure difference:
 - 1. Test-Pressure Difference: 1.57 lbf/sq. ft.
- D. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E 331 at the following test-pressure difference:
 - 1. Test-Pressure Difference: 2.86 lbf/sq. ft.
- E. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change (Range): 120 deg F ambient; 180 deg F, material surfaces.

2.2 CONCEALED-FASTENER, METAL WALL AND SOFFIT PANELS

- A. General: Provide factory-formed metal wall and soffit panels designed to be field assembled by and interconnecting side edges of adjacent panels and mechanically attaching panel to supports using concealed clips and fasteners. Include accessories required for weathertight installation.

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- B. Concealed-Fastener Metal Wall Panels: Asymmetrical horizontal ribs with flat area between ribs, four (4) ribs per panel.
 - 1. Manufacturers: **No Substitute.** Required to match existing wall panels on new Lobby Addition and Gymnasium and factory color.
 - a. Metal Sales Manufacturing, Corp.; Contempra Series, CN88-1653.
 - 2. Metallic-Coated Steel Sheet: Aluminum-zinc alloy coated steel sheet complying with ASTM A 792, Class AZ50 coating designation; structural quality. Factory finished by the coil-coating process to comply with ASTM A 755.
 - a. Nominal Thickness: 24 gauge.
 - b. Panel Width: Approximately 16" inches, three (3) or four (4) ribs per panel.
 - c. Exterior Finish: Two-coat fluoropolymer.
 - d. Color: Old Town Grey (W25).
- C. Concealed-Fastener Metal Soffit Panels: Flat smooth panel, vented.
 - 1. Manufacturers: **No Substitute.** Required to match existing soffit panels on new Lobby Addition and factory color.
 - a. Metal Sales Manufacturing, Corp.; Flat Soffit Panel Lanced.
 - 2. Metallic-Coated Steel Sheet: Aluminum-zinc alloy coated steel sheet complying with ASTM A 792, Class AZ50 coating designation; structural quality. Factory finished by the coil-coating process to comply with ASTM A 755.
 - a. Nominal Thickness: 24 gauge.
 - b. Panel Width: Approximately 12" inches, smooth, vented.
 - c. Depth: Approximately 1" inch.
 - d. Length: Full length without joints.
 - e. Exterior Finish: Two-coat fluoropolymer.
 - f. Color: Old Town Grey (W25).
- D. Source Limitations: Metal wall and soffit panels and all associated components shall be furnished by the same manufacturer and be warranted by the same weathertightness warranty. This shall provide a single source for all products and be serviced under one manufacturer's warranty.
- E. Provide all miscellaneous accessories for a complete installation.

2.3 MISCELLANEOUS MATERIALS

- A. Miscellaneous Metal Sub-framing and Furring: G90 coating designation. Provide manufacturer's standard sections as required for support and alignment of metal panel system.
- B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.

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1. Closures: Provide closures at eaves and rakes, fabricated of same metal as metal panels.
 2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
 3. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1 inch thick, flexible closure strips; cut or pre-molded to match metal panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
- C. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, bases, drips, sills, jambs, corners, end-walls, framed openings, rakes, fasciae, parapet caps, soffits, reveals, and fillers. Finish flashing and trim with same finish system as adjacent metal panels.
- D. Panel Fasteners: Self-tapping screws designed to withstand design loads. Provide exposed fasteners with heads matching color of metal panels by means of plastic caps or factory-applied coating. Provide EPDM or PVC sealing washers for exposed fasteners.
- E. Panel Sealants and Sealant Tape: Provide sealant type recommended by manufacturer that are compatible with panel materials, are non-staining, and do not damage panel finish.

2.4 FABRICATION

- A. General: Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.
- B. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.
- C. Fabricate metal panel joints with factory-installed captive gaskets or separator strips that provide a weathertight seal and prevent metal-to-metal contact, and that minimize noise from movements.
- D. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.
1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
 2. Sealed Joints: Form non-expansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
 3. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.

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4. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal panel manufacturer.
 - a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal wall panel manufacturer for application but not less than thickness of metal being secured.

2.5 FINISHES

- A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Steel Panels and Accessories:
 1. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 2. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal panel supports, and other conditions affecting performance of the Work.
 1. Examine wall framing to verify that girts, angles, channels, studs, and other structural panel support members and anchorage have been installed within alignment tolerances required by metal wall panel manufacturer.
 2. Examine wall sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal wall panel manufacturer.
 - a. Verify that air- or water-resistive barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.
- B. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

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3.2 PREPARATION

- A. Miscellaneous Supports: Install sub-framing, furring, and other miscellaneous panel support members and anchorages according to ASTM C 754 and metal panel manufacturer's written recommendations.

3.3 METAL WALL PANEL INSTALLATION

- A. General: Install metal panels according to manufacturer's written instructions in orientation, sizes, and locations indicated. Install panels perpendicular to supports unless otherwise indicated. Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.
 - 1. Shim or otherwise plumb substrates receiving metal panels.
 - 2. Flash and seal metal panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal panels are installed.
 - 3. Install screw fasteners in predrilled holes.
 - 4. Locate and space fastenings in uniform vertical and horizontal alignment.
 - 5. Install flashing and trim as metal panel work proceeds.
 - 6. Align bottoms of metal panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.
 - 7. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.
- B. Fasteners:
 - 1. Steel Panels: Use stainless-steel fasteners for surfaces exposed to the exterior; use galvanized-steel fasteners for surfaces exposed to the interior.
- C. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal panel manufacturer.
- D. Watertight Installation:
 - 1. Apply a continuous ribbon of sealant or tape to seal lapped joints of metal panels, using sealant or tape as recommend by manufacturer on side laps of nesting-type panels; and elsewhere as needed to make panels watertight.
 - 2. Provide sealant or tape between panels and protruding equipment, vents, and accessories.
 - 3. At panel splices, nest panels with minimum 6 inch end lap, sealed with sealant and fastened together by interlocking clamping plates.
- E. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.
 - 1. Install components required for a complete metal panel system including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips,

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and similar items. Provide types indicated by metal wall panel manufacturer; or, if not indicated, provide types recommended by metal panel manufacturer.

- F. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that are permanently watertight.
 - 1. Install exposed flashing and trim that is without buckling and tool marks, and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and achieve waterproof performance.

3.4 SOFFIT INSTALLATION

- A. Directly over the completed soffit substrate, install metal soffit panels. All panels will be fastened into the structural substrate with screw type fasteners at twenty-four (24) inches on center maximum spacing along each panel seam.
- B. Seal laps and joints in accordance with roofing system manufacturer's product data.
- C. Coordinate flashing and sheet metal work to provide weathertight conditions at soffit terminations. Fabricate and install in accordance with standards of SMACNA Manual.
- D. Installed system shall be true to line and plane and free of dents, and physical defects.

3.5 CLEANING AND PROTECTION

- A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.
- B. After metal panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.
- C. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 074213.13

SECTION 074648 – FIBER-CEMENT PANELS

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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. Fiber-cement panels for ceiling application.
- B. Related Sections:
 - 1. Section 061000 "Rough Carpentry" for wood furring, grounds, nailers, and blocking.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Initial Selection: For the product including related accessories.
- C. Samples for Verification: For each product.
 - 1. 4-inch-square.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of product, from manufacturer.
- B. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for fiber-cement panels.
- C. Warranty: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of product and related accessories to include in maintenance manuals.

SECTION 074648 – FIBER-CEMENT PANELS

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1.6 QUALITY ASSURANCE

- A. Labeling: Provide fiber-cement siding that is tested and labeled according to ASTM C 1186 by a qualified testing agency acceptable to authorities having jurisdiction.
- B. Source Limitations: Obtain products, including related accessories, from single source from single manufacturer.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store materials in a dry, well-ventilated, weathertight place.

1.8 COORDINATION

- A. Coordinate installation with flashings and other adjoining construction to ensure proper sequencing.

1.9 WARRANTY

- A. Special Warranty: Standard form in which manufacturer agrees to repair or replace panels that fail(s) in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including cracking and deformation.
 - 2. Warranty Period: 30 years from date of Substantial Completion.

PART 2 - PRODUCTS**2.1 FIBER-CEMENT PANELS**

- A. General: ASTM C 1186, Type A, Grade II, fiber-cement board, noncombustible when tested according to ASTM E 136; with a flame-spread index of 25 or less when tested according to ASTM E 84.
 - 1. Basis of Design Product: Subject to compliance with requirements, provide James Hardie Panel or comparable product by the following:
 - a. Cemplank.
 - 2. Panel Size and Texture: 48-inch-wide sheets with smooth texture.
 - 3. Panel Thickness: 5/16" minimum.
 - 4. Factory Priming: Manufacturer's standard acrylic primer.

SECTION 074648 – FIBER-CEMENT PANELS

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2.2 ACCESSORIES

- A. Fasteners:
 - 1. For fastening fiber cement, use hot-dip galvanized fasteners.

PART 3 - EXECUTION**3.1 EXAMINATION**

- A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of panels and related accessories.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean substrates of projections and substances detrimental to application.

3.3 INSTALLATION

- A. General: Comply with panel manufacturer's written installation instructions applicable to products and applications indicated unless more stringent requirements apply.
 - 1. Do not install damaged components.
 - 2. Fasten along panel edges without binding siding to allow for thermal movement.
 - 3. Install panels with no flying or open joints.
 - 4. Install fasteners no more than 16 inches on center.
- B. Install joint sealants as specified in Section 079200 "Joint Sealants" and to produce a weathertight and smooth installation without visible joint lines.

3.4 ADJUSTING AND CLEANING

- A. Remove damaged, improperly installed, or otherwise defective materials and replace with new materials complying with specified requirements.
- B. Clean finished surfaces according to manufacturer's written instructions and maintain in a clean condition during construction.

END OF SECTION 074648

SECTION 075000 – GYPSUM ROOF DECK BOARD

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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. Gypsum Roof Deck Board.

1.3 RELATED SECTIONS

- 1. Division 07 Section "Standing Seam Metal Roofing"
- 2. Division 07 Section "Roof Deck Insulation"

1.4 SCOPE OF WORK

- A. Provide all labor, materials, and equipment to install gypsum roof deck boards over the prepared substrate as shown on the drawings.

1.5 SUBMITTALS

- A. Product Data: Provide manufacturer's specification data sheets indicating material composition, thickness, sizes, and fire resistance that relate to the specified roofing assembly in accordance with Division 01 requirements.
- B. Shop Drawings: Submit shop drawings indicating fastener patterns that will resist the specified uplift pressures of the standing seam metal roofing system.
- C. Roofing System Certification:
 - 1. Submit written certification that the roof deck board is acceptable for use by the standing seam metal roofing manufacturer as a component of their roofing system.
 - 2. Submit written certification that the roof deck board, used in conjunction with the standing seam metal roofing system, passes the UL1256 test for a fire rated assembly, if required.

SECTION 075000 – GYPSUM ROOF DECK BOARD

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1.6 SUBSTITUTIONS

- A. Comply with all requirements set forth in Division 01 for substitution requests.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Delivery: Deliver products to the job site in manufacturer's original packaging, containers, and bundles with manufacturer's brand name and identification intact and legible.
- B. Storage: Keep products dry before, during, and after application. Outside storage must be off the ground and protected by a breathable waterproof covering. Products shall be covered the same day as laid. Store all panels flat. Damaged products shall be removed from the premises.
- C. Handling: Products should be cut to size using utility knife and straight edge. Score surface with utility knife and bend board up sharply toward score. Use keyhole-type drywall saw or recommended score and knock-out method for penetration cut-outs and radiuses.

1.8 ENVIRONMENTAL REQUIREMENTS

- A. Apply products only when the weather conditions are in compliance with the roofing system limitations.
- B. Application of the roofing system shall immediately follow the substrate board installation.
- C. Protect installed products from water at the end of each day's work.

PART 2 - PRODUCTS

2.1 GYPSUM ROOF DECK BOARD

- A. Gypsum Roof Deck Board: ASTM C 1177 or ASTM C 1278, water-resistant gypsum substrate, Class A Fire Rated, 1/2 inch thick.
 - 1. Subject to compliance with requirements, provide one of the following:
 - a. Georgia Pacific Corporation; Dens Deck Prime.
 - b. USG Corporation; Securock Gypsum Fiber Roof Board.
 - 2. Size: 48 inches x 96 inches maximum size when installed using mechanical fasteners, 36 fasteners per 48 x 96 board.

SECTION 075000 – GYPSUM ROOF DECK BOARD

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2.2 MISCELLANEOUS MATERIALS

- A. Fasteners: Corrosion resistant screw fastener as recommended and approved by the standing seam metal roofing system manufacturer.
 - 1. Approved with three (3) inches galvanized coated disc to resist the specified uplift pressures.

PART 3 - EXECUTION**3.1 EXAMINATION**

- A. Contractor shall verify deck and/or substrate surface is clean and smooth, free of depressions, waves, or projections. Beginning installation means acceptance of substrate.

3.2 PROTECTION

- A. Protect the roof deck board from damage during installation. Replace damage sheets immediately. Work shall not resume until correction(s) are made.
- B. During execution of work covered by this Section, the Contractor shall provide protections for the deck board from water and wind penetration at the end of each day's work.

3.3 INSTALLATION

- A. Install gypsum roof deck board to the prepared substrate with fasteners, 36 fasteners per 48 x 96 board, in accordance with the specified standing seam metal roofing system manufacturer's requirements, instructions, and to resist specified uplift pressures.
- B. Install roof deck boards with long joints in continuous straight lines with end joints staggered between rows. Offset joints of the insulation below a minimum of 6 inches in each direction. Each deck board shall butt firmly against adjacent boards. There shall be no uneven surfaces.

END OF SECTION 075000

SECTION 079200 – JOINT SEALANTS

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Urethane joint sealants.
- B. Related Sections:
 - 1. Division 07 Section "Sheet Metal Flashing and Trim".

1.3 ACTION SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
- B. Source Limitations: Obtain each kind of joint sealant from single source from single manufacturer.
- C. Mockups: Install sealant in mockups of assemblies specified in other Sections that are indicated to receive joint sealants specified in this Section. Use materials and installation methods specified in this Section.
- D. Pre-installation Conference: Conduct conference at Project site.

1.5 PROJECT CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
 - 1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
 - 2. When joint substrates are wet.
 - 3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.

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4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.
- B. VOC Content of Interior Sealants: Sealants and sealant primers used inside the weatherproofing system shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 1. Architectural Sealants: 250 g/L.
 2. Sealant Primers for Nonporous Substrates: 250 g/L.
 3. Sealant Primers for Porous Substrates: 775 g/L.
- C. Low-Emitting Interior Sealants: Sealants and sealant primers used inside the weatherproofing system shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- D. Liquid-Applied Joint Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied joint sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.
 1. Suitability for Immersion in Liquids. Where sealants are indicated for Use I for joints that will be continuously immersed in liquids, provide products that have undergone testing according to ASTM C 1247. Liquid used for testing sealants is deionized water, unless otherwise indicated.
- E. Stain-Test-Response Characteristics: Where sealants are specified to be non-staining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.
- F. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 URETHANE JOINT SEALANTS

- A. Single-Component, Non-sag, Urethane Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT.
 1. Subject to compliance with requirements, provide one of the following:

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- a. BASF Building Systems; Sonolastic NP1.
 - b. Tremco Incorporated; Vulkem 116.
2. Submit procurement substitution requests per Section 013350.

2.3 JOINT SEALANT BACKING

- A. General: Provide sealant backings of material that are non-staining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
- C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

2.4 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.
- C. Masking Tape: Non-staining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

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3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
 - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
 - 2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
 - a. Concrete.
 - b. Masonry.
 - 3. Remove laitance and form-release agents from concrete.
 - 4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
 - a. Metal.
- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

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1. Do not leave gaps between ends of sealant backings.
 2. Do not stretch, twist, puncture, or tear sealant backings.
 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
- D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
1. Place sealants so they directly contact and fully wet joint substrates.
 2. Completely fill recesses in each joint configuration.
 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- F. Tooling of Non-sag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
1. Remove excess sealant from surfaces adjacent to joints.
 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 3. Provide concave joint profile per Figure 8A in ASTM C 1193, unless otherwise indicated.

3.4 CLEANING

- A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

- A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

END OF SECTION 079210

DIVISION 08

**TECHNICAL
SPECIFICATIONS**

OPENINGS

SECTION 081113 – HOLLOW METAL DOORS AND FRAMES

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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 hollow-metal work.
- B. Related Requirements:
 - 1. Section 087100 "Door Hardware" for door hardware for hollow-metal doors.

1.3 DEFINITIONS

- A. Minimum Thickness: Minimum thickness of base metal without coatings according to NAAMM-HMMA 803 or SDI A250.8.

1.4 COORDINATION

- A. Coordinate anchorage installation for hollow-metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, core descriptions, fire-resistance ratings, and finishes.
- B. Shop Drawings: Include the following:
 - 1. Elevations of each door type.
 - 2. Details of doors, including vertical- and horizontal-edge details and metal thicknesses.
 - 3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
 - 4. Locations of reinforcement and preparations for hardware.
 - 5. Details of each different wall opening condition.
 - 6. Details of anchorages, joints, field splices, and connections.
 - 7. Details of accessories.

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- 8. Details of moldings, removable stops, and glazing.
- C. Schedule: Provide a schedule of hollow-metal work prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final Door Hardware Schedule.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver hollow-metal work palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use non-vented plastic.
 - 1. Provide additional protection to prevent damage to factory-finished units.
- B. Protect hollow metal work from rusting during construction. Comply with cleaning and adjusting directives specified herein.
- C. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
- D. Store hollow-metal work vertically under cover at Project site with head up. Place on minimum 4-inch-high wood blocking. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with requirements, provide products by one of the following:
 - 1. Ceco Door Products; an ASSA ABLOY company.
 - 2. Curries, an ASSA ABLOY company.
 - 3. Karpen Steel Custom Doors and Frames.
 - 4. Mesker Door, Inc.
 - 5. Premier Products, Inc.
 - 6. Republic Doors and Frames.
 - 7. Steelcraft; an Allegion company.
- B. Source Limitations: Obtain hollow-metal work from single source from single manufacturer.

2.2 REGULATORY REQUIREMENTS

- A. Fire-Rated Assemblies: Complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.

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1. Smoke- and Draft-Control Assemblies: Provide an assembly with gaskets listed and labeled for smoke and draft control by a qualified testing agency acceptable to authorities having jurisdiction, based on testing according to UL 1784 and installed in compliance with NFPA 105.
- B. Fire-Rated, Borrowed-Light Assemblies: Complying with NFPA 80 and listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction for fire-protection ratings indicated, based on testing according to NFPA 257 or UL 9.

2.3 INTERIOR DOORS AND FRAMES

- A. Construct interior doors and frames to comply with the standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.
- B. Extra-Heavy-Duty Doors and Frames: SDI A250.8, Level 3.
 1. Physical Performance: Level A according to SDI A250.4.
 2. Doors:
 - a. Type: As indicated in the Door and Frame Schedule.
 - b. Thickness: 1-3/4 inches.
 - c. Face: Metallic-coated steel sheet, minimum thickness of 0.0548 inch or 16 gauge, with minimum A60 coating.
 - d. Edge Construction: Model 2, Seamless.
 - e. Core: Kraft-paper honeycomb.
 3. Frames:
 - a. Materials: Metallic-coated steel sheet, minimum thickness of 0.0548 inch or 16 gauge, with minimum A60 coating.
 - b. Construction: Face welded.
 4. Exposed Finish: Prime.

2.4 EXTERIOR HOLLOW-METAL DOORS AND FRAMES

- A. Construct exterior doors and frames to comply with the standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.
- B. Extra-Heavy-Duty Doors and Frames: SDI A250.8, Level 3.
 1. Physical Performance: Level A according to SDI A250.4.
 2. Doors:
 - a. Type: As indicated in the Door and Frame Schedule.
 - b. Thickness: 1-3/4 inches.

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- c. Face: Metallic-coated steel sheet, minimum thickness of 0.0548 inch or 16 gauge, with minimum A60 coating.
- d. Edge Construction: Model 2, Seamless.
- e. Core: Polyurethane.
- 1) Thermal-Rated Doors: Provide doors fabricated with thermal-resistance value (R-value) of not less than 11 deg F x h x sq. ft./Btu when tested according to ASTM C 1363.
- 3. Frames:
 - a. Materials: Metallic-coated steel sheet, minimum thickness of 0.0548 inch or 16 gauge, with minimum A60 coating.
 - b. Construction: Face welded.
- 4. Exposed Finish: Prime.

2.5 FRAME ANCHORS

- A. Jamb Anchors:
 - 1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.
 - 2. Compression Type for Drywall Slip-on Frames: Adjustable compression anchors.
 - 3. Post-installed Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch-diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.
- B. Floor Anchors: Formed from same material as frames, minimum thickness of 0.042 inch, and as follows:
 - 1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.

2.6 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
- B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.
- C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B.
- D. Frame Anchors: ASTM A 879/A 879M, Commercial Steel (CS), 04Z coating designation; mill phosphatized.

SECTION 081113 – HOLLOW METAL DOORS AND FRAMES

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1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.
- E. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.
- F. Power-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 hollow-metal frames of type indicated.
- G. Grout: ASTM C 476, except with a maximum slump of 4 inches, as measured according to ASTM C 143/C 143M.
- H. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.
- I. Bituminous Coating: Cold-applied asphalt mastic, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.7 FABRICATION

- A. Fabricate hollow-metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for metal thickness. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.
- B. Hollow-Metal Doors:
 1. Steel-Stiffened Door Cores: Provide minimum thickness 0.026 inch, steel vertical stiffeners of same material as face sheets extending full-door height, with vertical webs spaced not more than 6 inches apart. Spot weld to face sheets no more than 5 inches o.c. Fill spaces between stiffeners with glass- or mineral-fiber insulation.
 2. Vertical Edges for Single-Acting Doors: Bevel edges 1/8 inch in 2 inches.
 3. Top Edge Closures: Close top edges of doors with inverted closures, except provide flush closures at exterior doors of same material as face sheets.
 4. Bottom Edge Closures: Close bottom edges of doors where required for attachment of weather stripping with end closures or channels of same material as face sheets.
 5. Exterior Doors: Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.
- C. Hollow-Metal 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.

SECTION 081113 – HOLLOW METAL DOORS AND FRAMES

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1. crossings and to jambs by butt welding.
 2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
 3. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
 4. Floor Anchors: Weld anchors to bottoms of jambs with at least four spot welds per anchor; however, for slip-on drywall frames, provide anchor clips or countersunk holes at bottoms of jambs.
 5. Jamb Anchors: Provide number and spacing of anchors as follows:
 - a. Masonry Type: Locate anchors not more than 16 inches from top and bottom of frame. Space anchors not more than 32 inches o.c., to match coursing, and as follows:
 - 1) Two anchors per jamb up to 60 inches high.
 - 2) Three anchors per jamb from 60 to 90 inches high.
 - 3) Four anchors per jamb from 90 to 120 inches high.
 - 4) Four anchors per jamb plus one additional anchor per jamb for each 24 inches or fraction thereof above 120 inches high.
 - b. Compression Type: Not less than two anchors in each frame.
 - c. Post-installed Expansion Type: Locate anchors not more than 6 inches from top and bottom of frame. Space anchors not more than 26 inches o.c.
 6. Head Anchors: Two anchors per head for frames more than 42 inches wide and mounted in metal-stud partitions.
 7. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Keep holes clear during construction.
 - a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
- D. Fabricate concealed stiffeners and edge channels from either cold- or hot-rolled steel sheet.
- E. Hardware Preparation: Factory prepare hollow-metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to SDI A250.6, the Door Hardware Schedule, and templates.
1. Reinforce doors and frames to receive non-templated, mortised, and surface-mounted door hardware.
 2. Comply with applicable requirements in SDI A250.6 and BHMA A156.115 for preparation of hollow-metal work for hardware.

2.8 STEEL FINISHES

- A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.
1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with SDI A250.10; recommended by primer manufacturer for

SECTION 081113 – HOLLOW METAL DOORS AND FRAMES

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substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

2.9 ACCESSORIES

- A. Grout Guards: Formed from same material as frames, not less than 0.016 inches thick.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.
- B. Drill and tap doors and frames to receive non-templated, mortised, and surface-mounted door hardware.

3.3 INSTALLATION

- A. General: Install hollow-metal work plumb, rigid, properly aligned, and securely fastened in place. Comply with Drawings and manufacturer's written instructions.
- B. Hollow-Metal Frames: Install hollow-metal frames of size and profile indicated. Comply with SDI A250.11 or NAAMM-HMMA 840 as required by standards specified.
 - 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.
 - a. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
 - b. Install door silencers in frames before grouting.

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- c. Remove temporary braces necessary for installation only after frames have been properly set and secured.
 - d. Check plumb, square, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
 - e. Field apply bituminous coating to backs of frames that will be filled with grout containing anti-freezing agents.
 2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with post-installed expansion anchors.
 - a. Floor anchors may be set with power-actuated fasteners instead of post-installed expansion anchors if so indicated and approved on Shop Drawings.
 3. Masonry Walls: Where indicated on drawings, coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.
 4. In-Place Concrete or Masonry Construction: Secure frames in place with post-installed expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
 5. Installation Tolerances: Adjust hollow-metal door frames for squareness, alignment, twist, and plumb to the following tolerances:
 - a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
 - c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.
- C. Hollow-Metal Doors: Fit hollow-metal doors accurately in frames, within clearances specified below. Shim as necessary.
 1. Non-Fire-Rated Steel Doors:
 - a. Between Door and Frame Jambs and Head: 1/8 inch plus or minus 1/32 inch.
 - b. Between Edges of Pairs of Doors: 1/8 inch to 1/4 inch plus or minus 1/32 inch.
 - c. At Bottom of Door: 5/8 inch plus or minus 1/32 inch.
 - d. Between Door Face and Stop: 1/16 inch to 1/8 inch plus or minus 1/32 inch.

3.4 ADJUSTING AND CLEANING

- A. 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 hollow-metal work that is warped, bowed, or otherwise unacceptable.

SECTION 081113 – HOLLOW METAL DOORS AND FRAMES

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- B. Remove grout and other bonding material from hollow-metal work immediately after installation.
- C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

END OF SECTION 081113

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. Exterior storefront framing.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: For aluminum-framed entrances and storefronts. Include plans, elevations, sections, full-size details, and attachments to other work.
 - 1. Include details of provisions for assembly expansion and contraction and for draining moisture occurring within the assembly to the exterior.
 - 2. Include full-size isometric details of each vertical-to-horizontal intersection of aluminum-framed entrances and storefronts, showing the following:
 - a. Joinery, including concealed welds.
 - b. Anchorage.
 - c. Expansion provisions.
 - d. Glazing.
 - e. Flashing and drainage.
 - 3. Show connection to and continuity with adjacent thermal, weather, air, and vapor barriers.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For aluminum-framed entrances and storefronts to include in maintenance manuals.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

SECTION 084113 – ALUMINUM FRAMED STOREFRONT Phase 8 Stadium Improvements – Washington-Marion High

- B. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
- C. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.
 - 1. Do not change intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If changes are proposed, submit comprehensive explanatory data to Architect for review.

1.6 WARRANTY

- A. Warranty: Standard form acceptable to Owner jointly signed by the manufacturer, contractor, and installer warranting work to be water-tight, free from defective materials, defective workmanship, glass breakage due to defective design, and agreeing to replace components which fail within the specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including, but not limited to, excessive deflection.
 - b. Noise or vibration created by wind and thermal and structural movements.
 - c. Glazing sealants and gaskets will remain free from abnormal deterioration or dislocation.
 - d. Deterioration of metals and other materials beyond normal weathering.
 - e. Water penetration through fixed glazing and framing areas.
 - f. Failure of operating components.
 - 2. Warranty Period: Ten years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General Performance: Comply with performance requirements specified, as determined by testing of aluminum framed storefronts representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.
 - 1. Aluminum framed storefronts shall withstand movements of supporting structure including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
 - 2. Failure also includes the following:
 - a. Thermal stresses transferring to building structure.
 - b. Glass breakage.
 - c. Noise or vibration created by wind and thermal and structural movements.

SECTION 084113 – ALUMINUM FRAMED STOREFRONT

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- d. Loosening or weakening of fasteners, attachments, and other components.
 - e. Failure of operating units.
- B. Structural Loads, include sun control devices if applicable:
 - 1. Wind Loads: 140 mph.
 - 2. Risk Category: III.
 - 3. Exposure Category: B
 - 4. Importance Factor: 1.00.
- C. Deflection of Framing Members: At design wind pressure, as follows:
 - 1. Deflection Normal to Wall Plane: Limited to 1/175 of clear span for spans up to 13 feet 6 inches and to 1/240 of clear span plus 1/4 inch for spans greater than 13 feet 6 inches or an amount that restricts edge deflection of individual glazing lites to 3/4 inch, whichever is less.
 - 2. Deflection Parallel to Glazing Plane: Limited to 1/360 of clear span or 1/8 inch, whichever is smaller.
 - a. Operable Units: Provide a minimum 1/16-inch clearance between framing members and operable units.
- D. Structural: Test according to ASTM E 330 as follows:
 - 1. When tested at positive and negative wind-load design pressures, assemblies do not evidence deflection exceeding specified limits.
 - 2. When tested at 150 percent of positive and negative wind-load design pressures, assemblies, including anchorage, do not evidence material failures, structural distress, or permanent deformation of main framing members exceeding 0.2 percent of span.
 - 3. Test Durations: As required by design wind velocity, but not less than 10 seconds.
- E. Air Infiltration: Test according to ASTM E 283 for infiltration as follows:
 - 1. Fixed Framing and Glass Area:
 - a. Maximum air leakage of 0.06 cfm/sq. ft. at a static-air-pressure differential of 6.24 lbf/sq. ft.
 - 2. Entrance Doors:
 - a. Pair of Doors: Maximum air leakage of 1.0 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft.
- F. Water Penetration under Static Pressure: Test according to ASTM E 331 as follows:
 - 1. No evidence of water penetration through fixed glazing and framing areas when tested according to a minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not less than 10 lbf/sq. ft.
- G. Water Penetration under Dynamic Pressure: Test according to AAMA 501.1 as follows:

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1. No evidence of water penetration through fixed glazing and framing areas when tested at dynamic pressure equal to 20 percent of positive wind-load design pressure, but not less than 10 lbf/sq. ft.
 2. Maximum Water Leakage: No uncontrolled water penetrating assemblies or water appearing on assemblies' normally exposed interior surfaces from sources other than condensation. Water leakage does not include water controlled by flashing and gutters, or water that is drained to exterior.
- H. Energy Performance: Certify and label energy performance according to NFRC as follows:
1. Thermal Transmittance (U-factor): Fixed glazing and framing areas shall have U-factor of not more than 0.45 Btu/sq. ft. x h x deg F as determined according to NFRC 100.
 2. Solar Heat Gain Coefficient: Fixed glazing and framing areas shall have a solar heat gain coefficient of no greater than 0.30 as determined according to NFRC 200.
 3. Condensation Resistance: Fixed glazing and framing areas shall have an NFRC-certified condensation resistance rating of no less than 45 as determined according to NFRC 500.
- I. Noise Reduction: Test according to ASTM E 90, with ratings determined by ASTM E 1332, as follows:
1. Outdoor-Indoor Transmission Class: Minimum 34.
- J. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes:
1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.
 2. Thermal Cycling: No buckling; stress on glass; sealant failure; excess stress on framing, anchors, and fasteners; or reduction of performance when tested according to AAMA 501.5.
 - a. High Exterior Ambient-Air Temperature: That which produces an exterior metal-surface temperature of 180 deg F.
 - b. Low Exterior Ambient-Air Temperature: 0 deg F.

2.2 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Kawneer; 451T Series.
 2. Tubelite; 14000 Series.
- B. Source Limitations: Obtain all components of aluminum-framed entrance and storefront system, including framing and accessories, from single manufacturer.

2.3 FRAMING

- A. Framing Members: Manufacturer's extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.
 - 1. Construction: Thermally broken.
 - 2. Glazing System: Retained mechanically with gaskets on four sides.
 - 3. Glazing Plane: Center.
 - 4. Finish: Clear anodic finish.
 - 5. Fabrication Method: Field-fabricated stick system.
- B. Backer Plates: Manufacturer's standard, continuous backer plates for framing members, if not integral, where framing abuts adjacent construction.
- C. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with non-staining, nonferrous shims for aligning system components.
- D. Materials:
 - 1. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
 - a. Sheet and Plate: ASTM B 209 (ASTM B 209M).
 - b. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221 (ASTM B 221M).
 - c. Extruded Structural Pipe and Tubes: ASTM B 429/B 429M.
 - d. Structural Profiles: ASTM B 308/B 308M.
 - 2. Steel Reinforcement: Manufacturer's standard zinc-rich, corrosion-resistant primer complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM, and prepare surfaces according to applicable SSPC standard.
 - a. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
 - b. Cold-Rolled Sheet and Strip: ASTM A 1008/A 1008M.
 - c. Hot-Rolled Sheet and Strip: ASTM A 1011/A 1011M.

2.4 GLAZING

- A. Glazing: Comply with Section 088000 "Glazing."
- B. Glazing Gaskets: Comply with Section 088000 "Glazing."
- C. Glazing Sealants: Comply with Section 088000 "Glazing."
- D. Sealants used inside the weatherproofing system shall have a VOC content of 250 g/L or less.

2.5 ACCESSORIES

- A. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, non-staining, non-bleeding fasteners and accessories compatible with adjacent materials.
 - 1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
 - 2. Reinforce members as required to receive fastener threads.
 - 3. Use exposed fasteners with countersunk Phillips screw heads, fabricated from 300 series stainless steel and finished to match the framing system.
- B. Anchors: Three-way adjustable anchors with minimum adjustment of 1 inch that accommodate fabrication and installation tolerances in material and finish compatible with adjoining materials and recommended by manufacturer.
 - 1. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A 123/A 123M or ASTM A 153/A 153M requirements.
- C. Concealed Flashing: Manufacturer's standard corrosion-resistant, non-staining, non-bleeding flashing compatible with adjacent materials.
- D. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for 30-mil thickness per coat.

2.6 FABRICATION

- A. Form or extrude aluminum shapes before finishing.
- B. 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. Physical and thermal isolation of glazing from framing members.
 - 4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
 - 5. Provisions for field replacement of glazing from interior.
 - 6. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
- C. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.
- D. Storefront Framing: Fabricate components for assembly using screw-spline system.
- E. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.7 ALUMINUM FINISHES

- A. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas, with Installer present, 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

- A. General:
 - 1. Comply with manufacturer's written instructions.
 - 2. Do not install damaged components.
 - 3. Fit joints to produce hairline joints free of burrs and distortion.
 - 4. Rigidly secure non-movement joints.
 - 5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
 - 6. Seal perimeter and other joints watertight unless otherwise indicated.
- B. Metal Protection:
 - 1. Where aluminum is in contact with dissimilar metals, protect against galvanic action by painting contact surfaces with materials recommended by manufacturer for this purpose or by installing nonconductive spacers.
 - 2. Where aluminum is in contact with concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
- C. Set continuous sill members and flashing in full sealant bed as specified in Section 079200 "Joint Sealants" to produce weather-tight installation.
- D. Install components plumb and true in alignment with established lines and grades.
- E. Install glazing as specified in Section 088000 "Glazing."

3.3 ERECTION TOLERANCES

- A. Erection Tolerances: Install aluminum-framed storefronts to comply with the following maximum tolerances:
 - 1. Plumb: 1/8 inch in 10 feet; 1/4 inch in 40 feet.
 - 2. Level: 1/8 inch in 20 feet; 1/4 inch in 40 feet.
 - 3. Alignment:

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- a. Where surfaces abut in line or are separated by reveal or protruding element up to 1/2 inch wide, limit offset from true alignment to 1/16 inch.
 - b. Where surfaces are separated by reveal or protruding element from 1/2 to 1 inch wide, limit offset from true alignment to 1/8 inch.
 - c. Where surfaces are separated by reveal or protruding element of 1 inch wide or more, limit offset from true alignment to 1/4 inch.
4. Location: Limit variation from plane to 1/8 inch in 12 feet; 1/2 inch over total length.

3.4 CLEANING

- A. Remove all residues, smears, smudges, etc. for a finished appearance that is acceptable to the Owner and Designer. Refer to Specification Section 011000 for additional cleaning requirements.
- B. Final cleaning of all aluminum framed storefronts, including glass, shall be performed at the time of project acceptance of the Owner.
- C. Cleaning at the time of installation and/or during the course of construction shall not relieve the Contractor from cleaning at the time of acceptance by the Owner.

END OF SECTION 084113

SECTION 087100 – DOOR HARDWARE

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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. Mechanical door hardware for the following:
 - a. Swinging doors.
- B. Related Sections:
 - 1. Section 081113 "Hollow Metal Doors and Frames".

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction and installation details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Other Action Submittals:
 - 1. Door Hardware Schedule: Prepared by the supplier and/or under the supervision of Installer, detailing fabrication and assembly of door hardware, as well as installation procedures and diagrams. Coordinate final door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
 - a. Submittal Sequence: Submit door hardware schedule concurrent with submissions of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate the fabrication of other work that is critical in Project construction schedule.
 - b. Format: Use same scheduling sequence and format and use same door numbers as in the Contract Documents.
 - c. Content: Include the following information:
 - 1) Identification number, location, hand, fire rating, size, and material of each door and frame.
 - 2) Locations of each door hardware set, cross-referenced to Drawings on floor plans and to door and frame schedule.

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- 3) Complete designations, including name and manufacturer, type, style, function, size, quantity, function, and finish of each door hardware product.
 - 4) Description of electrified door hardware sequences of operation and interfaces with other building control systems.
 - 5) Fastenings and other pertinent information.
 - 6) Explanation of abbreviations, symbols, and codes contained in schedule.
 - 7) Mounting locations for door hardware.
 - 8) List of related door devices specified in other Sections for each door and frame.
2. Keying Schedule: Prepared by the Architect and Owner, detailing final keying instructions for locks.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: For compliance with accessibility requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for door hardware on doors located in accessible routes.
- C. Warranty: Special warranty specified in this Section.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of door hardware to include in maintenance manuals. Include final hardware and keying schedule.

1.6 QUALITY ASSURANCE

- A. Supplier Qualifications: All door hardware shall be supplied by a firm regularly engaged in supplying the products specified herein for commercial, industrial and institutional construction and have in their employ at least one (1) qualified Architectural Hardware Consultant (AHC) that is a regular member in good standing of the Door Hardware Institute (DHI). The supplier shall also be licensed with Louisiana State Fire Marshal for Life Safety and Property Protection under LA RS: 1664. A copy of such shall be submitted with the shop drawings.
 1. Warehousing Facilities: In Project's vicinity.
 2. Scheduling Responsibility: Preparation of door hardware and keying schedules.
- B. Installer Qualifications: Supplier of products and an employer of workers trained and approved by product manufacturers and an Architectural Hardware Consultant who is available during the course of the Work to consult with Contractor, Architect, and Owner about door hardware and keying.

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- C. Architectural Hardware Consultant Qualifications: A person who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project and who is currently certified by DHI as follows:
 - 1. For door hardware, an Architectural Hardware Consultant (AHC).
- D. Source Limitations: Obtain each type of door hardware from a single manufacturer.
- E. Fire-Rated Door Assemblies: Where fire-rated door assemblies are indicated, provide door hardware rated for use in assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C, unless otherwise indicated.
- F. Means of Egress Doors: Latches do not require more than 15 lbf to release the latch. Locks do not require use of a key, tool, or special knowledge for operation.
- G. Accessibility Requirements: Comply with the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.
 - 1. Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf.
 - 2. Comply with the following maximum opening-force requirements:
 - a. Interior, Non-Fire-Rated Hinged Doors: 5 lbf applied perpendicular to door.
 - b. Fire Doors: Minimum opening force allowable by authorities having jurisdiction.
 - 3. Bevel raised thresholds with a slope of not more than 1:2.
 - 4. Adjust door closer sweep periods so that, from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches from the latch, measured to the leading edge of the door.
- H. Keying Conference: Conduct conference at a location as determined by the Architect. In addition to the Owner, Contractor and/or Project Superintendent, and Architect, conference participants shall also include Installer's Architectural Hardware Consultant. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including, but not limited to, the following:
 - 1. Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
 - 2. Preliminary key system schematic diagram.
 - 3. Requirements for key control system.
 - 4. Address for delivery of keys.
- I. Pre-installation Conference: If requested by the Architect and Owner, conduct conference at Project site.

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1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
2. Inspect and discuss preparatory work performed by other trades.
3. Review required testing, inspecting, and certifying procedures.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up for door hardware delivered to Project site.
- B. Tag each item or package separately with identification coordinated with the final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package.
- C. Deliver keys, and if specified, permanent cores to Owner by registered mail or overnight package service. Cores to be installed by the Owner. Construction cores and keys to be returned to the hardware supplier.

1.8 COORDINATION

- A. Installation Templates: Distribute for doors, frames, and other work specified to be factory prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

1.9 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fails in materials or workmanship within specified warranty period.
 1. Failures include, but are not limited to, the following:
 - a. Structural failures including excessive deflection, cracking, or breakage.
 - b. Faulty operation of doors and door hardware.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.
 2. Warranty Period: Ten years from date of Substantial Completion, unless otherwise indicated.
 - a. Locking Devices: 10 years from date of Substantial Completion.
 - b. Manual Closers: 25 years from date of Substantial Completion.

SECTION 087100 – DOOR HARDWARE

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PART 2 - PRODUCTS**2.1 SCHEDULED DOOR HARDWARE**

- A. Provide door hardware for each door as scheduled in Part 3 "Door Hardware Schedule" Article to comply with requirements in this Section.
 - 1. Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and named manufacturers' products or products equivalent in function and comparable in quality to named products. Refer to list under appropriate Part 2 Article.
- B. Designations: Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of door hardware are indicated in Part 3 "Door Hardware Schedule" Article. Products are identified by using door hardware designations, as follows:
 - 1. Named Manufacturers' Products: Manufacturer and product designation are listed for each door hardware type required for the purpose of establishing minimum requirements. Manufacturers' names are abbreviated in Part 3 "Door Hardware Schedule" Article.
 - 2. References to BHMA Designations: Provided to ensure product compliance with specific designations and requirements for description, quality, and function.

2.2 HINGES

- A. Hinges: BHMA A156.1. Provide template-produced hinges for hinges installed on hollow-metal doors and hollow-metal frames, full mortise, five knuckle, heavy weight, heavy duty, ball bearing, satin stainless steel.
 - 1. Subject to compliance with requirements, provide product indicated on schedule or one of the following:
 - a. McKinney Products Co.; an ASSA ABLOY Group company; T4B3386.
 - b. PBB, Inc.; 4B81 Series.

2.3 MECHANICAL LOCKS AND LATCHES

- A. Lock Functions: As indicated in door hardware schedule.
- B. Lock Throw: Comply with testing requirements for length of bolts required for labeled fire doors, and as follows:
 - 1. Bored Locks: Minimum 3/4-inch latch-bolt projection.
 - 2. Deadbolts: Minimum 1-inch bolt projection.
- C. Lock Backset: 2-3/4 inches, unless otherwise indicated.

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D. Lock Trim:

1. Description: Refer to Part 3 Hardware Schedule for trim designation. Substitutions shall match specified trim design.
2. Levers: Cast.
3. Escutcheons (Roses): Wrought.
4. Dummy Trim: Match lever lock trim and escutcheons.
5. Operating Device: Lever with escutcheons (roses).

E. Strikes: Provide manufacturer's standard strike for each lock bolt or latch-bolt complying with requirements indicated for applicable lock or latch and with strike box and curved lip extended to protect frame; finished to match lock or latch.

F. Bored Locks: BHMA A156.2; Grade 1; Operational Grade 1, Series 4000; heavy gauge steel cylindrical housing with corrosion resistant steel or brass parts, documented testing of no less than 9 million cycles, minimum 7-year warranty.

1. Subject to compliance with requirements, provide product indicated on schedule or one of the following:
 - a. Corbin Russwin; an ASSA ABLOY Group Company; CLX3300 Series.
 - b. Schlage Commercial Lock Division; an Allegion company, NDBD Series.

2.4 AUXILIARY LOCKS

A. Bored Auxiliary Locks: BHMA A156.5: Grade 1; with strike that suits frame, documented testing of no less than 10 million cycles, minimum 10-year warranty.

1. Subject to compliance with requirements, provide product indicated on schedule or one of the following:
 - a. Corbin Russwin; an ASSA ABLOY Group Company; DL3200 Series.
 - b. Schlage Commercial Lock Division; an Allegion company, B600 Series.

2.5 LOCK CORES

A. Lock Cores (No Substitute, Calcasieu Parish School Board): Stanley Best Cormax, small format, 7-pin patented key system, removable and interchangeable, constructed from brass with 626 finish. All costs for providing and installing lock cores (permanent and construction) shall be included in the project.

B. Construction Cores: Provide construction cores that are replaceable by permanent cores. Provide 15 construction keys.

2.6 KEYING

A. Keying System: Factory registered, complying with guidelines in BHMA A156.28, Appendix A. Incorporate decisions made in keying conference.

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1. Grand Master Key System: Key to established CPSB grand master system. Change keys and a master key to operate cylinders.
- B. Keys: Brass.
 1. Stamping: Permanently inscribe each key with a visual key control number and include the following notation:
 - a. Notation: **"DO NOT DUPLICATE."**
 2. Quantity: In addition to two extra key blank for each lock, provide the following:
 - a. Cylinder Change Keys: Two.
 - b. Master Keys: Four.

2.7 SURFACE CLOSERS

- A. Surface Closers: BHMA A156.4; heavy duty, extreme high use, documented testing of no less than 15 million cycles, minimum 25-year warranty, rack-and-pinion hydraulic type with adjustable sweep and latch speeds controlled by key-operated valves and forged-steel main arm with cast iron body. Comply with manufacturer's written recommendations for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.
 1. Subject to compliance with requirements, provide product indicated on schedule or one of the following:
 - a. LCN; an Allegion company; 4040XP Series.
 - b. Corbin Russwin; an ASSA ABLOY Group company; DC6000 Series.

2.8 MECHANICAL STOPS AND HOLDERS

- A. Wall- and Floor-Mounted Stops: BHMA A156.16; wrought construction, polished cast brass base metal.
 1. Subject to compliance with requirements, provide product indicated on schedule or comparable product by one of the following:
 - a. IVES Hardware; an Allegion company.

2.9 DOOR GASKETING

- A. Door Gasketing: BHMA A156.22; air leakage not to exceed 0.50 cfm per foot of crack length for gasketing other than for smoke control, as tested according to ASTM E 283; with resilient or flexible seal strips that are easily replaceable and readily available from stocks maintained by manufacturer.

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1. Subject to compliance with requirements, provide product indicated on schedule or comparable product by one of the following:

- a. Zero International.

2.10 THRESHOLDS

- A. Thresholds: BHMA A156.21; fabricated to full width of opening indicated.

1. Subject to compliance with requirements, provide product indicated on schedule or comparable product by one of the following:

- a. Zero International.

2.11 METAL PROTECTIVE TRIM UNITS

- A. Metal Protective Trim Units: BHMA A156.6; fabricated from 0.050-inch-thick stainless steel; with manufacturer's standard machine or self-tapping screw fasteners.

1. Subject to compliance with requirements, provide product indicated on schedule or comparable product by one of the following:

- a. IVES Hardware; an Allegion company.

2.12 AUXILIARY DOOR HARDWARE

- A. Auxiliary Hardware: BHMA A156.16.

1. Subject to compliance with requirements, provide product indicated on schedule or comparable product by one of the following:

- a. Hager Companies.

2.13 FABRICATION

- A. Manufacturer's Nameplate: Do not provide products that have manufacturer's name or trade name displayed in a visible location except in conjunction with required fire-rated labels and as otherwise approved by Architect.

1. Manufacturer's identification is permitted on rim of lock cylinders only.

- B. Base Metals: Produce door hardware units of base metal indicated, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness. Furnish metals of a quality equal to or greater than that of specified door hardware units and BHMA A156.18.

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- C. Fasteners: Provide door hardware manufactured to comply with published templates prepared for machine, wood, and sheet metal screws. Provide screws that comply with commercially recognized industry standards for application intended, except aluminum fasteners are not permitted. Provide Phillips flat-head screws with finished heads to match surface of door hardware, unless otherwise indicated.
 - 1. Concealed Fasteners: For door hardware units that are exposed when door is closed, except for units already specified with concealed fasteners. Do not use through bolts for installation where bolt head or nut on opposite face is exposed unless it is the only means of securely attaching the door hardware. Where through bolts are used on hollow door and frame construction, provide sleeves for each through bolt.
 - 2. Fire-Rated Applications:
 - a. Wood or Machine Screws: For the following:
 - 1) Hinges mortised to doors or frames.
 - 2) Strike plates to frames.
 - 3) Closers to doors and frames.
 - b. Steel Through Bolts: For the following unless door blocking is provided:
 - 1) Surface hinges to doors.
 - 2) Closers to doors and frames.
 - 3) Surface-mounted exit devices.
 - 3. Spacers or Sex Bolts: For through bolting of hollow-metal doors.
 - 4. Fasteners for Gaskets: Provide noncorrosive fasteners for exterior applications and elsewhere as indicated.

2.14 FINISHES

- A. Provide finishes complying with BHMA A156.18 as indicated in door hardware schedule.
- 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.

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PART 3 - EXECUTION**3.1 EXAMINATION**

- A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Steel Doors and Frames: For surface applied door hardware, drill and tap doors and frames according to ANSI/SDI A250.6.

3.3 INSTALLATION

- A. Mounting Heights: Mount door hardware units at heights to comply with the following unless otherwise indicated or required to comply with governing regulations.
 - 1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
 - 2. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
- B. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing. Do not install surface-mounted items until finishes have been completed on substrates involved.
 - 1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
 - 2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
- C. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than the number recommended by manufacturer for application indicated or one hinge for every 30 inches of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.
- D. Lock Cylinders: Install construction cores to secure building and areas during construction period.
 - 1. Replace construction cores with permanent cores as indicated in keying schedule.
- E. Thresholds: Set thresholds for exterior doors and other doors indicated in full bed of sealant complying with requirements specified in Section 079200 "Joint Sealants."

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- F. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they will impede traffic.
- G. Perimeter Gaskets: Apply to head and jamb, forming seal between door and frame.
- H. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed. This shall result in no water penetrating beneath the door and entering the premise.

3.4 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
 - 1. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.
- B. Occupancy Adjustment: Approximately three months after date of Substantial Completion, Installer's Architectural Hardware Consultant shall examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors and door hardware.

3.5 CLEANING AND PROTECTION

- A. Clean adjacent surfaces soiled by door hardware installation.
- B. Clean operating items as necessary to restore proper function and finish.
- C. Provide final protection and maintain conditions that ensure that door hardware is without damage or deterioration at time of Substantial Completion.

3.6 DOOR HARDWARE SCHEDULE

SECTION 087100 – DOOR HARDWARE

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H - 1Door **11-001** – Single, 3-0 | 7-0, RHR, EXHMD, HMFDoor **11-002** – Single, 3-0 | 7-0, LHR, EXHMD, HMFDoor **13-001** – Single, 3-0 | 7-0, LHR, HMD, HMFDoor **13-002** – Single, 3-0 | 7-0, RHR, HMD, HMF

3	Hinges	FBB199 x 4.5 x 4.5 x NRP	Stanley	630
1	Aux. Lock	8T37S-STK	Best	626
1	HD Closer	QDC115, parallel	Stanley	689
1	Pull Plate	107 x 70C	Rockwood	630
1	Push	70C	Rockwood	630
1	Floor Stop	466	Rockwood	630
1	Threshold	2005A x 36"	Pemko	
1	Perimeter Gasket	303APK17	Pemko	
1	Door Bottom	217AV	Pemko	
1	Protection Plate	K1050 x 12 x 34	Rockwood	

Note: Prep frame and strike for aux. lock. Floor stop not required for 13-001 and 13-002.

H - 2Door **11-003** – Single, 3-0 | 7-0, RHR, HMD, EXHMFDoor **11-004** – Single, 3-0 | 7-0, RHR, HMD, HMFDoor **12-001** – Single, 3-0 | 7-0, RHR, HMD, HMFDoor **15-001** – Single, 3-0 | 7-0, RHR, HMD, HMF

3	Hinges	FBB199 x 4.5 x 4.5 x NRP	Stanley	630
1	Office Entry	9K37AB14CS3-3/4	Best	626
1	Aux. Lock	8T37S-STK	Best	626
1	HD Closer	QDC115, parallel	Stanley	689
1	Threshold	2005A x 36"	Pemko	
1	Drip (15-001 only)	346D x 40"	Pemko	
1	Perimeter Gasket	303APK17	Pemko	
1	Door Bottom	217AV	Pemko	
1	Protection Plate	K1050 x 12 x 34	Rockwood	

Note: Prep frame and strike for aux. lock.

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H - 3Door **12-002** – Single, 3-0 | 7-0, LHR, HMD, HMFDoor **14-001** – Single, 3-0 | 6-8, LHR, HMD, EXHMFDoor **13-003** – Single, 3-0 | 7-0, RHR, HMD, HMFDoor **13-004** – Single, 3-0 | 7-0, LHR, HMD, HMF

3	Hinges	FBB199 x 4.5 x 4.5 x NRP	Stanley	630
1	Office Entry	9K37AB14CS3-3/4	Best	626
1	HD Closer	QDC115, parallel	Stanley	689
1	Threshold	2005A x 36"	Pemko	
1	Perimeter Gasket	303APK17	Pemko	
1	Door Bottom	217AV	Pemko	
1	Protection Plate	K1050 x 12 x 34	Rockwood	

Note: Provide proper strike plate for frame on 14-001.

H - 4Door **12-003** – Single, 3-0 | 7-0, LHR, HMD, HMF

3	Hinges	FBB199 x 4.5 x 4.5	Stanley	630
1	Office Entry	9K37AB14CS3	Stanley	626
1	Protection Plate	K1050 x 12 x 34	Rockwood	
3	Mutes	608	Rockwood	

Notes:

END OF SECTION 087100

SECTION 088000 – GLAZING

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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 glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:
 - 1. Storefront framing.
- B. Related Sections:
 - 1. Section 084113 "Aluminum Framed Storefronts."

1.3 DEFINITIONS

- A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.
- B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.
- C. Interspace: Space between lites of an insulating-glass unit.

1.4 PERFORMANCE REQUIREMENTS

- A. General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.
 - 1. Design Wind Pressures: Determine design wind pressures applicable to Project according to ASCE/SEI 7, based on heights above grade indicated on Drawings.
 - a. Basic Wind Speed: 140 mph.
 - b. Risk Category: III.
 - c. Exposure Category: B.
 - 2. Vertical Glazing: For glass surfaces sloped 15 degrees or less from vertical, design glass to resist design wind pressure based on glass type factors for short-duration load.

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3. Maximum Lateral Deflection: For glass supported on all four edges, limit center-of-glass deflection at design wind pressure to not more than 1/50 times the short-side length or 1 inch, whichever is less.
 4. Differential Shading: Design glass to resist thermal stresses induced by differential shading within individual glass lites.
- B. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.
1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

1.5 ACTION SUBMITTALS

- A. Product Data: For each glass product and glazing material indicated.
- B. Glass Samples: For each type of glass product; 12 inches square.

1.6 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For glass and glazing products, from manufacturer.
- B. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for all glass, sealants, and gaskets used for this project.
1. For glazing sealants, provide test reports based on testing current sealant formulations within previous 36-month period.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.
- B. Source Limitations for Glass: Obtain glass products from single source from single manufacturer for each glass type.
- C. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.
- D. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.
1. GANA Publications: GANA's "Laminated Glazing Reference Manual" and GANA's "Glazing Manual."
 2. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."

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- E. Safety Glazing Labeling: Where safety glazing labeling is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.
- F. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Protect glazing materials according to manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.
- B. Comply with insulating-glass manufacturer's written recommendations for venting and sealing units to avoid hermetic seal ruptures due to altitude change.

1.9 PROJECT CONDITIONS

- A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.
 - 1. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or below 40 deg F.

1.10 WARRANTY

- A. Manufacturer's Special Warranty on Insulating Glass: Manufacturer's standard form in which insulating-glass manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.
 - 1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 GLASS PRODUCTS, GENERAL

- A. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass lites in thicknesses as needed to comply with requirements indicated.

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- B. Strength: Where fully tempered glass is indicated, provide Kind FT heat-treated float glass.
- C. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:
 - 1. For monolithic-glass lites, properties are based on units with lites of thickness indicated.
 - 2. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
 - 3. U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2 computer program, expressed as Btu/sq. ft. x h x deg F.
 - 4. Solar Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values, according to NFRC 200 and based on LBL's WINDOW 5.2 computer program.
 - 5. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

2.2 GLASS PRODUCTS

- A. Heat-Treated Float Glass: ASTM C 1048; Type I; Quality-Q3; Class I (clear) unless otherwise indicated; of kind and condition indicated.
 - 1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.
- B. Heat-Treated, Tinted Float Glass: Class 2, complying with other requirements specified.
 - 1. Tint Color: Solar Gray.

2.3 INSULATING GLASS

- A. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E 2190, and complying with other requirements specified.
 - 1. Sealing System: Dual seal, with manufacturer's standard primary and secondary.
 - 2. Spacer: Manufacturer's non-metallic or thermoplastic type spacer material.
 - 3. Desiccant: Molecular sieve or silica gel, or blend of both.
- B. Glass: Comply with applicable requirements in "Glass Products" Article and in "Laminated Glass" Article as indicated by designations in "Insulating-Glass Types" Article and in "Insulating-Laminated-Glass Types" Article.

2.4 GLAZING GASKETS

- A. Dense Compression Gaskets: Molded or extruded gaskets of profile and hardness required to maintain watertight seal, made from the following:

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1. EPDM complying with ASTM C 864.
- B. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned EPDM gaskets complying with ASTM C 509, Type II, black; of profile and hardness required to maintain watertight seal.
 1. Application: Use where soft compression gaskets will be compressed by inserting dense compression gaskets on opposite side of glazing or pressure applied by means of pressure-glazing stops on opposite side of glazing.
- C. Lock-Strip Gaskets: Neoprene extrusions in size and shape indicated, fabricated into frames with molded corner units and zipper lock-strips, complying with ASTM C 542, black.

2.5 GLAZING SEALANTS

- A. General:
 1. Compatibility: Provide glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
 2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
 3. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.
- B. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 50, Use NT.
 1. Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Dow Corning Corporation; 795.
 - b. Tremco Incorporated; Spectrem 3.

2.6 MISCELLANEOUS GLAZING MATERIALS

- A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
- B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
- C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.

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- D. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
- E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

2.7 FABRICATION OF GLAZING UNITS

- A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.
- B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites to produce square edges with slight chamfers at junctions of edges and faces.
- C. Grind smooth and polish exposed glass edges and corners.

2.8 MONOLITHIC-GLASS TYPES

- A. Tinted fully tempered float glass.
 - 1. Thickness: 1/4 inch.

2.9 INSULATING-GLASS TYPES

- A. Low-e-coated, tinted insulating glass.
 - 1. Overall Unit Thickness: 1 inch.
 - 2. Thickness of Each Glass Lite: 1/4 inch.
 - 3. Outdoor Lite: Tinted fully tempered float glass.
 - 4. Interspace Content: Dehydrated air.
 - 5. Indoor Lite: Clear fully tempered float glass.
 - 6. Low-E Coating: Pyrolytic on third surface.
 - 7. Visible Light Transmittance: 26 percent minimum.
 - 8. Winter Nighttime U-Factor: 0.29 maximum.
 - 9. Summer Daytime U-Factor: 0.27 maximum.
 - 10. Solar Heat Gain Coefficient: 0.22 maximum.
 - 11. Provide safety glazing labeling.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:

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1. Manufacturing and installation tolerances, including those for size, square-ness, and offsets at corners.
 2. Presence and functioning of weep systems.
 3. Minimum required face and edge clearances.
 4. Effective sealing between joints of glass-framing members.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.
- B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that will leave visible marks in the completed work.

3.3 GLAZING, GENERAL

- A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
- B. Adjust glazing channel dimensions as required by Project conditions during installation to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.
- C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.
- D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.
- E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- G. Provide spacers for glass lites where length plus width is larger than 50 inches.
1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
 2. Provide 1/8-inch minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.

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- H. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.
- I. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.
- J. Set glass lites with proper orientation so that coatings face exterior or interior as specified.
- K. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.
- L. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

3.4 GASKET GLAZING (DRY)

- A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.
- B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
- C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- E. Install gaskets so they protrude past face of glazing stops.

3.5 SEALANT GLAZING (WET)

- A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.
- B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.

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- C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.6 LOCK-STRIP GASKET GLAZING

- A. Comply with ASTM C 716 and gasket manufacturer's written instructions. Provide supplementary wet seal and weep system unless otherwise indicated.

3.7 CLEANING AND PROTECTION

- A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels and clean surfaces.
- B. Protect glass from contact with contaminating substances resulting from construction operations. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer.
- C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains; remove as recommended in writing by glass manufacturer.
- D. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.
- E. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

END OF SECTION 088000

SECTION 089119 – FIXED LOUVERS

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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. Fixed, extruded-aluminum louvers, wind and driven rain resistant.

1.3 DEFINITIONS

- A. Louver Terminology: Definitions of terms for metal louvers contained in AMCA 501 apply to this Section unless otherwise defined in this Section or in referenced standards.
- B. Horizontal Louver: Louver with horizontal blades (i.e., the axes of the blades are horizontal).
- C. Vertical Louver: Louver with vertical blades (i.e., the axes of the blades are vertical).
- D. Drainable-Blade Louver: Louver with blades having gutters that collect water and drain it to channels in jambs and mullions, which carry it to bottom of unit and away from opening.
- E. Wind-Driven-Rain-Resistant Louver: Louver that provides specified wind-driven rain performance, as determined by testing according to AMCA 500-L.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. For louvers specified to bear AMCA seal, include printed catalog pages showing specified models with appropriate AMCA Certified Ratings Seals.
- B. Shop Drawings: For louvers and accessories. Include plans, elevations, sections, details, and attachments to other work. Show frame profiles and blade profiles, angles, and spacing.
 - 1. Show weep paths, gaskets, flashing, sealant, and other means of preventing water intrusion.
 - 2. Show mullion profiles and locations.

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1.5 FIELD CONDITIONS

- A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain louvers from single source from a single manufacturer where indicated to be of same type, design, or factory-applied color finish.

2.2 PERFORMANCE REQUIREMENTS

- A. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
 - 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
- B. SMACNA Standard: Comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" for fabrication, construction details, and installation procedures.

2.3 FIXED, EXTRUDED-ALUMINUM LOUVERS

- A. Horizontal, Drainable-Blade Louver:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Air Balance Inc.; A445.
 - b. Ruskin Company; ELF445DX.
 - 2. Louver Depth: 4 inches.
 - 3. Frame and Blade Nominal Thickness: Not less than 0.080 inch for blades and 0.080 inch for frames.
 - 4. Blade Angle: 45 degrees.
 - 5. Mullion Type: Recessed.
 - 6. Louver Performance Ratings:
 - a. Free Area: Not less than 8.0 sq. ft. for 48-inch- wide by 48-inch- high louver.
 - b. Point of Beginning Water Penetration: Not less than 1000 fpm.
 - c. Air Performance: Not more than 0.10-inch wg static pressure drop at 750-fpm free area intake velocity.
 - 7. Seal: Mark units with AMCA Certified Ratings Seal.

SECTION 089119 – FIXED LOUVERS

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2.4 LOUVER SCREENS

- A. General: Provide screen at each louver.
 - 1. Screen Location for Fixed Louvers: Interior face.
 - 2. Screening Type: Insect screening.
- B. Secure screen frames to louver frames with stainless-steel machine screws, spaced a maximum of 6 inches from each corner and at 12 inches o.c.
- C. Louver Screen Frames: Fabricate with mitered corners to louver sizes indicated.
 - 1. Metal: Same type and form of metal as indicated for louver to which screens are attached. Reinforce extruded-aluminum screen frames at corners with clips.
 - 2. Finish: Same finish as louver frames to which louver screens are attached.
 - 3. Type: Non-rewirable, U-shaped frames.
- D. Louver Screening for Aluminum Louvers:
 - 1. Insect Screening: Stainless steel, 18-by-18 mesh, 0.009-inch wire.

2.5 MATERIALS

- A. Aluminum Extrusions: ASTM B 221, Alloy 6063-T5, T-52, or T6.
- B. Aluminum Sheet: ASTM B 209, Alloy 3003 or 5005 with temper as required for forming, or as otherwise recommended by metal producer for required finish.
- C. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304, No. 2D finish
- D. Fasteners: Use types and sizes to suit unit installation conditions.
 - 1. Use hex-head or Phillips pan-head screws for exposed fasteners unless otherwise indicated.
 - 2. For fastening aluminum, use aluminum or 300 series stainless-steel fasteners.
 - 3. For fastening stainless steel, use 300 series stainless-steel fasteners.
 - 4. For color-finished louvers, use fasteners with heads that match color of louvers.
- E. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

2.6 FABRICATION

- A. Factory assemble louvers to minimize field splicing and assembly. Disassemble units as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.
- B. Maintain equal louver blade spacing, including separation between blades and frames at head and sill, to produce uniform appearance.

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- C. Fabricate frames, including integral sills, to fit in openings of sizes indicated, with allowances made for fabrication and installation tolerances, adjoining material tolerances, and perimeter sealant joints.
 - 1. Frame Type: Channel with exterior flange unless otherwise indicated.
- D. Include supports, anchorages, and accessories required for complete assembly.
- E. Provide vertical mullions of type and at spacings indicated, but not more than is recommended by manufacturer, or 72 inches o.c., whichever is less.
 - 1. Fully Recessed Mullions: Where indicated, provide mullions fully recessed behind louver blades. Where length of louver exceeds fabrication and handling limitations, fabricate with close-fitting blade splices designed to permit expansion and contraction.
- F. Provide subsills made of same material as louvers or extended sills for recessed louvers.
- G. Join frame members to each other and to fixed louver blades with fillet welds concealed from view unless otherwise indicated or size of louver assembly makes bolted connections between frame members necessary.

2.7 ALUMINUM FINISHES

- A. High-Performance Organic Finish: Two-coat fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 1. Color and Gloss: Custom color and finish as selected by Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and openings, with Installer present, 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 PREPARATION

- A. Coordinate setting drawings, diagrams, templates, instructions, and directions for installation of anchorages that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to Project site.

SECTION 089119 – FIXED LOUVERS

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3.3 INSTALLATION

- A. Locate and place louvers level, plumb, and at indicated alignment with adjacent work.
- B. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weathertight connection.
- C. Form closely fitted joints with exposed connections accurately located and secured.
- D. Provide perimeter reveals and openings of uniform width for sealants and joint fillers, as indicated.
- E. Protect unpainted galvanized and nonferrous-metal surfaces that are in contact with concrete, masonry, or dissimilar metals from corrosion and galvanic action by applying a heavy coating of bituminous paint or by separating surfaces with waterproof gaskets or nonmetallic flashing.
- F. Install concealed gaskets, flashings, joint fillers, and insulation as louver installation progresses, where weathertight louver joints are required. Comply with Section 079200 "Joint Sealants" for sealants applied during louver installation.

3.4 ADJUSTING AND CLEANING

- A. Clean exposed louver surfaces that are not protected by temporary covering, to remove fingerprints and soil during construction period. Do not let soil accumulate during construction period.
- B. Before final inspection, clean exposed surfaces with water and a mild soap or detergent not harmful to finishes. Thoroughly rinse surfaces and dry.
- C. Restore louvers damaged during installation and construction so no evidence remains of corrective work. If results of restoration are unsuccessful, as determined by Architect, remove damaged units and replace with new units.
 - 1. Touch up minor abrasions in finishes with air-dried coating that matches color and gloss of, and is compatible with, factory-applied finish coating.

END OF SECTION 089119

DIVISION 09

**TECHNICAL
SPECIFICATIONS**

FINISHES

SECTION 096700 – FLUID-APPLIED FLOORING FOR CONCRETE

Phase 8 Stadium Improvements – Washington-Marion High

PART 1 - GENERAL

- A. RELATED DOCUMENTS
- B. 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 surface preparation and the application of paint systems on the following interior substrates:
 - 1. Concrete Floors.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
- B. Samples for Initial Selection: For each type of topcoat product.
- C. Samples for Verification: For each type of paint system and in each color and gloss of topcoat.
 - 1. Submit Samples on rigid backing, 8 inches square.
 - 2. Step coats on Samples to show each coat required for system.
 - 3. Label each coat of each Sample.
 - 4. Label each Sample for location and application area.
- D. Product List: For each product indicated, include the following:
 - 1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
 - 2. Printout of current "MPI Approved Products List" for each product category specified in Part 2, with the proposed product highlighted.

1.4 QUALITY ASSURANCE

- A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.
 - a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft.
 - b. Other Items: Architect will designate items or areas required.

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2. Final approval of color selections will be based on mockups.
 - a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.
3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
 1. Maintain containers in clean condition, free of foreign materials and residue.
 2. Remove rags and waste from storage areas daily.

1.6 FIELD CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.
- B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by Sherwin-Williams Company or approved equivalent.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Notify Architect or Specifier of unsatisfactory conditions prior to proceeding.

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3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
- C. Removal of old paint by sanding, scraping or other means may generate dust or fumes that may contain lead. Controlling exposure to lead or other hazardous substances requires the use of proper protective equipment, such as a properly fitted respirator (NIOSH approved) and proper containment and cleanup. Removal must be done in accordance with EPA Renovation, Repair and Painting Rule and all related state and local regulations. Care should be taken to follow all state and local regulations which may be stricter than those set under the federal RRP Rule.
- D. Proper product selection, surface preparation, and application affect coating performance. Coating integrity and service life will be reduced due to improperly prepared surfaces. Selection and implementation of proper surface preparation ensures coating adhesion to the substrate and prolongs the service life of the coating system.
- E. Selection of the proper method of surface preparation depends on the substrate, environment, and expected service life of the coating system.
- F. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, loose rust and other foreign material as well as incompatible paints and encapsulants to insure adequate adhesion.
 - 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

3.3 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

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- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.4 CLOSEOUT

- A. Paint Maintenance Manual: Upon completion of the project, the Contractor or paint manufacturer/supplier shall furnish the Designer, two (2) copies of a paint maintenance manual. The manual shall be of the spiral bound type. The manual shall include an area summary with finish schedule, area detail designating where each product/color/finish was used, product data pages, MSDS documentation, care and cleaning instructions, touch-up procedures, and color samples of each color and finish used.

3.5 FLUID-APPLIED FLOORING FOR CONCRETE

A. New Poured Concrete

1. For surface preparation, refer to SSPC-SP13/NACE 6/ICRI #03732. Surfaces must be clean, dry, sound, and offer the recommended concrete surface profile for the floor system to be installed.
2. Minimum Substrate Cure: 28 days at 75 degrees F.
3. Remove all form release agents, curing compounds, salts, efflorescence, laitance, and other foreign matter by mechanical scarification.

B. Previously Painted Concrete/Surfaces

1. Clean surface of all foreign materials. Smooth, hard or glossy coatings and surfaces shall be dulled by abrading the surface. Apply a test area, allowing paint to dry one week before testing adhesion. If adhesion is poor or if this product attacks the previous finish, removal of the previous coating may be necessary. If paint is peeling or badly weathered, clean surface to sound substrate and treat as a new surface as above, "New Poured Concrete".
2. Fill all cracks, voids, bug holes and joints with appropriate filler or ArmorSeal Crack Filler, ArmorSeal Joint Sealant, or ArmorSeal Expresspatch.
3. Follow the ASTM methods listed below:
 - a. ASTM F 1869 Moisture Test by use of Calcium Chloride
 - b. ASTM D 4258 Standard Practice for Cleaning Concrete.
 - c. ASTM D 4259 Standard Practice for Abrading Concrete.
 - d. ASTM D 4260 Standard Practice for Etching Concrete.
 - e. ASTM D 4263 Plastic Sheet Method for Checking Moisture in Concrete.
 - f. SSPC-SP 13/NACE 6 Surface Preparation for Concrete
 - g. ICRI #03732 Surface Preparation of Concrete.

3.6 INSTALLATION

- A. Apply all coatings and materials in accordance with manufacturer's specifications. Mix and thin coatings according to manufacturer's written recommendations.

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- B. Do not apply to wet or damp surfaces.
- C. Uniformly apply coatings without runs or sags, without brush marks, and with consistent sheet.
- D. Apply coatings at spreading rate required to achieve the manufacturer's recommended dry film thickness.
- E. Inspection: Coated surface must be inspected and approved by the Architect just prior to the application of each coat.

3.7 PROTECTION

- A. Protect finished coatings from damage until completion of project.
- B. Touch up damaged coatings after substantial completion, following manufacturer's recommendations for touch up or repair of damaged coatings. Repair any defects that will hinder the performance of the coatings.

3.8 SCHEDULES

- A. Epoxy System for Unpainted Concrete Floors: Two-component, water based, polyamine epoxy coating.
 - 1. Base Coat (1): ArmorSeal 8100, 2.0-4.0 DFT mils, reduced with one pint of water per gallon.
 - 2. Top Coats (2): ArmorSeal 8100, 2.0-4.0 DFT mils.
- B. Epoxy System for Previously Painted Concrete Floors: Two-component, water based, polyamine epoxy coating.
 - 1. Base Coat (1): Spot prime bare areas with ArmorSeal 8100, 2.0-4.0 DFT mils.
 - 2. Top Coats (2): ArmorSeal 8100, 2.0-4.0 DFT mils.
- C. Anti-Slip Additives: H&C Shark Grip or ArmorSeal Hi-Wear Additive shall be added to the coating to provide acceptable resistance.

END OF SECTION 096700

SECTION 099113 – EXTERIOR PAINTING

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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 surface preparation and the application of paint systems on the following exterior substrates:
 - 1. Steel.
 - 2. Galvanized metal.
- B. Related Requirements:
 - 1. Section 099123 "Interior Painting" for surface preparation and the application of paint systems on interior substrates.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
- B. Samples for Initial Selection: For each type of topcoat product.
- C. Samples for Verification: For each type of paint system and each color and gloss of topcoat.
 - 1. Submit Samples on rigid backing, 8 inches square.
 - 2. Step coats on Samples to show each coat required for system.
 - 3. Label each coat of each Sample.
 - 4. Label each Sample for location and application area.
- D. Product List: For each product indicated, include the following:
 - 1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
 - 2. Printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
 - 3. VOC content.

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1.4 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Paint: 5 percent, but not less than 1 gal. of each material and color applied.

1.5 QUALITY ASSURANCE

- A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.
 - a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft.
 - b. Other Items: Architect will designate items or areas required.
 - 2. Final approval of color selections will be based on mockups.
 - a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.
 - 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
 - 1. Maintain containers in clean condition, free of foreign materials and residue.
 - 2. Remove rags and waste from storage areas daily.

1.7 FIELD CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.
- B. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

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PART 2 - PRODUCTS**2.1 MANUFACTURERS**

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Benjamin Moore & Co.
 - 2. PPG Paints.
 - 3. Sherwin-Williams Company (The).
- B. All paint products for this project shall be from a single manufacturer.

2.2 PAINT, GENERAL

- A. MPI Standards: Provide products that comply with MPI standards indicated and that are listed in its "MPI Approved Products List."
- B. Material Compatibility:
 - 1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 - 2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.
- C. VOC Content: Provide materials that comply with VOC limits of authorities having jurisdiction.
- D. Colors: As selected by Architect from manufacturer's full range.

2.3 METAL PRIMERS

- A. Primer, Steel and Galvanized, Water Based: MPI #134.
 - 1. Benjamin Moore; Ultra Spec HP Acrylic Metal Primer, HP04.
 - 2. PPG Paints; Pitt-Tech Plus 4020 PF.
 - 3. Sherwin Williams; Pro Industrial Acrylic Universal Primer, B66W1310 Series.

2.4 SOLVENT-BASED PAINTS

- A. Alkyd, Exterior, Semi-Gloss (Gloss Level 5): MPI #48.
 - 1. Benjamin Moore; Corotech Urethane Enamel, V200 Series.
 - 2. PPG Paints; HPC Industrial Alkyd Urethane Enamel, 4308.
 - 3. Sherwin Williams; Pro-Industrial Urethane Enamel, Semi-Gloss, B54 Series.

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2.5 SOURCE QUALITY CONTROL

- A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure:
1. Owner will engage the services of a qualified testing agency to sample paint materials. Contractor will be notified in advance and may be present when samples are taken. If paint materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
 2. Testing agency will perform tests for compliance with product requirements.
 3. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

PART 3 - EXECUTION**3.1 EXAMINATION**

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Verify that all factory-primed steel products such as, but not limited to, hollow metal doors, hollow metal frames, and structural steel is compatible with the paint products specified herein.
- C. Proceed with coating application only after unsatisfactory conditions have been corrected.
1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates and paint systems indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.

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- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
 - 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
- D. Steel Substrates: Remove rust, loose mill scale, and shop primer if any. Clean using methods recommended in writing by paint manufacturer or one of the following.
 - 1. SSPC-SP 2, "Hand Tool Cleaning."
 - 2. SSPC-SP 3, "Power Tool Cleaning."
 - 3. SSPC-SP 7/NACE No. 4, "Brush-off Blast Cleaning."
 - 4. SSPC-SP 11, "Power Tool Cleaning to Bare Metal."
 - a. After removing the rust, scaling, and existing paint/primers as described above, apply a rust inhibiting product such as Ospho or Gem to the surface. Allow proper drying time prior to priming.
- E. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
- F. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions and recommendations in "MPI Manual."
 - 1. Use applicators and techniques suited for paint and substrate indicated.
 - 2. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.
 - 3. Paint both sides and edges of exterior doors and entire exposed surface of exterior door frames.
 - 4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
 - 5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.
- B. Tint undercoats same color as topcoat, but tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

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- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
- E. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
 - 1. Paint the following work where exposed to view:
 - a. Equipment, including panelboards and switch gear.
 - b. Uninsulated metal piping.
 - c. Uninsulated plastic piping.
 - d. Pipe hangers and supports.
 - e. Metal conduit.
 - f. Plastic conduit.

3.4 FIELD QUALITY CONTROL

- A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
 - 1. Contractor shall touch up and restore painted surfaces damaged by testing.
 - 2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 CLOSEOUT

- A. Paint Maintenance Manual: Upon completion of the project, the Contractor or paint manufacturer/supplier shall furnish the Designer, two (2) copies of a paint maintenance manual. The manual shall be of the spiral bound type. The manual shall include an area

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summary with finish schedule, area detail designating where each product/color/finish was used, product data pages, MSDS documentation, care and cleaning instructions, touch-up procedures, and color samples of each color and finish used.

3.7 EXTERIOR PAINTING SCHEDULE**A. Steel and Galvanized-Metal Substrates:****1. Alkyd System:**

- a. Prime Coat: Primer, alkyd, anticorrosive for metal, MPI #134.
- b. Intermediate Coat: Exterior alkyd enamel matching topcoat.
- c. Topcoat: Alkyd, exterior, semi-gloss (Gloss Level 5), MPI #48.

END OF SECTION 099113

SECTION 099123 – INTERIOR PAINTING

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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 surface preparation and the application of paint systems on the following interior substrates:
 - 1. Concrete masonry units (CMU).
 - 2. Steel.
 - 3. Galvanized metal.
 - 4. Gypsum board.
 - 5. Cement board.
 - 6. Wood.
- B. Related Requirements:
 - 1. Section 099113 "Exterior Painting" for surface preparation and the application of paint systems on exterior substrates.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
- B. Samples for Initial Selection: For each type of topcoat product.
- C. Samples for Verification: For each type of paint system and in each color and gloss of topcoat.
 - 1. Submit Samples on rigid backing, 8 inches square.
 - 2. Step coats on Samples to show each coat required for system.
 - 3. Label each coat of each Sample.
 - 4. Label each Sample for location and application area.
- D. Product List: For each product indicated, include the following:
 - 1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
 - 2. Printout of current "MPI Approved Products List" for each product category specified in Part 2, with the proposed product highlighted.

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1.4 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Paint: 5 percent, but not less than 1 gal. for each material and color applied.

1.5 QUALITY ASSURANCE

- A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.
 - a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft.
 - b. Other Items: Architect will designate items or areas required.
 - 2. Final approval of color selections will be based on mockups.
 - a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.
 - 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
 - 1. Maintain containers in clean condition, free of foreign materials and residue.
 - 2. Remove rags and waste from storage areas daily.

1.7 FIELD CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.
- B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

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PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Benjamin Moore & Co.
 2. Sherwin-Williams Company (The).

2.2 PAINT, GENERAL

- A. MPI Standards: Provide products that comply with MPI standards indicated and that are listed in its "MPI Approved Products List."
- B. Material Compatibility:
1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.
- C. VOC Content: Products shall comply with VOC limits of authorities having jurisdiction and, for interior paints and coatings applied at Project site, the following VOC limits, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
1. Flat Paints and Coatings: 50 g/L.
 2. Non-flat Paints and Coatings: 150 g/L.
 3. Primers, Sealers, and Undercoaters: 200 g/L.
 4. Anticorrosive and Antirust Paints Applied to Ferrous Metals: 250 g/L.
 5. Zinc-Rich Industrial Maintenance Primers: 340 g/L.
 6. Pretreatment Wash Primers: 420 g/L.
- D. Colors: As selected by Architect from manufacturer's full range.

2.3 BLOCK FILLER FOR NEW CMU MASONRY

- A. Block Filler, Latex, Interior/Exterior: MPI #4.
1. Benjamin Moore; Super Spec Hi Build Block Filler, 206.
 2. Sherwin Williams; Cement Plex Block Filler 875, B42 Series.

2.4 PRIMER/SEALER FOR NEW GYPSUM DRYWALL AND CEMENT BOARD

- A. Primer Sealer, Interior, Institutional Low Odor/VOC: MPI #149.

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1. Benjamin Moore; Ultra Spec 500 Interior Primer, 534.
2. Sherwin Williams; ProMar 200 Zero VOC, B28 Series.

2.5 PRIMER FOR WOOD

A. Primer, Interior Wood:

1. Benjamin Moore; Fresh Start High Hiding All Purpose Primer, 046.
2. Sherwin Williams; PrepRite ProBlock, B51W00620.

2.6 PRIMER FOR METAL

A. Primer, Latex, Anti-Corrosive, for Metal: MPI #107.

1. Benjamin Moore; Super Spec HP D.T.M. Acrylic, P25 Series.
2. Sherwin Williams; Pro Industrial Pro-Cryl Universal Primer, B66W310.

2.7 PAINT FOR WOOD

A. Interior/Exterior, Institutional Low Odor/VOC, Semi-Gloss:

1. Benjamin Moore; Ultra Spec 500, N540.
2. Sherwin Williams; Pro-Industrial Alkyd Urethane Enamel, B5301150.

2.8 WATER-BASED PAINT FOR NEW GYPSUM DRYWALL AND CEMENT BOARD

A. Latex, Interior, Institutional Low Odor/VOC, Flat (Gloss Level 1): MPI #143.

1. Benjamin Moore; Ultra Spec 500 Interior Latex Flat, N536.
2. Sherwin Williams; ProMar 200 Zero VOC Interior Latex Flat, B30 Series.

2.9 EPOXY MODIFIED LATEX PAINT FOR NEW METAL

A. Epoxy-Modified Latex, Interior, Gloss (Gloss Level 6): MPI #115.

1. Benjamin Moore; Corotech Acrylic Epoxy Gloss, V450.
2. Sherwin Williams; Pro Industrial Water Based Catalyzed Epoxy, B73 Series.

2.10 EPOXY MODIFIED LATEX PAINT FOR NEW CMU MASONRY

A. Epoxy-Modified Latex, Interior, Semi-Gloss (Gloss Level 5): MPI #215.

1. Benjamin Moore; Super Spec HP Epoxy, P43.
2. Sherwin Williams; Pro Industrial Water Based Catalyzed Epoxy, B71 Series.

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2.11 PAINT FOR PREVIOUSLY PAINTED CMU MASONRY

- A. Interior, High Performance Architectural, Semi-Gloss:
 - 1. Benjamin Moore; Ultra Spec 500, 540.
 - 2. Sherwin Williams; Sher-Cryl HPA Acrylic, B66 Series.

2.12 PAINT FOR PREVIOUSLY PAINTED WOOD

- A. Interior/Exterior, Institutional Low Odor/VOC, Semi-Gloss:
 - 1. Benjamin Moore; Ultra Spec 500, N540.
 - 2. Sherwin Williams; Pro-Industrial Alkyd Urethane Enamel, B5301150.

2.13 PAINT FOR EXISTING PREVIOUSLY PAINTED METAL

- A. Alkyd Urethane Enamel, Interior, Semi-Gloss:
 - 1. Benjamin Moore; Advance Alkyd Enamel, 793.
 - 2. Sherwin Williams, Pro Industrial Water Based Alkyd Urethane Enamel, B53W01151.

2.14 SOURCE QUALITY CONTROL

- A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure:
 - 1. Owner will engage the services of a qualified testing agency to sample paint materials. Contractor will be notified in advance and may be present when samples are taken. If paint materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
 - 2. Testing agency will perform tests for compliance with product requirements.
 - 3. Owner may direct Contractor to stop applying coatings if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

PART 3 - EXECUTION**3.1 EXAMINATION**

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

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- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 - 1. Masonry (Clay and CMU): 12 percent.
 - 2. Gypsum Board: 12 percent.
- C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
- D. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- E. Verify that all factory-primed steel products such as, but not limited to, hollow metal doors, hollow metal frames, and structural steel is compatible with the paint products specified herein.
- F. Proceed with coating application only after unsatisfactory conditions have been corrected.
 - 1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
 - 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
- D. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceed that permitted in manufacturer's written instructions.
- E. Steel Substrates: Remove rust, and loose mill scale, if any. Clean using methods recommended in writing by paint manufacturer.
 - 1. SSPC-SP 2, "Hand Tool Cleaning."

SECTION 099123 – INTERIOR PAINTING

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- F. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
- G. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."
 - 1. Use applicators and techniques suited for paint and substrate indicated.
 - 2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
 - 3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
 - 4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
 - 5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.
- B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
- E. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
 - 1. Paint the following work where exposed in occupied spaces:
 - a. Uninsulated metal piping.
 - b. Pipe hangers and supports.
 - c. Metal conduit.
 - d. Ducts and equipment including any paintable jacket material.
 - e. Other items as directed by Architect.
 - 2. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

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3.4 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.5 CLOSEOUT

- A. Paint Maintenance Manual: Upon completion of the project, the Contractor or paint manufacturer/supplier shall furnish the Designer, two (2) copies of a paint maintenance manual. The manual shall be of the spiral bound type. The manual shall include an area summary with finish schedule, area detail designating where each product/color/finish was used, product data pages, MSDS documentation, care and cleaning instructions, touch-up procedures, and color samples of each color and finish used.

3.6 INTERIOR PAINTING SCHEDULE

- A. CMU Substrates, New:
 - 1. Block Filler: Block filler, latex, interior/exterior.
 - 2. Intermediate Coat: Match topcoat.
 - 3. Topcoat: Latex epoxy, interior, water based, semi-gloss.
- B. Gypsum and Cement Board Substrates, New:
 - 1. Primer: Primer sealer, interior, institutional, low odor/VOC.
 - 2. Intermediate Coat: Match topcoat.
 - 3. Topcoat: Latex, interior, institutional, low odor/VOC, flat (gloss level 1).
 - 4. Topcoat: Latex, interior, institutional, low odor/VOC, egg shell (gloss level 3).
- C. Wood Substrates, New:
 - 1. Latex over Alkyd Primer System:
 - a. Prime Coat: Primer sealer, alkyd, interior.
 - b. Intermediate Coat: Latex, interior, matching topcoat.
 - c. Topcoat: Latex, interior, semi-gloss.

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- D. Wood Substrates, Existing Previous Painted:
 - 1. Latex over Alkyd Primer System:
 - a. Prime Coat: Primer sealer, interior, spot prime.
 - b. Topcoat: Latex, interior, semi-gloss.
- E. CMU Substrates, Existing Previously Painted:
 - 1. Base Coat: Match topcoat.
 - 2. Topcoat: Acrylic.
- F. Steel Substrates:
 - 1. Prime Coat: Primer, rust-inhibitive, water based.
 - 2. Intermediate Coat: Match topcoat.
 - 3. Topcoat: Epoxy-modified latex, interior, gloss (gloss level 6).
- G. Steel Substrates, Existing Previously Painted:
 - 1. Base Coat: Match topcoat.
 - 2. Topcoat: Alkyd urethane enamel, interior, gloss (gloss level 6).

END OF SECTION 099123

DIVISION 10

**TECHNICAL
SPECIFICATIONS**

SPECIALTIES

SECTION 101423 – PANEL SIGNAGE

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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. Panel signs.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show fabrication and installation details for signage and letters.
 - 1. Show mounting heights, locations of supplementary supports to be provided by others, and accessories.
 - 2. Provide message list, typestyles, and graphic elements, including tactile characters and Braille, and layout for each sign.
- C. Samples for Initial Selection: Manufacturer's color charts consisting of actual units or sections of units showing the full range of colors available.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Contractor that has at least three (3) years of experience in installing specified signage.
- B. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.
- C. Source Limitations for Signs and Letters: Obtain each sign and letter type indicated from one source from a single manufacturer.
- D. Regulatory Requirements: Comply with applicable provisions and sections of the 2010 ADA Accessibility Guidelines.

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1.5 PROJECT CONDITIONS

- A. Interior Finishes: Proceed with installation only when interior painting finishes are complete.

1.6 COORDINATION

- A. Coordinate placement of anchorage devices, if any, with templates for installing signs.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Polycarbonate Sheet: Of thickness indicated, manufactured by extrusion process, coated on both surfaces with abrasion-resistant coating:
 - 1. Impact Resistance: 16 ft-lbf/in. per ASTM D 256, Method A.
 - 2. Tensile Strength: 9000 lbf/sq. in. per ASTM D 638.
 - 3. Flexural Modulus of Elasticity: 340,000 lbf/sq. in. per ASTM D 790.
 - 4. Heat Deflection: 265 deg F at 264 lbf/sq. in. per ASTM D 648.

2.2 PANEL SIGNS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Best Sign Systems Inc., HC300 Series.
 - 2. Mohawk Sign Systems, 200A Series Sand Carved.
- B. Interior Panel Signs: Provide smooth sign panel surfaces constructed to remain flat under installed conditions from corner to corner, complying with the following requirements:
 - 1. Laminated, Sandblasted Polymer (MP): Raised graphics and text with Braille 1/32 inch above surface with three (3) contrasting colors and laminated to acrylic back, self-extinguishing, and fire retardant.
 - 2. Thickness: 1/8 inch overall.
 - 3. Edge Condition: Square cut as shown.
 - 4. Border and Corner Condition: Square cut, 3/8" wide raised edge as shown.
 - 5. Mounting: Wall mount with four (4) Phillips Pan head stainless steel screws for substrates encountered.
 - 6. Background Colors: Special custom color match as selected by Designer.
 - 7. Raised Letter and Character Colors: Special custom color match as selected by Designer.
 - 8. Raised Border Color: Special custom color match as selected by Designer.
 - 9. Letter Style: As selected by Architect from manufacturer's full range.

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10. Tactile Characters: Characters and Grade 2 Braille raised 1/32 inch above surface with contrasting custom colors.
11. Location: Field located by Architect.
12. Location: Refer to project drawings.

C. Panel Sign Schedule:

1. Refer to project drawings.

2.3 ACCESSORIES

A. Anchors and Inserts: Manufacturer's standard as required for secure anchorage of signage and letters, noncorrosive and compatible with each material joined, and complying with the following:

1. Use concealed fasteners and anchors unless indicated to be exposed.
2. For interior and exterior exposure, furnish stainless-steel fasteners unless otherwise indicated.
3. Letter Mounting Fasteners:
 - a. Concealed Studs: Concealed (blind), threaded studs welded or brazed to back of letter material, screwed into back of letter, or screwed into tapped lugs cast integrally into back of letter material, unless otherwise indicated.

2.4 FABRICATION

A. General: Provide manufacturer's standard signs of configurations indicated.

2.5 FINISHES, GENERAL

A. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
- B. Verify that items, including anchor inserts, are sized and located to accommodate signs.
- C. Complete finishing operations, including painting, before installing signage.

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- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Locate signs, letters, and accessories where indicated, using mounting methods of types described and complying with manufacturer's written instructions.
- B. Install signs and letters level, plumb, and at heights indicated, with sign surfaces free of distortion and other defects in appearance.
 - 1. Interior Wall Signs: Install signs on walls adjacent to latch side of door or where shown on plans. Verify final mounting location and height with Architect.

3.3 CLEANING AND PROTECTION

- A. After installation, clean soiled sign surfaces according to manufacturer's written instructions. Protect signs from damage until acceptance by Owner.

END OF SECTION 10431

SECTION 102113 – TOILET COMPARTMENTS

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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. Solid-polymer toilet compartments configured as toilet enclosures and urinal screens.
- B. Related Sections:
 - 1. Section 102800 "Toilet, Bath, and Laundry Accessories" for toilet tissue dispensers, grab bars, purse shelves, and similar accessories.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: For toilet compartments. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Show locations of cutouts for compartment-mounted toilet accessories.
 - 2. Show locations of reinforcements for compartment-mounted grab bars.
 - 3. Show locations of centerlines of toilet fixtures.
- C. Samples for Initial Selection: For each type of unit indicated. Include Samples of hardware and accessories involving material and color selection.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For toilet compartments to include in maintenance manuals.

1.5 QUALITY ASSURANCE

- A. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84, or another standard acceptable to authorities having jurisdiction, by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: 25 or less.

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- 2. Smoke-Developed Index: 450 or less.
- B. Room Corner Test: Toilet compartments fabricated from polymers (high density polyethylene or polypropylene) shall be tested in accordance with NFPA 286.
- C. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities" and ICC/ANSI A117.1 for toilet compartments designated as accessible.

1.6 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of toilet fixtures, walls, columns, ceilings, and other construction contiguous with toilet compartments by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Aluminum Castings: ASTM B 26/B 26M.
- B. Aluminum Extrusions: ASTM B 221.
- C. Stainless-Steel Sheet: ASTM A 666, Type 304, stretcher-leveled standard of flatness.
- D. Stainless-Steel Castings: ASTM A 743/A 743M.

2.2 SOLID-POLYMER UNITS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following
 - 1. Accurate Partitions Corporation.
 - 2. Ampco, Inc.
 - 3. Bradley Corporation; Mills Partitions.
 - 4. General Partitions Mfg. Corp.
 - 5. Global Steel Products Corp.
 - 6. Santana Products, Inc.
- B. Toilet-Enclosure Style: Overhead braced.
- C. Urinal-Screen Style: Floor and wall anchored.
- D. Door, Panel, Screen, and Pilaster Construction: Solid, high-density polyethylene (HDPE) panel material, not less than 1 inch thick, seamless, with eased edges, and with homogenous color and pattern throughout thickness of material.

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1. Integral Hinges: Configure doors and pilasters to receive integral hinges.
 2. Heat-Sink Strip: Manufacturer's standard continuous, extruded-aluminum strip fastened to exposed bottom edges of solid-polymer components to prevent burning.
 3. Color and Pattern: Two colors and patterns in each room as selected by Architect from manufacturer's full range.
- E. Pilaster Shoes and Sleeves (Caps): Manufacturer's standard design; stainless steel.
- F. Urinal-Screen Post: Manufacturer's standard post design of material matching the thickness and construction of pilasters.
- G. Brackets (Fittings):
1. Full-Height (Continuous) Type: Manufacturer's standard design; stainless steel.

2.3 ACCESSORIES

- A. Hardware and Accessories: Manufacturer's standard design, heavy-duty operating hardware and accessories.
1. Material: Stainless steel.
 2. Hinges: Manufacturer's standard continuous, cam type that swings to a closed or partially open position.
 3. Latch and Keeper: Manufacturer's standard surface-mounted latch unit designed for emergency access and with combination rubber-faced door strike and keeper. Provide units that comply with regulatory requirements for accessibility at compartments designated as accessible.
 4. Coat Hook: Manufacturer's standard combination hook and rubber-tipped bumper, sized to prevent in-swinging door from hitting compartment-mounted accessories.
 5. Door Bumper: Manufacturer's standard rubber-tipped bumper at out-swinging doors.
 6. Door Pull: Manufacturer's standard unit at out-swinging doors that complies with regulatory requirements for accessibility. Provide units on both sides of doors at compartments designated as accessible.
- B. Overhead Bracing: Manufacturer's standard continuous, extruded-aluminum head rail with anti-grip profile and in manufacturer's standard finish.
- C. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel, finished to match the items they are securing, with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications. For concealed anchors, use stainless steel, hot-dip galvanized steel, or other rust-resistant, protective-coated steel.

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2.4 FABRICATION

- A. Overhead-Braced Units: Provide manufacturer's standard corrosion-resistant supports, leveling mechanism, and anchors at pilasters to suit floor conditions. Provide shoes at pilasters to conceal supports and leveling mechanism.
- B. Urinal-Screen Posts: Provide manufacturer's standard corrosion-resistant anchoring assemblies with leveling adjustment at bottoms of posts. Provide shoes and sleeves (caps) at posts to conceal anchorage.
- C. Door Size and Swings: Unless otherwise indicated, provide 24-inch-wide, in-swinging doors for standard toilet compartments and 36-inch-wide, out-swinging doors with a minimum 32-inch-wide, clear opening for compartments designated as accessible.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, level, and plumb. Secure units in position with manufacturer's recommended anchoring devices.
 - 1. Maximum Clearances:
 - a. Pilasters and Panels: 1/2 inch.
 - b. Panels and Walls: 1 inch.
 - 2. Stirrup Brackets: Secure panels to walls and to pilasters with no fewer than three brackets attached at midpoint and near top and bottom of panel.
 - a. Locate wall brackets so holes for wall anchors occur in masonry or tile joints.
 - b. Align brackets at pilasters with brackets at walls.
- B. Overhead-Braced Units: Secure pilasters to floor and level, plumb, and tighten. Set pilasters with anchors penetrating not less than 1-3/4 inches into structural floor unless otherwise indicated in manufacturer's written instructions. Secure continuous head rail to each pilaster with no fewer than two fasteners. Hang doors to align tops of doors with tops of panels, and adjust so tops of doors are parallel with overhead brace when doors are in closed position.
- C. Urinal Screens: Attach with anchoring devices to suit supporting structure. Set units level and plumb, rigid, and secured to resist lateral impact.

3.2 ADJUSTING

- A. Hardware Adjustment: Adjust and lubricate hardware according to hardware manufacturer's written instructions for proper operation. Set hinges on in-swinging doors

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to hold doors open approximately 30 degrees from closed position when unlatched.
Set hinges on out-swinging doors to return doors to fully closed position.

END OF SECTION 102113

SECTION 102800 – TOILET, BATH, and LAUNDRY ACCESSORIES

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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. Public-use washroom accessories.
 - 2. Electric Hand Dryers.
- B. Owner-Furnished Contractor Installed Material: Paper Towel & Soap Dispensers.
 - 1. The Contractor shall include labor to install a total of eight (8) soap dispensers and four (4) paper towel dispensers.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include the following:
 - 1. Construction details and dimensions.
 - 2. Anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
 - 3. Material and finish descriptions.
 - 4. Features that will be included for Project.
 - 5. Manufacturer's warranty.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For toilet and bath accessories to include in maintenance manuals.

1.5 QUALITY ASSURANCE

- A. Source Limitations: For products listed together in the same Part 2 articles, obtain products from single source from single manufacturer.

SECTION 102800 – TOILET, BATH, and LAUNDRY ACCESSORIES

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1.6 COORDINATION

- A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.
- B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

1.7 WARRANTY

- A. Special Mirror Warranty: Manufacturer's standard form in which manufacturer agrees to replace mirrors that develop visible silver spoilage defects and that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Stainless Steel: ASTM A 666, Type 304, 0.031-inch minimum nominal thickness unless otherwise indicated.
- B. Brass: ASTM B 19, flat products; ASTM B 16/B 16M, rods, shapes, forgings, and flat products with finished edges; or ASTM B 30, castings.
- C. Steel Sheet: ASTM A 1008/A 1008M, Designation CS (cold rolled, commercial steel), 0.036-inch minimum nominal thickness.
- D. Galvanized-Steel Sheet: ASTM A 653/A 653M, with G60 hot-dip zinc coating.
- E. Galvanized-Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.
- F. Fasteners: Screws, bolts, and other devices of same material as accessory unit and tamper-and-theft resistant where exposed, and of galvanized steel where concealed.
- G. Chrome Plating: ASTM B 456, Service Condition Number SC 2 (moderate service).
- H. ABS Plastic: Acrylonitrile-butadiene-styrene resin formulation.

2.2 PUBLIC-USE WASHROOM ACCESSORIES

- A. Subject to compliance with requirements, provide products as scheduled herein or indicated on Drawings or comparable product by one of the following:

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1. A & J Washroom Accessories, Inc.
2. American Specialties, Inc.
3. Bradley Corporation.

B. Toilet Tissue (Roll) Dispenser, TT-1:

1. Basis-of-Design Product: Bobrick #B-2740.
2. Description: Double-roll dispenser.
3. Mounting: Surface mounted.
4. Operation: Non-control delivery with standard spindle.
5. Capacity: Designed for up to 6-inch diameter tissue rolls.
6. Material and Finish: Satin-finish aluminum bracket with plastic spindle.

C. Grab Bar, GB-1 (Backwall in HC Stall, Sidewall of Ambulatory Stall):

1. Basis-of-Design Product: Bobrick #B-6806.
2. Mounting: Flanges with concealed fasteners.
3. Material: Stainless steel, 0.05-inch thick.
 - a. Finish: Smooth, No. 4 finish (satin).
4. Outside Diameter: 1-1/2 inches.
5. Configuration and Length: Straight, 42 inches.

D. Grab Bar, GB-2 (Sidewall of HC Stall):

1. Basis-of-Design Product: Bobrick #B-6806.
2. Mounting: Flanges with concealed fasteners.
3. Material: Stainless steel, 0.05-inch thick.
 - a. Finish: Smooth, No. 4 finish (satin).
4. Outside Diameter: 1-1/2 inches.
5. Configuration and Length: Straight, 48 inches.

E. Sanitary-Napkin Disposal Unit, SN-1:

1. Basis-of-Design Product: Bobrick #B-270.
2. Mounting: Surface mounted.
3. Door or Cover: Self-closing, disposal-opening cover.
4. Receptacle: Removable.
5. Material and Finish: Stainless steel, No. 4 finish (satin).

2.3 ELECTRIC HAND DRYERS

A. Hand Dryer Unit, HD-1

1. Basis-Of-Design Product: World Dryer SLIMdri #L-973
2. Mounting: Surface ADA compliant.
3. Finish: Brushed stainless steel.

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4. Voltage/Power: 120 volts AC, 950 watts.
5. Volume and Velocity: 70 cfm at 140 mph.
6. Protection and IP Rating: Thermally and IP23.

2.4 FABRICATION

- A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.
- B. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six (6) keys to Owner's representative.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install accessories according to manufacturers' written instructions and in accordance with ADA mounting height and location requirements, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.
- B. Grab Bars: Install to withstand a downward load of at least 250 lbf, when tested according to ASTM F 446.

3.2 ADJUSTING AND CLEANING

- A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.
- B. Remove temporary labels and protective coatings.
- C. Clean and polish exposed surfaces according to manufacturer's written recommendations.

END OF SECTION 102800

SECTION 104416 – FIRE EXTINGUISHERS

Phase 8 Stadium Improvements – Washington-Marion High

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 portable, hand-carried fire extinguishers and mounting brackets for fire extinguishers.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include rating and classification, material descriptions, dimensions of individual components and profiles, and finishes for fire extinguishers and mounting brackets.

1.4 QUALITY ASSURANCE

- A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."
- B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.
 - 1. Provide fire extinguishers approved, listed, and labeled by FMG.

1.5 COORDINATION

- A. Coordinate type and capacity of fire extinguishers with fire protection cabinets to ensure fit and function.

PART 2 - PRODUCTS**2.1 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS**

- A. Fire Extinguishers: Type, size, and capacity for each fire protection cabinet and mounting bracket indicated.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. J.L. Industries, Inc., Cosmic 10E.

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- b. Larsen's Manufacturing Co., MP10.
 - 2. Valves: Manufacturer's standard.
 - 3. Handles and Levers: Manufacturer's standard.
 - 4. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B and bar coding for documenting fire extinguisher location, inspections, maintenance, and recharging.
- B. Multipurpose Dry-Chemical Type in Steel Container: UL-rated 4-A:80-B:C, 10-lb nominal capacity, with mono-ammonium phosphate-based dry chemical in enameled-steel container.

2.2 MOUNTING BRACKETS

- A. Mounting Brackets: Manufacturer's standard steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or red baked-enamel finish.
- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. J. L. Industries, Inc., Standard J-Hook.
 - b. Larsen's Manufacturing Co., #546 Standard Bracket.
- B. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.
- 1. Identify bracket-mounted fire extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to mounting surface.
 - a. Orientation: Vertical.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine fire extinguishers for proper charging and tagging.
- 1. Remove and replace damaged, defective, or undercharged fire extinguishers.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install fire extinguishers and mounting brackets in locations indicated and in compliance with requirements of authorities having jurisdiction.

SECTION 104416 – FIRE EXTINGUISHERS

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1. Mounting Brackets: 48 inches above finished floor to top of fire extinguisher.
- B. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.
- C. Tagging: Fire extinguishers shall be tagged at the time of final inspection nearing the project acceptance date of the Owner. This is to coincide with the one (1) year warranty period. Failure to do so shall require re-tagging at the Contractor's expense.

END OF SECTION 104416

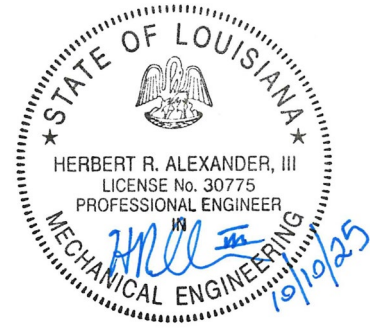
DIVISION 22

**TECHNICAL
SPECIFICATIONS**

PLUMBING

SECTION 22 00 00 – PLUMBING GENERAL PROVISIONS

Phase 8 Stadium Improvements – Washington-Marion High



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 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

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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

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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

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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 ANIC" 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

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- 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.

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- 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:

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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

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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.

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- 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 blueines 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.

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- 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's 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

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- 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,

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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

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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

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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:

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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.

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- 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 APlumbing 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.

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- 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.

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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,

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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

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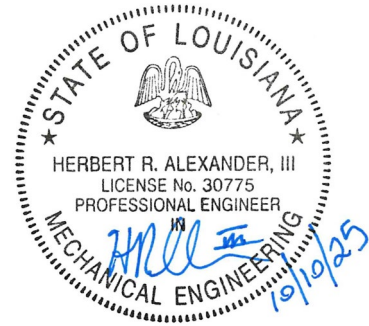
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- A. Sterilize water lines in strict accordance with State Board of Health requirements. After flushing out, obtain approval of water sample analysis from State Board of Health and submit to Architect.

END OF SECTION 22 05 00

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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):

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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. 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.
- D. Grease Waste Lines Below Slab (Cast Iron – No Hub):
1. These shall be constructed of "no hub" cast iron pipe conforming with CISPI 301 Standards. 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 hubless couplings and shall conform to CISPI Standard 310, be manufactured in the United States, and be certified by NSF® International. Heavy Duty and Medium Duty couplings shall conform to ASTM C 1540, shall be manufactured in the United States, and shall be used if indicated.
 2. Sanitary sewer pipe penetrating concrete slabs shall be wrapped with Virginia Chemical K-501, Benjamin Manufacturing Model 6200, or equal foam insulation tape.
- 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).

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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.

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 pigmental 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

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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.

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- 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

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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

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- 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.

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- 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 2".
 - 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

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- 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.

SECTION 22 05 19 – PLUMBING PIPING

Phase 8 Stadium Improvements – Washington-Marion High

- 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

Phase 8 Stadium Improvements – Washington-Marion High



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.

SECTION 22 07 00 – PLUMBING INSULATION

Phase 8 Stadium Improvements – Washington-Marion High

- 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 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

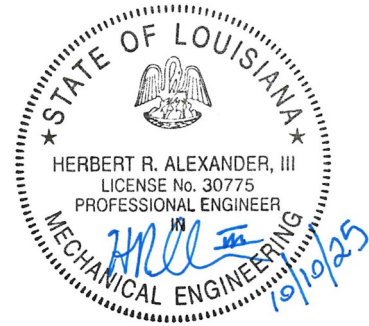
3.1 INSULATION THROUGH HANGERS AND SLEEVES

- 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

Phase 8 Stadium Improvements – Washington-Marion High



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 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.

SECTION 22 13 19 – PLUMBING SPECIALTIES

Phase 8 Stadium Improvements – Washington-Marion High

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

SECTION 22 13 19 – PLUMBING SPECIALTIES

Phase 8 Stadium Improvements – Washington-Marion High

- 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

SECTION 22 13 19 – PLUMBING SPECIALTIES

Phase 8 Stadium Improvements – Washington-Marion High

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

SECTION 22 13 19 – PLUMBING SPECIALTIES

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- 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.

SECTION 22 13 19 – PLUMBING SPECIALTIES

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- C. Starting Procedures: Follow manufacturer's written procedures.

3.5 ADJUSTING

- A. Adjust operation and correct deficiencies discovered during commissioning.

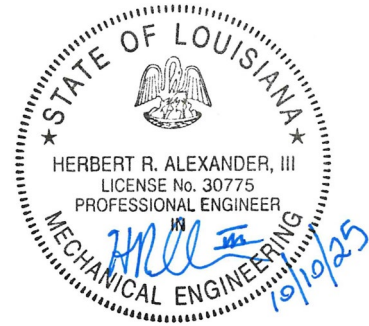
3.6 PROTECTION

- 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

Phase 8 Stadium Improvements – Washington-Marion High



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

SECTION 22 14 00 – DRAINAGE AND VENT SYSTEMS

Phase 8 Stadium Improvements – Washington-Marion High

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:

SECTION 22 14 00 – DRAINAGE AND VENT SYSTEMS

Phase 8 Stadium Improvements – Washington-Marion High

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.

SECTION 22 14 00 – DRAINAGE AND VENT SYSTEMS

Phase 8 Stadium Improvements – Washington-Marion High

- 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

SECTION 22 14 00 – DRAINAGE AND VENT SYSTEMS

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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

SECTION 22 14 00 – DRAINAGE AND VENT SYSTEMS

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- 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

SECTION 22 14 00 – DRAINAGE AND VENT SYSTEMS

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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

SECTION 22 14 00 – DRAINAGE AND VENT SYSTEMS

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- 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

Phase 8 Stadium Improvements – Washington-Marion High



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 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.

SECTION 22 40 00 – PLUMBING FIXTURES

Phase 8 Stadium Improvements – Washington-Marion High

- 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.

SECTION 22 40 00 – PLUMBING FIXTURES

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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

SECTION 22 40 00 – PLUMBING FIXTURES

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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.

SECTION 22 40 00 – PLUMBING FIXTURES

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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

SECTION 22 40 00 – PLUMBING FIXTURES

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- 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

DIVISION 23

TECHNICAL SPECIFICATIONS

HEATING, VENTILATING, and AIR CONDITIONING (HVAC)

SECTION 23 00 10 – MECHANICAL GENERAL PROVISIONS

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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.

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- 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

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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,

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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 ANIC" equipment as required, as the work progresses.

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- 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) 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. 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.

SECTION 23 00 10 – MECHANICAL GENERAL PROVISIONS

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- 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,

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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's 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

SECTION 23 00 10 – MECHANICAL GENERAL PROVISIONS

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- 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.

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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.

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- 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

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- 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.

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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.

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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.

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- 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.

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- 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.

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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

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- 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.

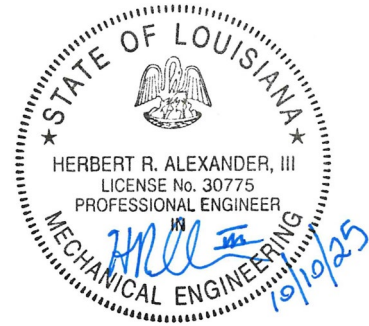
3.15 PENETRATIONS THROUGH FIRE SEPARATIONS

- 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

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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.

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- 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;

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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.

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- 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,

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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.

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- 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 all 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

SECTION 23 00 20 – BASIC MECHANICAL REQUIREMENTS

Phase 8 Stadium Improvements – Washington-Marion High

- 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.

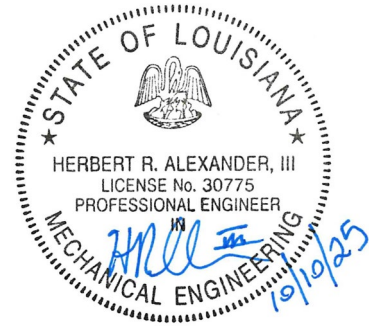
3.3 CLEANING

- 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

Phase 8 Stadium Improvements – Washington-Marion High



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

SECTION 23 05 10 – ELECTRICAL REQUIREMENTS FOR MECHANICAL EQUIPMENT

Phase 8 Stadium Improvements – Washington-Marion High

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 AKill" 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

SECTION 23 05 10 – ELECTRICAL REQUIREMENTS FOR MECHANICAL EQUIPMENT

Phase 8 Stadium Improvements – Washington-Marion High

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

SECTION 23 05 10 – ELECTRICAL REQUIREMENTS FOR MECHANICAL EQUIPMENT

Phase 8 Stadium Improvements – Washington-Marion High

- 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

SECTION 23 05 10 – ELECTRICAL REQUIREMENTS FOR MECHANICAL EQUIPMENT

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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.

SECTION 23 05 10 – ELECTRICAL REQUIREMENTS FOR MECHANICAL EQUIPMENT

Phase 8 Stadium Improvements – Washington-Marion High

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.

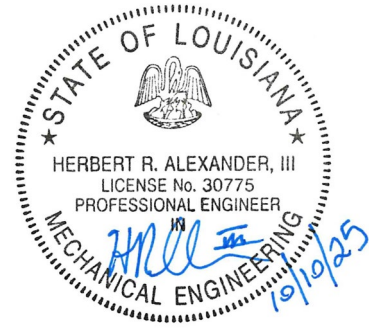
3.3 TRAINING & DEMONSTRATION

- A. Provide training as described in individual technical specifications.

END SECTION 23 05 10

SECTION 23 05 13 – ELECTRICAL MOTORS

Phase 8 Stadium Improvements – Washington-Marion High



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

SECTION 23 05 13 – ELECTRICAL MOTORS

Phase 8 Stadium Improvements – Washington-Marion High

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:

SECTION 23 05 13 – ELECTRICAL MOTORS

Phase 8 Stadium Improvements – Washington-Marion High

1. NEMA Standard MG 1, Part 31, ADefinite 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 APremium" label and shall meet or exceed the following nominal energy efficiency levels prescribed below for Design A or B continuous rated:

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SECTION 23 05 13 – ELECTRICAL MOTORS

Phase 8 Stadium Improvements – Washington-Marion High

Table 1 Nominal Efficiencies For ANEMA 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

SECTION 23 05 13 – ELECTRICAL MOTORS

Phase 8 Stadium Improvements – Washington-Marion High

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.

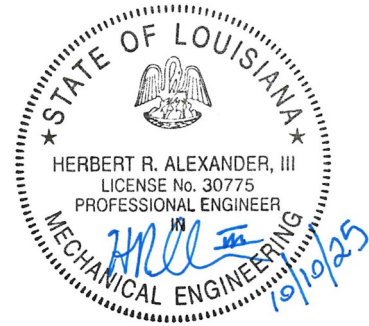
3.3 TRAINING AND DEMONSTRATION

- 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 14 – MOTOR STARTERS

Phase 8 Stadium Improvements – Washington-Marion High



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. All motor starters specified under this section shall be provided by the same manufacturer.
- B. All motor starters installed in return air plenums shall be plenum rated.
- C. Extent of motor starter work is indicated by drawings and schedules. All motors and mechanical equipment provided with motors supplied by the Division 23 Contractor shall be also provided with Motor Starters and/or Variable Frequency Drives. It is the responsibility of the Division 23 Contractor to ensure that all Motor Starters/VFD=s are sized and suitable for the intended purpose of the mechanical equipment provided.
- D. Disconnecting means unless integral to the Starter/VFD shall be provided by the Division 26 Contractor.
- E. Types of motor starters specified in this section include the following:
 - 1. Magnetic.
 - 2. Manual.

1.3 QUALITY ASSURANCE

- A. Manufacturers: Firms regularly engaged in manufacturer of motor starters, of types, ratings and characteristics required, whose products have been in satisfactory use in similar service for not less than 5 years.
- B. Installer's Qualifications: Firm with at least 3 years of successful installation experience on projects utilizing motor starters similar to that required for the project.
- C. NEC Compliance: As a minimum, comply with NEC as applicable to wiring methods, construction, and installation of motor starters.
- D. NFPA Compliance: As a minimum, comply with applicable requirements of NFPA 70E "Standard for Electrical Safety Requirements for Employee Workplaces".

SECTION 23 05 14 – MOTOR STARTERS

Phase 8 Stadium Improvements – Washington-Marion High

- E. UL Compliance: As a minimum, comply with applicable requirements of UL 468A, "Wire Connectors and Soldering Lugs for Use with Copper Conductors", and UL 508, "Electrical Industrial Control Equipment", pertaining to installation of motor starters.
- F. IEE Compliance: As a minimum, comply with applicable requirements of IEE STD 241, "Recommended Practice for Electric Power Systems in Commercial Buildings" pertaining to motor starters.
- G. NEMA Compliance: As a minimum, comply with applicable portions of NEMA Standard ICS 2, "Industrial Control Devices, Controllers and Assemblies", Maximum), pertaining to motor controllers/starters and enclosures.

1.4 SUBMITTALS

- A. Product Data: Submit manufacturer's data on motor starters.
- B. Shop Drawings: Submit layout drawings of motor starters showing accurately scaled equipment locations and spatial relationships to associated motors.
- C. Wiring Diagrams: Submit wiring diagrams for motor starters showing connections to electrical power panels, feeders, and equipment. Clearly differentiate between portions of wiring that are manufacturer-installed and portions to be field-installed.
- D. Maintenance Stock - Fuses: For types and ratings required, furnish additional fuses, amounting to one set for every 10 installed units, but not less than 5 sets of each.

1.5 DELIVERY & STORAGE

- A. Motor Starter(s) shall be stored and handled per manufacturer=s recommendations.
 - 1. Deliver motor starter(s) from the factory properly secured, crated, and protected with factory plastic shrink wrap or other protective wrap.
 - 2. Lift and support motor starter(s) with the manufacturer's designated lifting or supporting points.
 - 3. Disassemble and reassemble motor starter(s) as required for movement into the final location following manufacturer's written instructions.
 - 4. Deliver motor starter(s) as a factory-assembled unit to the extent allowable by shipping limitations, with protective crating and covering.
 - 5. Store motor starter(s) to prevent damage to starter(s). Store units out of the elements and maintain factory protective covering until ready for installation.
- B. Lift and support motor starter(s) with the manufacturer's designated lifting or supporting points.
- C. Disassemble and reassemble motor starter(s) as required for movement into the final location following manufacturer's written instructions.
- D. Deliver motor starter(s) as a factory-assembled unit to the extent allowable by shipping limitations, with protective crating and covering.

PART 2 - PRODUCTS

SECTION 23 05 14 – MOTOR STARTERS

Phase 8 Stadium Improvements – Washington-Marion High

2.1 ACCEPTABLE MANUFACTURERS

- A. Acceptable Manufacturers: Subject to compliance with requirements, manufacturers offering motor starters which may be incorporated in the work are as follows:
1. Allen-Bradley Co.
 2. Cutler Hammer Products, Eaton Corp.
 3. General Electric Co.
 4. GTE Products Corp.
 5. Gould, Inc.
 6. Square D Co.
 7. Westinghouse Corp.
 8. Siemens, Inc.

2.2 MOTOR STARTERS

- A. General: Except as otherwise indicated, provide motor starters and ancillary components which as a minimum, comply with manufacturer's standard materials, design and construction in accordance with published product information, and as required for complete installation.
- B. Magnetic Starter Requirements: Provide magnetic starters for motors 3/4 hp and larger, and for smaller motors where interlock or automatic operation with other equipment is indicated. Include the following accessories for all starters:
1. Provide UL Listing as a unit. Starters assembled with only UL components will not be acceptable.
 2. Maintained-contact push buttons and pilot lights, properly arranged for single-speed or multi-speed operation as indicated.
 3. Trip-free thermal adjustable overload relays, each phase.
 4. Interlocks, pneumatic switches, and similar devices as required for coordination with control requirements of Section 230900 – "Building Automation System" sections.
 5. Built-in 120-volt control circuit transformer with fused secondary, fused from line inside, where service exceeds 240 volts.
 6. Pilot Light; Red - AOn"
 7. Pilot Light; Green - AOff"
 8. Auxiliary Contact Block
 9. Externally operated manual AReset" overload relay button mounted on door/cover of the unit.
 10. 2-Point terminal strip with AH-O-A" Selector switch
 11. Hinged cabinet cover. Lift cover is not acceptable.
 12. Enclosure - Rated for exposure indicated on plans unless otherwise specifically indicated.
 13. Under-voltage release or protection.
 14. Lockable Handle AOFF" position switch.
- C. AC Fractional HP Manual Starters: Provide manual single-phase fractional HP manual motor starters, of sizes and ratings indicated. Equip with manually operated quick-make, quick-break toggle mechanisms; and with one-piece melting alloy type thermal units. Starter

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to become inoperative when thermal unit is removed. Provide starters with double break

silver alloy contacts, visible from both sides of starter; green pilot lights, and switch capable of being padlocked AOFF". Enclose starter unit in NEMA Type 1, 12, 4X, or 3R general purpose enclosure suitable for surface mounting according to the environment in which the starter is installed. Coat with manufacturer's standard color finish.

- D. Full Voltage Non-Reversing Starters: Starters for three phase motors 10 horsepower and below.
 - 1. Provide combination type starter/disconnect, full voltage non- reversing (FVNR), with magnetic NEMA rated contactors rated for horsepower of motor served.
 - 2. Adjustable trip magnetic circuit breaker disconnect (motor circuit protector) capable of being padlocked in the open position (power off).
 - 3. 10K AIC minimum fault rating with higher rating, when necessary, due to available fault levels.
 - 4. Starters shall have a fused 100VA minimum control transformer (120V, unless required otherwise).
 - 5. Provide HOA switch, push to test operating pilot light, solid state overload relays set for actual motor nameplate full load amps, and phase failure and phase reversal protection relays.
 - 6. Provide minimum two (2) N.O. and two (2) N.C. auxiliary contacts and terminal blocks factory pre-wired for field wiring.
 - 7. Starters shall be housed in a NEMA 1 enclosure for indoor applications and NEMA 3R enclosure for outdoor or wet locations. NEMA 12 enclosures shall be provided for installation in return air plenums or dirty/dusty indoor locations. NEMA 4X Stainless Steel enclosures shall be installed in corrosive environments.
 - 8. Coat with manufacturer's standard color finish.

PART 3 - EXECUTION

3.1 INSTALLATION OF MOTOR STARTERS

- A. Install motor starters, in accordance with equipment manufacturer's written instructions and with recognized industry practices; complying with applicable requirements of NEC, UL, and NEMA standards, to ensure that products fulfill requirements.
- B. Coordinate with other work including motor and electrical wiring/cabling work, as necessary to interface installation of motor starters with other work.
- C. Tighten connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values for equipment connectors. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL Std 486A.
- D. Install fuses in fusible disconnects, if any.

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3.2 ADJUSTING AND CLEANING

- A. Inspect electrical starter's operating mechanisms for malfunctioning and, where necessary, adjust units for free mechanical movement.
- B. Touch-up scratched or marred surfaces to match original finish.

3.3 FIELD QUALITY CONTROL

- A. Subsequent to connecting wire/cables, energize motor starter circuitry and demonstrate functioning of equipment in accordance with requirements; where necessary correct malfunctioning units, and then retest to demonstrate compliance. Ensure that direction of rotation of each motor fulfills requirements.

3.4 TRAINING & 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, Section 017780 - "Closeout Submittals" and Division 23, Section 230020 - "Basic Mechanical Requirements."
 - 3. Provide Service Manual for each motor starter specified.
- B. Provide three (3) hours of factory authorized training.
 - 1. Refer to Section 230010 - "Mechanical General Provisions" for video taping requirements.
 - 2. Schedule training with Owner's Representative with at least seven (7) days notice.

END OF SECTION 23 05 14

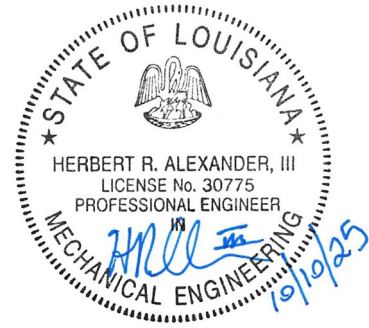
SECTION 23 05 29 – HANGERS AND SUPPORTS

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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

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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.

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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

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- 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	
<u>NPS (Inches)</u>	<u>(Inches)</u>	
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

SECTION 23 05 29 – HANGERS AND SUPPORTS

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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

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apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 23 05 29

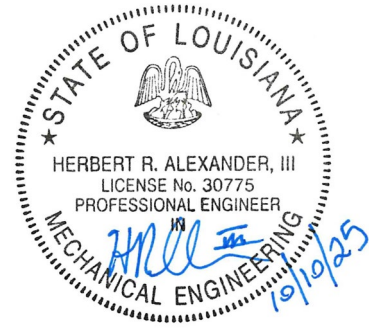
SECTION 23 05 53 – MECHANICAL IDENTIFICATION

Phase 8 Stadium Improvements – Washington-Marion High

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

SECTION 23 05 53 – MECHANICAL IDENTIFICATION

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- 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.

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- 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

SECTION 23 05 53 – MECHANICAL IDENTIFICATION

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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:

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- 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

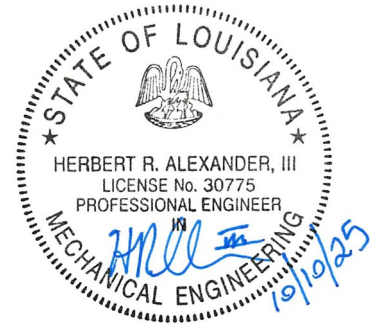
SECTION 23 05 93 – TESTING, ADJUSTING, AND BALANCING

Phase 8 Stadium Improvements – Washington-Marion High

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. Exhaust Air
 - 3. Return air systems
 - 4. AHUs
 - 5. Fans
 - 6. Fire, smoke, and combination fire/smoke damper operation
 - 7. 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.

SECTION 23 05 93 – TESTING, ADJUSTING, AND BALANCING

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- 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:

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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.

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- 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.

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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.

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- 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 $\pm 10\%$ of design value. Include all such variances, recommended resolutions and ultimate result in Appendix AA" 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

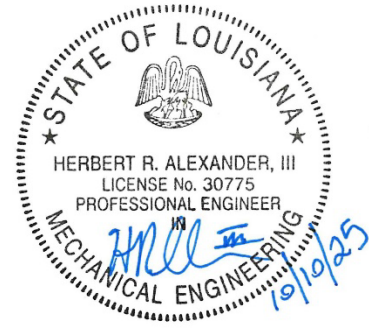
SECTION 23 07 13 – INSULATION

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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

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- 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:

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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.

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 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,

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insulation may cover pipe and hanger. Provide 18-gauge metal saddles between all hangers and insulation.

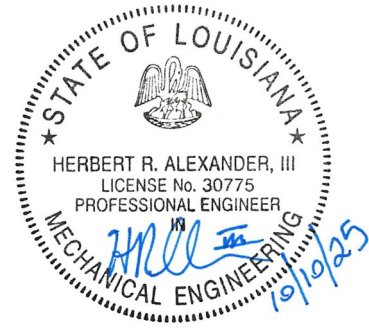
END OF SECTION 23 07 13

SECTION 23 09 00 – FACILITY MANAGEMENT SYSTEM

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1.01 SCOPE OF WORK

A. Furnish, install, program, and place into operations an extension of the 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 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.

1.02 QUALITY ASSURANCE

- A. The system shall be installed by competent mechanics and checked out by trained, experienced technicians directly employed by the FMS equipment manufacturer.
- B. 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.

1.03 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

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- 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.
- E. 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.

1.04 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.
- C. Wiring and piping interconnection diagrams including panel and device power, and sources.
 - 1. List of materials of all proposed devices and equipment.
 - 2. Software documentation:
 - a. Sequence(s) of operation, in text form.
 - b. Application programs
 - c. Statement of compatibility with existing programs
 - d. Hardware requirements
 - e. Point schedules
 - 3. Controls schematics and system diagrams

1.05 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.

1.06 CONTROL AND SENSING HARDWARE

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- A. Actuators: 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: 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)

1.07 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

- B. Start/stop and Control Relays:

1. Power requirements	24 VAC at .015 amps
2. Relay contacts	SPDT B 10 amps at 120 VAC
3. Data	UL listed, CSA approved
4. Indication	LED B on when energized
5. Override	built-in H-O-A switch

1.08 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.)

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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.

1.09 OPERATOR INTERFACE

- A. The new controls shall operate on the existing 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.
- C. Point identification, engineering units, status indication, and application naming conventions shall be the same at all operator devices.
- D. 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
- E. Dockable alarm panel which may be temporarily hidden
- F. Provides a tabbed workspace environment which is fully ActiveX compliant
- G. User can add additional ActiveX workspaces on line
- H. Enhanced terminal workspace providing pass through VT-100 interface with mouse/keyboard navigation, user selectable display preferences and screen prints.
- I. 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

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11. Enter/Modify analog alarm limits
12. Enable/Disable demand limiting
13. Enable/Disable average/high/low signal select and reset

J. Logs and Summaries: Reports shall be generated manually, and directed to the displays.

K. 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

1.10 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.

1.11 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.

1.12 SYSTEM SOFTWARE FEATURES (Existing)

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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)

D. Configured processes may be triggered based on any combination of the following:

1. Time of day
2. Calendar Date
3. Other process

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4. Events (e.g., point alarms)
- E. 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.
- F. 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.
- G. 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.

1.13 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:

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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. Power fail 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
4. HVAC Application Specific Controller Configuration
- H. 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.
- I. 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.
- J. Systems that require free-form programming will not be acceptable.

1.14 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.

1.15 INSTALLATION

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- 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
 - (i) Must conform to seismic restraint criteria established by governing authority.
 - (ii) Single runs: Galvanized conduit straps or ring bolt type hangers with specialty spring clips. Do not use plumber=s perforated straps.
 - (iii) Multiple runs: Conduit rack with 25 percent spare capacity.
 - (iv) Vertical runs: Channel support with conduit fittings.
- D. 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.
- E. Equipment:
 - 1. Temperature sensing wells: provide list of well locations with shop drawing(s) to mechanical contractor.

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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.

1.16 COMMISSIONING

- A. Control system to be set up and checked out by 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.

1.17 TRAINING

- A. Provide a minimum of 8 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.

1.18 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.

1.19 SEQUENCES OF OPERATIONS

A. DUCTLESS SPLIT SYSTEMS:

1. Provide an electric temperature control system by equipment manufacturer to control the Variable Refrigerant Flow System, to be installed by the Mechanical Contractor. The VRF control system shall be integrated into the existing JCI system to allow the school board maintenance office single point access to the complete campus temperature control system. The VRF system shall also be connected via CAT5or6 Cable as required to allow remote direct access to the VRF system.
2. The temperature control points indicated within this specification for each VRF unit shall be integrated into the JCI system from the VRF system by JCI. Floor plan graphics shall be developed within the JCI system for the school showing VRF units, assigned room numbers, unit tag number and current room temperature. Each unit shall be dynamic to allow the user to click on any unit on the graphic and the system pulls up the individual units control screen. JCI shall build graphics for each VRF outside unit, VRF indoor unit, Outside Air Indoor unit and Outside Air Outdoor Unit. JCI shall coordinate all integration requirements with the VRF representative

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3. Display alarms from VRF master controller on JCI controls system.

B. PTAC UNIT:

1. Supply fan start/stop: The supply fan will be started according to the schedule. After the supply fan has started, the control sequence will be enabled.
2. Zone control: The heat pump, electric heating, and the DX cooling stages will modulate/cycle in sequence to maintain the zone temperature at setpoint.
3. The unit shall be set to only allow the supply and outside air fans to cycle when in cooling or heating modes to prevent unconditioned outside air from entering the space.
4. 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.
5. Safety: All of the safety devices are manual reset; the device that has tripped must be manually reset before restarting the unit.

6. Shutdown:

When the unit is shutdown by either a stop command or system safety the unit will be set as follows:

- Supply fan will be off
- Outside air fan will be off
- DX cooling will be off
- Heating will be off

C. JCI - EXHAUST FANS:

1. Provide start/stop/status for each exhaust fan. Provide occupancy sensors to control exhaust fans. Provide thermostat in parallel with occupancy sensor where noted on sheet M2.2 keynote #9 and fan schedule. Provide metal lockbox at restroom fan thermostats.

1.20 FMS POINT LIST:

JCI –Ductless Split System Indoor Unit Points list:

BO	Status (ON/OFF)
BI	Operational Mode Status (Cooling/Heating/Fan Only)
AI	Room Temperature
AI	Room Temperature Set Point
AI	Occupied / Unoccupied Set Points
AI	Duct Humidity, Set Point, and Alarm (DOAS UNIT only)
BI	Supply fan status
BI	Compressor status

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JCI - Ductless Split System Indoor Outdoor Unit Points List:

BO	OFF / Unoccupied / Occupied
BI	Status (Off/Unoccupied mode/Occupied mode)
BI	Operational Mode Status (Cooling/Heating)

JCI – PTAC Unit:

BO	Fan Start/Stop
BI	Fan Status
AI	Space Temperature
AI	Setpoint Adjust

JCI - EXHAUST FANS:

BO	Fan Start/Stop
BI	Fan Status

CONTRACTOR SHALL CONTACT JCI FOR FULL SCOPE INCLUDING ALL REQUIREMENTS TO INTEGRATE CONTROLS INTO EXISTING BMS SYSTEM PRIOR TO BIDDING.

END OF SECTION

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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. Sheet metal materials.
 - 4. Sealants and gaskets.
 - 5. Hangers and supports.

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.
- B. Shop Drawings:

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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.

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- 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."

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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."
- E. All round ductwork shall comply with latest SMACNA standards. All round ductwork 4 in. – 14 in. shall be a minimum 26 ga. steel.

2.3 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

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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.

2.4 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.

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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

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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,

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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 for a complete penetration seal to the satisfaction of engineer.

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.

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- 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.

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

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- 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:

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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

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- 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.

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- 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,

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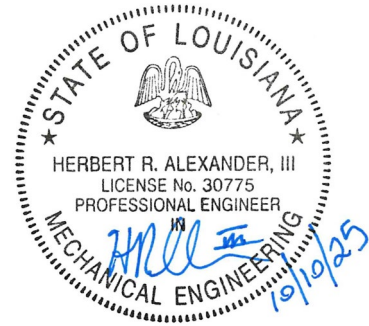
"Vanes and Vane Runners," and Figure 2-4, "Vane Support in Elbows."

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

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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. 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.

SECTION 23 33 00 – DUCT ACCESSORIES

Phase 8 Stadium Improvements – Washington-Marion High

- 11. Accessories hardware.
- 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."

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.

SECTION 23 33 00 – DUCT ACCESSORIES

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- 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.
- C. Provide damper stand off bracket to accommodate duct insulation.

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 with actuators. Motorized dampers shall be operated by 120/1/60 electric actuator (low sound) 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.
- C. Provide damper stand off bracket to accommodate duct insulation.

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.

SECTION 23 33 00 – DUCT ACCESSORIES

Phase 8 Stadium Improvements – Washington-Marion High

- C. Frame: Type B; fabricated with roll-formed, 22-gage, galvanized-steel; with mitered and interlocking corners.
- D. Style: Dynamic
- E. Mounting Sleeve: Factory-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.
- F. Mounting Orientation: Vertical or horizontal as indicated.
- G. 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.
- H. Horizontal Dampers: Include a blade lock and stainless steel negator closure spring.
- I. Fusible Link: Replaceable, 212 deg F rated.
- J. Dampers shall be 100% free area.
- K. Dampers shall be Ruskin DIB Series, Greenheck DFD Series, 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.

SECTION 23 33 00 – DUCT ACCESSORIES

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- 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 4-3.
- 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.

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.
- G. Access doors for oval and round ducts shall be constructed of 20 ga steel with neoprene gasket and hand knobs for access. Access doors shall be Ruskin Model ADR/ADF, Greenheck RAD, 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

SECTION 23 33 00 – DUCT ACCESSORIES

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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. Medium 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.

SECTION 23 33 00 – DUCT ACCESSORIES

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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 for fire dampers indicating damper type (Fire Damper, Fire Smoke Damper, Smoke Damper).

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

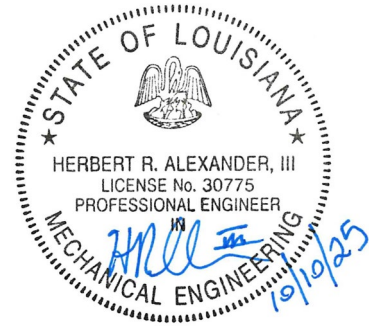
SECTION 23 34 23 – HVAC POWER VENTILATORS

Phase 8 Stadium Improvements – Washington-Marion High

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.

SECTION 23 34 23 – HVAC POWER VENTILATORS

Phase 8 Stadium Improvements – Washington-Marion High

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.

SECTION 23 34 23 – HVAC POWER VENTILATORS

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2.3 IN-LINE CABINET FANS

- A. Description: Square in-line centrifugal fans.
- B. Housing:
 - 1. Housing Material: Reinforced steel.
 - 2. Housing Coating: Hot-dip galvanized.
 - 3. Housing Construction: Side panels shall be easily removable for service. Include inlet and outlet flanges, and support bracket adaptable to floor, side wall, or ceiling mounting.
- C. Direct-Drive Units: Motor mounted in airstream; factory wired to disconnect switch located on outside of fan housing.
- D. Belt-Driven Units: Motor mounted on adjustable base, with adjustable sheaves, enclosures around belts within fan housing, and lubricating tubes from fan bearings extended to outside of fan housing.
- E. Fan Wheels: Centrifugal forward curved type, constructed of galvanized steel. Wheel shall be balanced in accordance with AMCA Standard 204-05, Balance quality and vibration levels for fans.
- F. Motor Enclosure: Open, dripproof type with permanently lubricated bearings, built-in thermal overload protection and disconnect plug. Motor shall be provided at the scheduled voltage.
- G. Accessories:
 - 1. Access for Inspection, Cleaning, and Maintenance: Comply with requirements in ASHRAE 62.1.
 - 2. Variable-Speed Controller: Solid-state control to reduce speed from 100 to less than 50 percent.
 - 3. Companion Flanges: For inlet and outlet duct connections.
 - 4. Fan Guards: 1/2- by 1-inch mesh of galvanized steel in removable frame. Provide guard for inlet or outlet for units not connected to ductwork.
 - 5. Motor and Drive Cover (Belt Guard): Epoxy-coated steel.
 - 6. Side Discharge: Flange connector and attachment hardware to provide right-angle discharge on side of unit.

2.4 CENTRIFUGAL IN-LINE FANS

- A. Description: Square in-line centrifugal fans.
- B. Housing:

SECTION 23 34 23 – HVAC POWER VENTILATORS

Phase 8 Stadium Improvements – Washington-Marion High

1. Housing Material: Reinforced steel.
 2. Housing Coating: Hot-dip galvanized.
 3. Housing Construction: Side panels shall be easily removable for service. Include inlet and outlet flanges, and support bracket adaptable to floor, side wall, or ceiling mounting.
- C. Direct-Drive Units: Motor mounted in airstream, factory wired to disconnect switch located on outside of fan housing; with wheel, inlet cone, and motor on swing-out service door.
- D. Belt-Driven Units: Motor mounted on adjustable base, with adjustable sheaves, enclosures around belts within fan housing, and lubricating tubes from fan bearings extended to outside of fan housing.
- E. Fan Wheels: Aluminum airfoil blades welded to aluminum hub.
- F. Motor Enclosure: Totally enclosed, fan cooled NEMA Design B motor with Class B insulation. Motor shall be rated for continuous duty and furnished at the scheduled voltage and phase.
- G. Accessories:
1. Access for Inspection, Cleaning, and Maintenance: Comply with requirements in ASHRAE 62.1.
 2. Variable-Speed Controller: Solid-state control to reduce speed from 100 to less than 50 percent.
 3. Companion Flanges: For inlet and outlet duct connections.
 4. Fan Guards: 1/2- by 1-inch mesh of galvanized steel in removable frame. Provide guard for inlet or outlet for units not connected to ductwork.
 5. Motor and Drive Cover (Belt Guard): Epoxy-coated steel.
 6. Side Discharge: Flange connector and attachment hardware to provide right-angle discharge on side of unit.

2.5 CENTRIFUGAL ROOF DOWNBLAST FANS

- A. Housing: Downblast; removable spun-aluminum dome top and outlet baffle; square, one-piece aluminum base with venturi inlet cone.
- B. Fan Wheels: Aluminum hub and wheel with backward-inclined blades.
- C. Belt Drives:
1. Resiliently mounted to housing.
 2. Fan Shaft: Turned, ground, and polished steel; keyed to wheel hub.
 3. Shaft Bearings: Permanently lubricated, permanently sealed, self-aligning ball bearings.
 4. Fan Pulleys: Cast iron or cast steel with split, tapered bushing; dynamically balanced at factory.
 5. Motor Pulleys: Adjustable pitch for use with motors through 5 hp. Select

SECTION 23 34 23 – HVAC POWER VENTILATORS

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6. pulley so pitch adjustment is at the middle of adjustment range at fan design conditions. Provide fixed pitch for use with motors larger than 5 hp.
Fan and motor isolated from exhaust airstream.

D. Accessories:

1. Variable-Frequency Motor Controller: Solid-state control to reduce speed from 100 to less than 50 percent.
2. Disconnect Switch: Nonfusible type, with thermal-overload protection mounted outside fan housing, factory wired through an internal aluminum conduit.
3. Bird Screens: Removable, 1/2-inch mesh, aluminum or brass wire.
4. Dampers: Counterbalanced, parallel-blade, backdraft dampers mounted in curb base; factory set to close when fan stops.
5. Motorized Dampers: Parallel-blade dampers mounted in curb base with electric actuator; wired to close when fan stops.
6. Spark-resistant, all-aluminum wheel construction.
7. Mounting Pedestal: Galvanized steel with removable access panel.

E. Prefabricated Roof Curbs: Galvanized steel; mitered and welded corners; 1-1/2-inch-thick, rigid, fiberglass insulation adhered to inside walls; and 1-1/2-inch wood nailer. Size as required to suit roof opening and fan base.

1. Configuration: Self-flashing without a cant strip, with mounting flange. Manufactured to accommodate roof slope.
2. Overall Height: 18 inches.
3. Sound Curb: Curb with sound-absorbing insulation.
4. Hinged sub-base to provide access to damper or as cleanout for grease applications.
5. Burglar Bars: 1/2-inch- thick steel bars welded in place to form 6-inch squares.
6. Pitch Mounting: Manufacture curb for roof slope.
7. Metal Liner: Galvanized steel.

2.6 CENTRIFUGAL ROOF UPBLAST FANS

- A. Configuration: Centrifugal roof upblast ventilator.
- B. Housing: Removable spun-aluminum dome top and outlet baffle; square, one-piece aluminum base with venturi inlet cone.
 1. Upblast Units: Provide spun-aluminum discharge baffle to direct discharge air upward, with rain and snow drains.
- C. Fan Wheels: Aluminum hub and wheel with backward-inclined blades.
- D. Belt Drives:

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1. Resiliently mounted to housing.
 2. Fan Shaft: Turned, ground, and polished steel; keyed to wheel hub.
 3. Shaft Bearings: Permanently lubricated, permanently sealed, self-aligning ball bearings; minimum ABMA9, L(10) of 100,000 hours.
 4. Fan Pulleys: Cast iron or cast steel with split, tapered bushing; dynamically balanced at factory.
 5. Motor Pulleys: Adjustable pitch for use with motors through 5 hp. Select pulley so pitch adjustment is at the middle of adjustment range at fan design conditions. Provide fixed pitch for use with motors larger than 5 hp.
 6. Fan and motor isolated from exhaust airstream.
- E. Accessories:
1. Variable-Frequency Motor Controller: Solid-state control to reduce speed from 100 to less than 50 percent.
 2. Disconnect Switch: Nonfusible type, with thermal-overload protection mounted outside fan housing, factory wired through an internal aluminum conduit.
 3. Bird Screens: Removable, 1/2-inch mesh, aluminum or brass wire.
 4. Dampers: Counterbalanced, parallel-blade, backdraft dampers mounted in curb base; factory set to close when fan stops.
 5. Motorized Dampers: Parallel-blade dampers mounted in curb base with electric actuator; wired to close when fan stops.
 6. Spark-resistant, all-aluminum wheel construction.
- F. Prefabricated Roof Curbs: Galvanized steel; mitered and welded corners; 1-1/2-inch-thick, rigid, fiberglass insulation adhered to inside walls; and 1-1/2-inch wood nailer. Size as required to suit roof opening and fan base.
1. Configuration: Self-flashing without a cant strip, with mounting flange. Manufactured to accommodate roof slope.

2.7 CENTRIFUGAL ROOF KITCHEN HOOD VENTILATOR

- A. Housing: Removable spun-aluminum dome top and outlet baffle; square, one-piece aluminum base with venturi inlet cone.
1. Upblast Units: Provide spun-aluminum discharge baffle to direct discharge air upward, with rain and snow drains.
 2. Provide grease collector.
- B. Fan Wheels: Aluminum hub and wheel with backward-inclined blades.
- C. Belt Drives:
1. Resiliently mounted to housing.
 2. Fan Shaft: Turned, ground, and polished steel; keyed to wheel hub.
 3. Shaft Bearings: Permanently lubricated, permanently sealed, self-aligning ball bearings; minimum ABMA9, L(10) of 100,000 hours.

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4. Fan Pulleys: Cast iron or cast steel with split, tapered bushing; dynamically balanced at factory.
 5. Motor Pulleys: Adjustable pitch for use with motors through 5 hp. Select pulley so pitch adjustment is at the middle of adjustment range at fan design conditions. Provide fixed pitch for use with motors larger than 5 hp.
 6. Fan and motor isolated from exhaust airstream.
- D. Accessories:
1. Variable-Frequency Motor Controller: Solid-state control to reduce speed from 100 to less than 50 percent.
 2. Disconnect Switch: Nonfusible type, with thermal-overload protection mounted outside fan housing, factory wired through an internal aluminum conduit.
 3. Bird Screens: Removable, 1/2-inch mesh, aluminum, or brass wire.
 4. Dampers: Counterbalanced, parallel-blade, backdraft dampers mounted in curb base; factory set to close when fan stops.
 5. Motorized Dampers: Parallel-blade dampers mounted in curb base with electric actuator; wired to close when fan stops.
 6. Spark-resistant, all-aluminum wheel construction.
 7. Mounting Pedestal: Galvanized steel with removable access panel.
 8. Restaurant Kitchen Exhaust: UL 762 listed for grease-laden air exhaust.
- E. Prefabricated Kitchen Exhaust Roof Curbs: Galvanized steel; mitered and welded corners; ventilation openings on all sides to ventilate curb interstitial space. Size as required to suit roof opening and fan base.
1. Configuration: Self-flashing without a cant strip, with mounting flange manufactured to accommodate roof slope.
 2. Overall Height: 18 inches.
 3. Hinged sub-base to provide access to damper or as cleanout for grease applications.
 4. Pitch Mounting: Manufacture curb for roof slope.
 5. Metal Liner: Galvanized steel.
 6. Mounting Pedestal: Galvanized steel with removable access panel.
 7. Vented Curb: For kitchen exhaust; 12-inch-high galvanized steel; unlined, with louvered vents in vertical sides.
 8. NFPA 96 code requirements for commercial cooking operations.
 9. Kitchen Hood Exhaust: UL 762 listed for grease-laden air.

2.8 CENTRIFUGAL SIDEWALL FANS

- A. Configuration: Centrifugal sidewall ventilator.
- B. Housing: Removable spun-aluminum dome top and outlet baffle; square, one-piece aluminum base with venturi inlet cone.
- C. Fan Wheels: Aluminum hub and wheel with backward-inclined blades.

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D. Belt Drives:

1. Resiliently mounted to housing.
2. Fan Shaft: Turned, ground, and polished steel; keyed to wheel hub.
3. Shaft Bearings: Permanently lubricated, permanently sealed, self-aligning ball bearings; minimum ABMA9, L(10) of 100,000 hours.
4. Fan Pulleys: Cast iron or cast steel with split, tapered bushing; dynamically balanced at factory.
5. Motor Pulleys: Adjustable pitch for use with motors through 5 hp. Select pulley so pitch adjustment is at the middle of adjustment range at fan design conditions. Provide fixed pitch for use with motors larger than 5 hp.
6. Fan and motor isolated from exhaust airstream.

E. Accessories:

1. Variable-Frequency Motor Controller: Solid-state control to reduce speed from 100 to less than 50 percent.
2. Disconnect Switch: Nonfusible type, with thermal-overload protection mounted outside fan housing, factory wired through an internal aluminum conduit.
3. Bird Screens: Removable, 1/2-inch mesh, aluminum, or brass wire.
4. Dampers: Counterbalanced, parallel-blade, backdraft dampers mounted in curb base; factory set to close when fan stops.
5. Motorized Dampers: Parallel-blade dampers mounted in curb base with electric actuator; wired to close when fan stops.
6. Spark-resistant, all-aluminum wheel construction.
7. Wall Mount Adapter: Attach wall-mounted fan to wall.

2.9 SIDEWALL PROPELLER FANS

A. Housing: Galvanized-steel sheet with flanged edges and integral orifice ring, with baked-enamel finish coat applied after assembly.

B. Fan Wheel: Replaceable, cast-aluminum, airfoil blades fastened to cast-aluminum hub; factory set pitch angle of blades.

C. Fan Drive:

1. Belt drive.
2. Resiliently mounted to housing.
3. Statically and dynamically balanced.
4. Selected for continuous operation at maximum rated fan speed and motor horsepower, with final alignment and belt adjustment made after installation.
5. Extend grease fitting to accessible location outside of unit.
6. Service Factor Based on Fan Motor Size: 1.4.
7. Fan Shaft: Turned, ground, and polished steel; keyed to wheel hub.
8. Shaft Bearings: Permanently lubricated, permanently sealed, self-aligning ball bearings.

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- a. Ball-Bearing Rating Life: ABMA 9, L(50) of 200,000 hours.
 9. Pulleys: Cast iron with split, tapered bushing; dynamically balanced at factory.
 10. Motor Pulleys: Adjustable pitch for use with motors through 5 hp; fixed pitch for use with larger motors. Select pulley so pitch adjustment is at the middle of adjustment range at fan design conditions.
 11. Belts: Oil resistant, nonsparking, and nonstatic; matched sets for multiple belt drives.
 12. Belt Guards: Fabricate of steel for motors mounted on outside of fan cabinet.
- D. Accessories:
1. Disconnect Switch: Nonfusible type, with thermal-overload protection mounted inside fan housing, factory wired through an internal aluminum conduit.
 2. Dampers: Counterbalanced, parallel-blade, backdraft dampers factory set to close when fan stops.
 3. Motorized Dampers: Parallel-blade dampers with electric actuator wired to close when fan stops.
 4. Motor-Side Back Guard: Galvanized steel, complying with OSHA specifications, removable for maintenance.
 5. Wall Sleeve: Galvanized steel to match fan and accessory size.
 6. Weathershield Hood: Galvanized steel to match fan and accessory size.

2.10 UPBLAST PROPELLER ROOF EXHAUST FANS

- A. Configuration: Upblast propeller ventilator.
- B. Wind Band, Fan Housing, and Base: Reinforced and braced aluminum, containing aluminum butterfly dampers and rain trough, motor and drive assembly, and fan wheel.
1. Damper Rods: Steel with bronze bearings.
 2. Hinged Subbase: Galvanized-steel hinged arrangement permitting service and maintenance.
- C. Fan Wheel: Replaceable, cast-aluminum, airfoil blades fastened to cast-aluminum hub; factory set pitch angle of blades; sparkproof construction.
- D. Belt Drives:
1. Resiliently mounted to housing.
 2. Weatherproof housing of same material as fan housing.
 3. Fan Shaft: Turned, ground, and polished steel; keyed to wheel hub.
 4. Shaft Bearings: Prelubricated and sealed, self-aligning, pillow-block-type ball bearings.
 5. Fan Pulleys: Cast iron or cast steel with split, tapered bushing; dynamically balanced at factory.

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6. Motor Pulleys: Adjustable pitch for use with motors through 5 hp. Select pulley so pitch adjustment is at the middle of adjustment range at fan design conditions. Provide fixed pitch for use with motors larger than 5 hp.
 7. Motor Mount: On outside of fan cabinet, adjustable base for belt tensioning.
- E. Accessories:
1. Disconnect Switch: Nonfusible type, with thermal-overload protection mounted outside fan housing, factory wired through an internal aluminum conduit.
 2. Bird Screens: Removable, 1/2-inch mesh, aluminum or brass wire.
 3. Inspection Door: Hinged.
 4. Dampers: Counterbalanced, parallel-blade, backdraft dampers mounted in curb base; factory set to close when fan stops.
 5. Motorized Dampers: Parallel-blade dampers mounted in curb base with electric actuator; wired to close when fan stops.
 6. Extended Lubrication Lines.
- F. Prefabricated Roof Curbs: Galvanized steel; mitered and welded corners; 1-1/2-inch-thick, rigid, fiberglass insulation adhered to inside walls; and 1-1/2-inch wood nailer. Size as required to suit roof opening and fan base.
1. Configuration: Self-flashing without a cant strip, with mounting flange.

2.11 AXIAL ROOF VENTILATORS

- A. Housing: Heavy-gauge, removable, spun-aluminum dome top and outlet baffle; square, one-piece, hinged, aluminum base.
- B. Fan Wheel: Aluminum hub and blades.
- C. Belt Drives:
1. Resiliently mounted to housing.
 2. Fan Shaft: Turned, ground, and polished steel; keyed to wheel hub.
 3. Shaft Bearings: Permanently lubricated, permanently sealed, self-aligning ball bearings.
 4. Fan Pulleys: Cast iron or cast steel with split, tapered bushing; dynamically balanced at factory.
 5. Motor Pulleys: Adjustable pitch for use with motors through 5 hp. Select pulley so pitch adjustment is at the middle of adjustment range at fan design conditions. Provide fixed pitch for use with motors larger than 5 hp.
- D. Accessories:
1. Disconnect Switch: Nonfusible type, with thermal-overload protection mounted outside fan housing, factory wired through an internal aluminum conduit.
 2. Bird Screens: Removable, 1/2-inch mesh, aluminum, or brass wire.

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3. Dampers: Counterbalanced, parallel-blade, backdraft dampers mounted in curb base; factory set to close when fan stops.
 4. Motorized Dampers: Parallel-blade dampers mounted in curb base with electric actuator; wired to close when fan stops.
 5. Stack hood with built-in backdraft dampers.
 6. Extended lubrication lines.
- E. Prefabricated Roof Curbs: Galvanized steel; mitered and welded corners; 1-1/2-inch-thick, rigid, fiberglass insulation adhered to inside walls; and 1-1/2-inch wood nailer. Size as required to suit roof opening and fan base.
1. Configuration: Self-flashing without a cant strip, with mounting flange.
 2. Overall Height: 18 inches.
 3. Sound Curb: Curb with sound-absorbing insulation.
 4. Pitch Mounting: Manufacture curb for roof slope.
 5. Metal Liner: Galvanized steel.
 6. Burglar Bars: 1/2-inch- thick steel bars welded in place to form 6-inch squares.

2.12 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.

2.13 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

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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 of 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.

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- 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

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

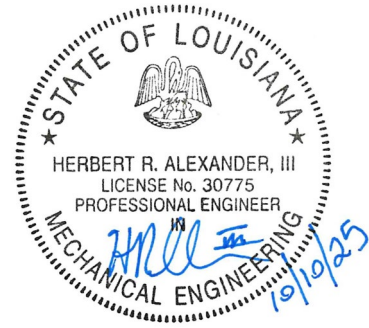
- A. The general provisions of the Contract, including the Conditions of the Contract (General, Supplementary, and other Conditions) and Division 00 and 01 as appropriate, apply to the Work specified in this Section.
- B. Refer to all Sections, as well as the Specifications for the other various trades 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.



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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. METALAIR, 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. METALAIR, 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.

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8. Dampers: Radial opposed blade.
9. Accessories:
 - a. Square to round neck adaptor.
 - b. Adjustable pattern vanes.
 - c. Throw reducing vanes.

2.2 CEILING LINEAR SLOT OUTLETS

A. Linear Bar 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. 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. Wide Core Spacing Arrangement: 1/8-inch thick blades spaced 1/2 inch apart, zero 15-degree deflection.
6. Wide Core Spacing Arrangement: 3/16-inch thick blades spaced 1/2 inch apart, zero 15 or 30-degree deflection.
7. Narrow Core Spacing Arrangement: 1/8-inch thick blades spaced 1/4 inch apart, zero 15degree deflection.
8. One-Way Deflection Vanes: Extruded construction fixed louvers with removable core.
9. Frame: 1- inches wide.
10. Mounting: Concealed bracket.
11. Damper Type: Adjustable opposed-blade assembly.

B. Linear Slot 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. Krueger.
 - iii. METALAIRE, Inc.
 - iv. Nailor Industries Inc.
 - v. Price Industries.

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- vi. Titus.
2. Devices shall be specifically designed for variable-air-volume flows.
3. Material - Shell: Aluminum, insulated.
4. Material - Pattern Controller and Tees: Aluminum.
5. Finish: White baked enamel, unless noted otherwise.
6. Number of Slots: as required or noted.
7. Length: See Plans.
8. Accessories: Plaster frame or T-bar slot.

2.3 REGISTERS AND GRILLES

A. Adjustable Bar Register:

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. Material: Aluminum.
3. Finish: Baked enamel, white.
4. Face Blade Arrangement: Horizontal spaced 3/4 inches apart.
5. Core Construction: Removable.
6. Rear-Blade Arrangement: Vertical spaced 3/4 inch apart.
7. Frame: 1 inch wide.
8. Mounting Frame: Filter
9. Mounting: Countersunk screw or Lay in.
10. Damper Type: Adjustable opposed blade.
11. Accessories:
 - a. Front-blade gang operator.

B. Adjustable Bar Grille:

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.

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- vi. Titus.
- 2. Material: Aluminum
- 3. Finish: White baked enamel, unless noted otherwise.
- 4. Face Blade Arrangement: Horizontal spaced 3/4 inches apart.
- 5. Core Construction: Integral
- 6. Rear-Blade Arrangement: Vertical spaced 3/4 inch apart.
- 7. Frame: 1 inch wide.
- 8. Mounting: Countersunk screw or Lay in.

C. 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. METALAIR, 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.

2.4 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

SECTION 23 37 13 – DIFFUSERS, REGISTERS, AND GRILLES

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- 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

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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.

SECTION 23 43 16 – AIR IONIZATION SYSTEMS

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- 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:

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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.

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- 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.

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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.

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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 on 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-PT™ 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.

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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.

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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.

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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,

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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

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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.

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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.

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3.8 PROTECTION

- A. Protect installed products and accessories from damage during construction.

END OF SECTION 23 43 16

SECTION 23 80 25 – DECENTRALIZED HVAC EQUIPMENT

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PART 1 - GENERAL

1.1 SYSTEM DESCRIPTION Y-SERIES (HEAT/COOL MODEL)

- A. Per the equipment schedule, the variable capacity, heat pump air conditioning system basis of design is Mitsubishi Electric CITY MULTI VRF (Variable Refrigerant Flow) zoning system(s).
- B. Acceptable alternative manufacturers, assuming compliance with these equipment specifications, are Daikin, Panasonic, and Hitachi. Contractor bidding an alternate manufacturer does so with full knowledge that that manufactures product may not be acceptable or approved and that contractor is responsible for all specified items and intents of this document without further compensation

1.2 QUALITY ASSURANCE

- 1. *The units shall be listed by Electrical Testing Laboratories (ETL) and bear the ETL label.*
- 2. *All wiring shall be in accordance with the National Electrical Code (N.E.C.).*
- 3. *The units shall be manufactured in a facility registered to ISO 9001 and ISO14001 which is a set of standards applying to environmental protection set by the International Standard Organization (ISO).*
- 4. *All units must meet or exceed the 2010 Federal minimum efficiency requirements and the ASHRAE 90.1 efficiency requirements for VRF systems. Efficiency shall be published in accordance with the Air-Conditioning, Heating, and Refrigeration Institute (AHRI) Standard 1230.*
- 5. *System start-up supervision shall be a required service to be completed by the manufacturer or a duly authorized, competent representative that has been factory trained in system configuration and operation. The representative shall provide proof of manufacturer certification indicating successful completion within no more than two (2) years prior to system installation. This certification shall be included as part of the equipment and/or controls submittals.*

1.3 DELIVERY, STORAGE AND HANDLING

- 1. *Unit shall be stored and handled according to the manufacturer's recommendation.*

PART 2 - Warranty

- A. The CITY MULTI units shall be covered by the manufacturer's limited warranty for a period of one (1) year parts and seven (7) year compressor to the original owner from date of installation.

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- B. Installing contractor shall meet manufacturer requirements to obtain extended manufacturer's limited parts and compressor warranty for a period of ten (10) years to the original owner from date of installation. This warranty shall not include labor.
- C. Manufacturer shall have a minimum of fifteen (15) years continuous experience providing VRF systems in the U.S. market.
- D. All manufacturer technical and service manuals must be readily available for download by any local contractor should emergency service be required. Registering and sign-in requirements which may delay emergency service reference are not allowed.
- E. The CITY MULTI VRF system shall be installed by a contractor with extensive CITY MULTI install and service training. The mandatory contractor service and install training should be performed by the manufacturer.

PART 3 - Outdoor Units

3.1 Y-SERIES HIGH EFFICIENCY (HEAT PUMP), AIR-COOLED OUTDOOR UNITS

- A. General:
 - 1. *The outdoor unit modules shall be air-cooled, direct expansion (DX), multi-zone units used specifically with VRF components described in this section and Part 5 (Controls). The outdoor unit modules shall be equipped with a single compressor which is inverter-driven and multiple circuit boards—all of which must be manufactured by the branded VRF manufacturer. Each outdoor unit module shall be completely factory assembled, piped and wired and run tested at the factory.*
 - 2. *Outdoor unit systems may be comprised of multiple modules with differing capacity if a brand other than basis of design is proposed. All units requiring a factory supplied twinning kits shall be piped together in the field, without the need for equalizing line(s). If an alternate manufacturer is selected, any additional material, cost, and labor to install additional lines shall be incurred by the contractor. Contractor responsible for ensuring alternative brand compatibility in terms of availability, physical dimensions, weight, electrical requirements, etc.*
 - 3. *Outdoor unit shall have a sound rating no higher than 68 dB(A) individually or 69.5 dB(A) twinned. Units shall have a sound rating no higher than 55 dB(A) individually or 55.5 dB(A) twinned while in night mode operation. Units shall have 5 levels sound adjustment via dip switch selectable fan speed settings. If an alternate manufacturer is selected, any additional material, cost, and labor to meet published sound levels shall be incurred by the contractor.*
 - 4. *Refrigerant lines from the outdoor unit to the indoor units shall be insulated in accordance with the installation manual.*
 - 5. *The outdoor unit shall have the capability of installing the main refrigerant piping through the bottom of the unit.*
 - 6. *The outdoor unit shall have an accumulator with refrigerant level sensors and controls. Units shall actively control liquid level in the accumulator via Linear Expansion Valves (LEV) from the heat exchanger.*

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7. *The outdoor unit shall have a high pressure safety switch, over-current protection, crankcase heater and DC bus protection.*
8. *VRF system shall meet performance requirements per schedule and be within piping limitations & acceptable ambient temperature ranges as described in respective manufacturers' published product catalogs. Non-published product capabilities or performance data are not acceptable.*
9. *The outdoor unit shall be capable of guaranteed operation in heating mode down to -25F ambient temperatures and cooling mode up to 126°F without additional restrictions on line length & vertical separation beyond those published in respective product catalogs. Models with capacity data for required temperature range published as "for reference only" are not considered capable of guaranteed operation and are not acceptable. If an alternate manufacturer is selected, any additional material, cost, and labor to meet ambient operating range and performance shall be incurred by the contractor.*
10. *The outdoor unit shall have a high efficiency oil separator plus additional logic controls to ensure adequate oil volume in the compressor is maintained. Oil return sequences must be enabled only during extended periods of reduced refrigerant flow to ensure no disruption to correct refrigerant flow to individual zones during peak loads. Systems which might engage oil return sequence based on hours of operation risk oil return during inopportune periods are not allowed. Systems which rely on sensors (which may fail) to engage oil return sequence are not allowed.*
11. *Unit must defrost all circuits simultaneously in order to resume full heating more quickly during extreme low ambient temperatures (below 23F). Partial defrost, also known as hot gas defrost which allows reduced heating output during defrost, is permissible only when ambient temperature is above 23F.*
12. *While in hot gas defrost the system shall slow the indoor unit fan speed down to maintain a high discharge air temperature, systems that keep fan running in same state shall not be allowed as they provide an uncomfortable draft to the indoor zone due to lower discharge air temperatures.*

B. Unit Cabinet:

1. *The casing(s) shall be fabricated of galvanized steel, bonderized and finished.*
2. *Outdoor unit components shall be coated with the Seacoast Protection Coating (Brine Spray – BS coating) to protect components from premature corrosion due to a seacoast environment. Coating shall be applied to components before original outdoor unit assembly to ensure manufacturer quality standards are not compromised and shall meet the following minimum requirements:*
 - a. *≥85µm thermoset polyester-resin powder coating on External Front Panel*
 - b. *≥70µm thermoset polyester-resin powder coating on External Panel Base, Pillar, Compressor Cover, Fan Motor Support, Electrical Box*
 - c. *≥1µm cellulose and polyurethane-resin coating on heat exchanger fins*
 - d. *≥10µm polyurethane coating on printed circuit boards*

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3. *The outdoor unit shall be tested in compliance with ISO9277 such that no unusual rust shall develop after 960 hours of salt spray testing.*
4. *Panels on the outdoor unit shall be scratch free at system startup. If a scratch occurs the salt spray protection is compromised and the panel should be replaced immediately.*

C. Fan:

1. *Each outdoor unit module shall be furnished with direct drive, variable speed propeller type fan(s) only. Fans shall be factory set for operation at 0 in. WG external static pressure, but capable of normal operation with a maximum of 0.32 in. WG external static pressure via dipswitch.*
2. *All fan motors shall have inherent protection, have permanently lubricated bearings, and be completely variable speed.*
3. *All fans shall be provided with a raised guard to prevent contact with moving parts.*

D. Refrigerant and Refrigerant Piping

1. *R410A refrigerant shall be required for systems.*
2. *Polyolester (POE) oil—widely available and used in conventional domestic systems—shall be required. Prior to bidding, manufacturers using alternate oil types shall submit material safety data sheets (MSDS) and comparison of hygroscopic properties for alternate oil with list of local suppliers stocking alternate oil for approval at least two weeks prior to bidding.*
3. *Refrigerant piping shall be phosphorus deoxidized copper (copper and copper alloy seamless pipes) of sufficient radial thickness as defined by the VRF equipment manufacturer and installed in accordance with manufacturer recommendations.*
4. *All refrigerant piping must be insulated with ½" closed cell, CFC-free foam insulation with flame-Spread Index of less than 25 and a smoke-development Index of less than 50 as tested by ASTM E 84 and CAN / ULC S-102. R value of insulation must be at least 3.*
5. *Refrigerant line sizing shall be in accordance with manufacturer specifications.*

E. Coil:

1. *Outdoor Coil shall be constructed to provide equal airflow to all coil face surface are by means of a 4-sided coil.*
2. *Outdoor Coil shall be elevated at least 12" from the base on the unit to protect coil from freezing and snow build up in cold climates. Manufacturer's in which their coil extends to within a few inches from the bottom of their cabinet frame shall provide an additional 12" of height to their stand or support structure to provide equal protection from elements as Mitsubishi Electric basis of design. Any additional support costs, equipment fencing, and tie downs required to meet this additional height shall be responsibility of Mechanical Contractor to provide.*
3. *The outdoor heat exchanger shall be of zinc coated aluminum construction with turbulating flat tube construction. The coil fins shall have a factory applied corrosion resistant finish. Uncoated aluminum coils/fins are not allowed.*

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4. *The coil shall be protected with an integral metal guard.*
5. *Refrigerant flow from the outdoor unit shall be controlled by means of an inverter driven compressor.*
6. *Unit shall have prewired plugs for optional panel heaters in order to prevent any residual ice buildup from defrost. Panel heaters are recommended for operating environments where the ambient temperature is expected to stay below -1F for 72 hours.*
7. *Condenser coil shall have active hot gas circuit direct from compressor discharge on lowest coil face area to shed defrost condensate away from coil and protect from Ice formation after returning to standard heat pump operation. While in Heat Pump operation this lower section of the Outdoor Evaporator coil shall continually run hot gas from the compressor discharge to protect the coil from ice buildup and coil rupture. Manufacturers who do not have an active hot gas circuit in the lower section of the Outdoor coil to protect coil from freezing shall not be allowed to bid on project in markets where the outdoor unit will see temperatures below freezing.*

F. Compressor:

1. *Each outdoor unit module shall be equipped with only inverter driven scroll hermetic compressors. Non inverter-driven compressors, which may cause inrush current (demand charges) and require larger generators for temporary power shall not be allowed.*
2. *Each compressor shall be equipped with a multi-port discharge mechanism to eliminate over compression at part load. Manufacturer's that rely on a single compressor discharge port and provide no means of eliminating over compression and energy waste at part load shall not be allowed.*
3. *Crankcase heat shall be provided via induction-type heater utilizing eddy currents from motor windings. Energy-wasting "belly-band" type crankcase heaters are not allowed. Manufacturers that utilize belly-band crankcase heaters will be considered as alternate only.*
4. *Compressor shall have an inverter to modulate capacity. The capacity for each compressor shall be variable with a minimum turndown not greater than 15%.*
5. *The compressor shall be equipped with an internal thermal overload.*
6. *Field-installed oil equalization lines between modules are not allowed. Prior to bidding, manufacturers requiring equalization must submit oil line sizing calculations specific to each system and module placement for this project.*
7. *Manufacturers that utilize a compressor sump oil sensor to equalize compressor oil volume within a single module shall not be allowed unless they actively shut down the system to protect from compressor failure.*

G. Controls:

1. *The unit shall be an integral part of the system & control network described in Part 5 (Controls) and react to heating/cooling demand as communicated from connected indoor e control circuit. Required field-installed control voltage transformers and/or signal boosters shall be provided by the manufacturer.*

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2. *The outdoor unit shall have the capability of 4 levels of demand control for each refrigerant system based on external input.*

H. Electrical:

1. *The outdoor unit electrical power shall be 208/230 volts, 3-phase, 60 hertz or 460 volts, 3-phase, 60 hertz per equipment schedule.*
2. *The outdoor unit shall be controlled by integral microprocessors.*
3. *The control circuit between the indoor units and the outdoor unit shall be 24VDC completed using a 2-conductor, twisted pair shielded cable to provide total integration of the system.*

PART 4 - Indoor Units

4.1 WALL MOUNTED INDOOR UNIT

A. General:

1. *The wall-mounted indoor unit shall be factory assembled, wired and run tested. Contained within the unit shall be all factory wiring, piping, electronic modulating linear expansion device, control circuit board and fan motor. The unit shall have a self-diagnostic function, 3-minute time delay mechanism, an auto restart function, and a test run switch. Indoor unit and refrigerant pipes shall be charged with dehydrated air before shipment from the factory.*

B. Unit Cabinet:

1. *All casings, regardless of model size, shall have the same white finish*
2. *Multi directional drain and refrigerant piping offering four (4) directions for refrigerant piping and two (2) directions for draining are required.*
3. *There shall be a separate back plate which secures the unit firmly to the wall.*

C. Fan:

1. *The indoor fan shall be statically and dynamically balanced to run on a single motor with permanently lubricated bearings.*
2. *A manual adjustable guide vane shall be provided with the ability to change the airflow from side to side (left to right).*
3. *A motorized air sweep louver shall provide an automatic change in airflow by directing the air up and down to provide uniform air distribution.*

D. Filter:

1. *Return air shall be filtered by means of an easily removable, washable filter.*

E. Coil:

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1. *Basis of design indoor units include factory-installed LEV/EEV. Alternative brands which require field-installed, accessory LEV or EEV kits are permissible only with written Engineer and Architect approval for the location of kits being submitted two weeks prior to bid date. EEV kits mounted in cavities inside fire-rated interior walls shall be mounted inside three hour fire rated enclosures with access panels supplied by the manufacturer. Enclosure type and placement require prior approval.*
2. *The indoor coil shall be of nonferrous construction with smooth plate fins on copper tubing. The tubing shall have inner grooves for high efficiency heat exchange. All tube joints shall be brazed with phos-copper or silver alloy.*
3. *The coils shall be pressure tested at the factory.*

F. Electrical:

1. *The unit electrical power shall be 208/230 volts, 1-phase, 60 hertz.*
2. *The system shall be capable of satisfactory operation within voltage limits of 187-228 volts (208V/60Hz) or 207-253 volts (230V/60Hz)*

G. Controls:

1. *The unit shall include an IR receiver for wireless remote control flexibility*
2. *Indoor unit shall compensate for the higher temperature sensed by the return air sensor compared to the temperature at level of the occupant when in HEAT mode. Disabling of compensation shall be possible for individual units to accommodate instances when compensation is not required.*
3. *Control board shall include contacts for control of external heat source. External heat may be energized as second stage with 1.8°F – 9.0°F adjustable deadband from set point.*
4. *Indoor unit shall include no less than four (4) digital inputs capable of being used for customizable control strategies.*
5. *Indoor unit shall include no less than three (3) digital outputs capable of being used for customizable control strategies.*
6. *Control board shall include contacts for control of no less than two stages of external heat. The first stage of external heat may be energized when the space temperature is 2.7°F from set point for between 10-25 minutes (user adjustable). The second stage of external heat may be energized when the first stage has been active for no less than 5 minutes and the space temperature has not risen by more than 0.9°F.*
7. *Indoor unit shall include no less than four (4) digital inputs capable of being used for customizable control strategies.*
8. *Indoor unit shall include no less than three (3) digital outputs capable of being used for customizable control strategies.*

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4.2 CEILING-SUSPENDED INDOOR UNIT

A. General:

- The indoor unit shall be factory assembled, wired and run tested. Contained within the unit shall be all factory wiring, piping, electronic modulating linear expansion device, control circuit board and fan motor. The unit shall have a self-diagnostic function, 3-minute time delay mechanism, an auto restart function, and a test run switch. The unit shall have an auto-swing function for the horizontal vane. Indoor unit and refrigerant pipes shall be charged with dehydrated air before shipment from the factory.*

B. Unit Cabinet:

- The casing shall have a white finish.*

C. Fan:

- The indoor unit fan shall be an assembly with two, three, or four Sirocco fan(s) direct driven by a single motor.*
- The indoor fan shall be statically and dynamically balanced to run on a motor with permanently lubricated bearings.*
- The indoor fan shall consist of four (4) speeds, Low, Mid1, Mid2, and High, and Auto fan function.*

D. Filter:

- Return air shall be filtered by means of an easily removable, washable filter.*

E. Coil:

- The indoor coil shall be of nonferrous construction with smooth plate fins on copper tubing. The tubing shall have inner grooves for high efficiency heat exchange. All tube joints shall be brazed with phos-copper or silver alloy.*
- The coils shall be pressure tested at the factory.*

F. Electrical:

- The unit electrical power shall be 208/230 volts, 1 phase, 60 hertz.*
- The system shall be capable of satisfactory operation within voltage limits of 187-228 volts (208V/60Hz) or 207-253 volts (230V/60Hz)*

G. Controls:

- Units shall have the ability to control supplemental heat via connector CN24 and a 12 VDC output.*
- Control board shall include contacts for control of external heat source. External heat may be energized as second stage with 1.8°F – 9.0°F adjustable deadband from set point.*
- Indoor unit shall include no less than four (4) digital inputs capable of being used for customizable control strategies.*

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4. *Indoor unit shall include no less than three (3) digital outputs capable of being used for customizable control strategies.*
5. *Manufacturer to provide drain pan level sensor powered by a 20-year life lithium battery. Sensor shall require no external power for operation and shall have an audible indication of low battery condition.*
6. *The drain pan sensor shall provide protection against drain pan overflow by sensing a high condensate level in the drain pan. Should this occur the control shuts down the indoor unit before an overflow can occur. A thermistor error code will be produced should the sensor activate indicating a fault which must be resolved before the unit re-starts.*

PART 5 - Controls

5.1 OVERVIEW

- A. The control system shall consist of a low voltage communication network and a web-based interface. The controls system shall gather data and generate web pages accessible through a conventional web browser on each PC connected to the network. Operators shall be able to perform all normal operator functions through the web browser interface.
- B. Furnish energy conservation features such as optimal start, request-based logic, and demand level adjustment of overall system capacity as specified in the sequence.
- C. System shall be capable of email generation for remote alarm annunciation.

5.2 ELECTRICAL CHARACTERISTICS

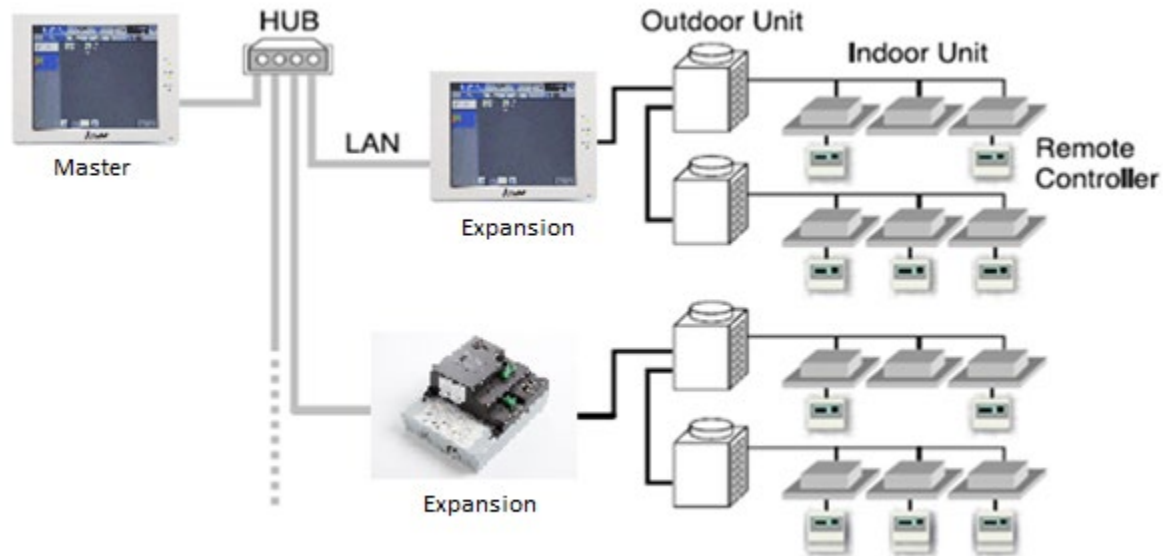
- A. General:
 1. *Controller power and communications shall be via a common non-polar communications bus and shall operate at 30VDC.*
- B. Wiring:
 1. *Control wiring shall be installed in a daisy chain configuration from indoor unit to indoor unit, to the BC controller (main and subs, if applicable) and to the outdoor unit. Control wiring to remote controllers shall be run from the indoor unit terminal block to the controller associated with that unit.*
 2. *Control wiring for centralized controllers shall be installed in a daisy chain configuration from outdoor unit to outdoor unit, to the system controllers (centralized controllers and/or integrated web based interface), to the power supply.*
- C. Wiring type:
 1. *Wiring shall be 2-conductor (16 AWG), twisted, stranded, shielded wire as defined by the Diamond System Builder output.*
 2. *Network wiring shall be CAT-5 with RJ-45 connection.*

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5.3 CITY MULTI CONTROLS NETWORK

1. The CITY MULTI Controls Network (CMCN) consists of remote controllers, centralized controllers, and/or integrated web based interface communicating over a high-speed communication bus. The CITY MULTI Controls Network shall support operation monitoring, scheduling, occupancy, error email distribution, personal web browsers, tenant billing, online maintenance support, and integration with Building Management Systems (BMS) using either LonWorks® or BACnet® interfaces. The below figure illustrates a sample CMCN System Configuration.



CMCN System Configuration

DIVISION 26

**TECHNICAL
SPECIFICATIONS**

ELECTRICAL

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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,



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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.

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- 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

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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. The following items shall be submitted for prior approval:
 - 1. Lighting Fixtures and Poles
 - 2. Electrical Gear (Loadcenters, Panelboards, Switchboards, Transformers, Safety Switches, Circuit Breakers, Motor Starters, Variable Frequency Drives, Motor Control Centers, Contactors/Relays). This includes Short-Circuit Study, Coordination Study and Arc-Flash Study.
 - 3. Receptacles
 - 4. Toggle Switches
 - 5. Wiring Device Box Support Brackets
 - 6. Photocells
 - 7. Tele/Data Systems
 - 8. Cover Plates
 - 9. Pull Boxes
 - 10. Wire
 - 11. Occupancy/Motion Sensors
 - 12. Dimming Systems/Lighting Control Systems
 - 13. Time Clocks System
 - 14. Lighting Emergency Battery Packs/Inverters

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.

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- 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, 2020 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.

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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

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2. Electrical Gear (Loadcenters, Panelboards, Switchboards, Transformers, Safety Switches, Circuit Breakers, Motor Starters, Variable Frequency Drives, Motor Control Centers, Contactors/Relays). This includes Short-Circuit Study, Coordination Study and Arc-Flash Study.
 3. Receptacles
 4. Toggle Switches
 5. Wiring Device Box Support Brackets
 6. Photocells
 7. Tele/Data Systems
 8. Cover Plates
 9. Pull Boxes
 10. Wire
 11. Occupancy/Motion Sensors
 12. Dimming Systems/Lighting Control Systems
 13. Time Clocks System
 14. Lighting Emergency Battery Packs/Inverters
- 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. Do not submit directly to ADG Engineering's project manager.
- 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, Lamps, Occupancy/Motion Sensors, Poles, Photocells, Dimming Systems/Lighting Control systems, Emergency Lighting Inverters, Generator Transfer Devices (GTDs), Emergency Battery Packs
 2. Electrical Gear, Medium Voltage Sectionalizers, Medium Voltage Cables, Medium Voltage Terminations and Load Interrupters, Overcurrent Protective Device Studies
 3. Tele/Data Systems
 4. Dimmer Switches, Receptacles, Toggle Switches, Cover Plates, Device Box Support Brackets, Pull Boxes, Power Poles, Floor Boxes,

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Surface Metal Raceway System(s), Cable Tray Surface Mounted
Multi-Outlet Assemblies and Wire

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 and a new addition 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.

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- 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.

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- 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.

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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. Equipment Tests
 - d. Torque Values
 - e. Rotation Tests
 - 2. Tele/Data system testing report(s)
 - 3. 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

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2. Electrical Gear (Loadcenters, Panelboards, Switchboards, Transformers, Safety Switches, Circuit Breakers, Motor Starters, Variable Frequency Drives, Motor Control Centers, Contactors/Relays). This includes Short-Circuit Study, Coordination Study and Arc-Flash Study.
3. Dimmer Switches
4. Receptacles
5. Toggle Switches
6. Photocells
7. Tele/Data Systems
8. Cover Plates
9. Pull Boxes
10. Wire
11. Occupancy/Motion Sensors
12. Dimming Systems/Lighting Control Systems
13. Time Clocks System
14. Lighting Emergency Battery Packs/Inverters

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.

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- 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.

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- 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.

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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, loose 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

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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 HARMONIC DISTORTION

- A. IEEE 519-1992 - Harmonic Control in Electrical Power Systems shall be a requirement of this project. Harmonic filters (passive or active), phase multiplication devices, or any other components required to mitigate harmonic voltage THD to 5% and current THD to 8% maximum levels shall be an integral part of the VFD system. Compliance measurement shall be based on THD added (during VFD full load operation compared to across-the-line operation) at the VFD circuit breaker terminals or actual THD measurement at the VFD circuit breaker terminals during full load VFD operation. Designs which employ shunt tuned filters must be designed to prevent the importation of outside harmonics which could cause system resonance or filter failure. Calculations supporting the design, including a system harmonic flow analysis, must be provided as part of the submittal

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process for shunt tuned filters. Any filter designs which cause voltage rise at the VFD terminals must include documentation in compliance with the total system voltage variation of plus or minus 10%. Documentation of Power Quality compliance shall be part of the commissioning required by the VFD supplier. Actual job site measurement testing shall be conducted at full load and documented in the operation and maintenance manuals. Harmonic measuring equipment utilized for certification shall carry a current NITS calibration certificate. The final test report shall be reviewed, and compliance certification stamped by a licensed professional engineer (PE).

3.3 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.

3.4 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.

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- 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."

3.5 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.

3.6 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 260001

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

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- b. Grounded neutral leads = white
 - c. Ungrounded phase wires = black, red and blue
 - 2. 277/480 Volt, 3-Phase, 4-wire Wye Systems
 - a. Grounding leads = green
 - b. Grounded neutral leads = gray
 - c. Ungrounded phase wires = brown, orange, yellow
- 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. Red concrete encasement shall be required for all elbows and vertical conduits. Refer to detail on plans.
- 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

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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.

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

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- 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.

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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. Three Way-20A (5623-2* / DS320*)
Rocker or Paddle Switch
 3. Four Way-20A (5624-2* / DS420*)
Rocker or Paddle Switch
 4. 20A 125V 2P 3W Duplex (16342-* / DR20*)
Decora Style
Grounded Receptacle
 5. 20A 125V 2P 3W Duplex (16362-*IG / SNAP2162IGL)
Smooth Face Isolated Ground Receptacle
(Color of device shall match other devices and shall be denoted as isolated ground type by the orange triangle on the receptacle face)
 6. 20A 125V 2P 3W Duplex (D8300-IG* / SNAP2182*IGL)
Smooth Face Hospital Grade Isolated Ground Receptacle
(Color of device shall match other devices and shall be denoted as isolated ground type by the orange triangle on the receptacle face)
 7. 20A 125V 2P 3W Duplex (M1636-HG* / 2182*)
Hospital Grade Receptacle
 8. 20A 125V 2P 3W Duplex (MT163-HG* / 2182*TRA)
Tamper-Resistant (Hospital Grade Receptacle)
 9. 20A 125V 2P 3W Duplex (GFNT2-HF* / GFRST83SNAP*)
Hospital Grade GFCI Receptacles
 10. 20A 125V 2P 3W Duplex (T5833-HG/USB8300AC5*)
Hospital Grade Grounded Receptacle with USB-A & USB-C Charging Ports
 11. 20A 125V 2P 3W Duplex (G5362-00* / GFRST20SNAP*)
GFCI Receptacles (Indoor)
 12. 20A 125V 2P 3W Duplex (G5362-WT* / GFTWRST20*)
GFCI Receptacles (Outdoor)
 13. 20A 125V 2P 3W Duplex (T5833/USB20AC5*)
Grounded Receptacle with USB-A & USB-C Charging Ports

- 14. 20A 250V 2P 3W (5461* / HBL5461*)
Grounded Receptacle
- 15. 30A 250V 2P 3W (5372 / HBL9630FR)
Grounded Receptacle
- 16. 50A 250V 2P 3W (5374 / HBL9650FR)
Grounded Receptacle
- 17. Switch with Pilot Light (120V)5628-2* / DS120PL*
(277V)5629-2* / DS277PL*
- 18. 4-Port Type A&C USB Charging Outlets (Hubbell USB4AC)

2.9 WEATHERPROOF RECEPTACLES

- A. Weatherproof receptacles shall be duplex receptacles of the ground fault current interrupting type as specified under WIRING DEVICES, mounted in a cast iron or cast aluminum Type FD (or approved equivalent) conduit fitting with Leviton No. 5997-DGY, (or approved equivalent) clear, extra deep GFCI Style weather resistant cover. Weatherproof receptacles shall be flush mounted in exterior walls whenever possible.

2.10 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.

2.11 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.

2.12 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

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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.

2.13 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.

2.14 FLOOR OUTLETS/FLOOR BOXES

- A. Floor outlets shall consist of the assembly of wiring devices, floor boxes and fittings. Floor boxes shall be 16 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 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

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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, four (4) RJ-45 data outlets in each floor box, four (4) USB charging ports and two (2) HDMI ports.

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.	Toggle Switches	4'-0" to top of device
2.	Receptacles	1'-6" to bottom of receptacle
3.	Panelboards	6'-7" to top of can
4.	Tele/Data Outlets	1'-6" to bottom of outlet
5.	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.

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- 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 circuits shall have a 200% rated neutral where more than one (1) branch circuit is in a raceway and the neutral conductor is shared. The neutral should match the branch phase wire size when only one (1) circuit is in a raceway and when the neutral conductor is not shared. Refer to the "Multiple Circuit Neutral Wiring Diagram." Provide multi-pole breakers to simultaneously trip all phase conductors for shared neutral circuits.
- H. 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.
- I. Where the length of a home run, from panel to the first outlet exceeds 75 feet (75') for 120-volt circuits or 175 feet (175') for 277-volt circuits, the conductor size shall be No. 10 AWG or that shown on the drawings, whichever is larger.
- J. 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.

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- 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.

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- 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 conditioned 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.

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.

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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 260500

SECTION 260526 – GROUNDING

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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. Ground grid cable: #3/0 AWG
 - 2. Equipment and structures to grid conductor: #3/0 AWG
 - 3. Fence grid conductor: #3/0 AWG
 - 4. Fence-to-fence post conductor: #2 AWG (Stranded)
 - 5. Fence post to grid conductor: #2 AWG (Stranded)

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2.2 CONNECTORS

- A. All connectors shall be of the exothermically welded type.

2.3 GROUND RODS

- A. Ground electrodes shall be copper-clad steel rods nominal 3/4 inch in diameter and ten feet (10') long.

2.4 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

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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) 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.

SECTION 260526 – GROUNDING

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- J. Provide gradual bends for all grounding grid cables wherever possible. Sharp bends will not be permitted. The minimum bending 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.

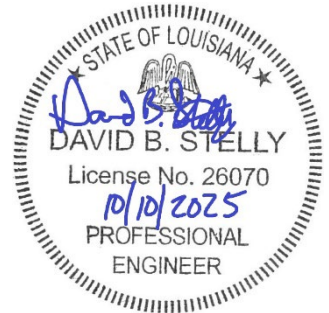
3.3 ELECTRICAL SERVICE ENTRANCE

- A. Grounding conductor shall be installed from one (1) ground rod to the next and then looped back to the service equipment. Both ends of the grounding conductor loop shall be properly terminated on the service equipment's neutral bus. Provide all required lugs to accomplish this. Properly bond to ground bus per NEC requirements.
- B. Ground rods shall be spaced a minimum of 6'0" from each other.
- C. Extend grounding conductor to all metallic water piping, building steel, concrete reinforcing steel, all other building steel for adjacent buildings services from main electrical service and properly terminate. Refer to details for additional requirements.
- D. Grounding conductor shall be installed using 1" schedule 80 PVC conduit.
- E. Prior to pouring of slab(s) and prior to covering grounding grid, contractor shall take digital photographs of all ground rods, terminations, conductors and overall photo and shall submit to engineer prior to requesting substantial completion.
- F. Provide and install hand-hole (inspection well) with bolt-down removable cover at all ground rods to allow visual inspection of the terminations of the grounding conductors to the grounding electrode(s). Refer to details for additional requirements.

END OF SECTION 260526

SECTION 260571 – ACCEPTANCE TESTING

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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. Contractor may, at his option, self-perform acceptance testing as specified herein.
- 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

SECTION 260571 – ACCEPTANCE TESTING

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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. Equipment Tests
 2. Ground Resistance Tests
 3. Relay Calibration and Tests
 4. 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.

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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

SECTION 260571 – ACCEPTANCE TESTING

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- 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 EQUIPMENT TESTS

- A. The Contractor shall provide the service of equipment manufacturer's field staff for inspection and testing of equipment installed under this contract. The Contractor shall coordinate and schedule test with Owner, Engineer, User Agency and Equipment Manufacturer. Adequate field tests shall be conducted to ensure Engineer, Owner and User Agency that equipment will operate in accordance with these specifications. Specific equipment requiring manufacturer field-testing shall be as follows:
 - 1. Switchboard
- B. Testing Agency shall perform thermographic study of all terminations in the new electrical system prior to acceptance. Thermographic study shall be performed after load is placed on the system
- C. All 600 volt and below cables shall be tested as specified after being installed but prior to being terminated.
- D. Ground resistance tests shall be performed at the pad mounted transformer, at the Service Entrance and at each step-down/step-up transformer as specified.
- E. All terminations (lugs, split-bolts, etc.) shall have their "tightness" torque values measured and verified against NEC and manufacturer's requirements.

3.3 GROUND RESISTANCE TESTS

- A. Inspect ground system for compliance with plans and specifications.
- B. Perform 3-point fall-of-potential test per IEEE Standard No. 81, Section 9.04 on the main grounding electrode or system.
- C. Perform the 2-point method test per IEEE No. 81, Section 9.03 to determine the grounding resistance between the main grounding system and all major electrical equipment frames, system neutral and/or derived neutral points.
- D. Alternate Method to Item C Above: Perform ground continuity test between main ground system and equipment frame, system neutral and/or derived neutral point. This test shall be made by passing a minimum of ten (10) amperes dc current between ground reference system and the ground point to be tested. Voltage drop shall be measured and resistance calculated by voltage drop method.
- E. The main ground electrode system resistance to ground shall be no greater than one (1) ohm at the pad mounted transformer at the Service Entrance and at all step-down/step-up transformers.

SECTION 260571 – ACCEPTANCE TESTING

Phase 8 Stadium Improvements – Washington-Marion High

3.4 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 service entrances, switchboards, MCC and 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.

3.5 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.

3.6 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. Medium Voltage Transformers
 - 2. Medium Voltage Terminations
 - 3. Medium Voltage Sectionalizers
 - 4. Medium Voltage Load Interrupters
 - 5. Switchboards
 - 6. Panelboards

SECTION 260571 – ACCEPTANCE TESTING

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7. Paralleling Gear
 8. TVSS Units
 9. UPS Units (rotary and/or battery based)
 10. Loadcenters
 11. Transfer Switches
 12. Safety Switches (fused and non-fused)
 13. Motor Controllers
 - a. Starters
 - b. Variable Frequency Drives
 14. Chillers
 15. Pumps
 16. Generators and it's terminations
- 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 260571

SECTION 260001 – ELECTRICAL GENERAL PROVISIONS

Phase 8 Stadium Improvements – Washington-Marion High

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.

SECTION 260001 – ELECTRICAL GENERAL PROVISIONS

Phase 8 Stadium Improvements – Washington-Marion High

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 is 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.

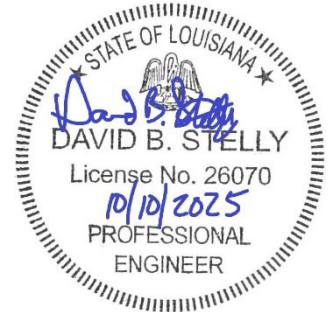
3.3 MISCELLANEOUS ITEMS

- 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 260923

SECTION 262713 – ELECTRICAL DISTRIBUTION

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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 (and emergency) 480 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, Entergy. 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 SERIES RATING OF EQUIPMENT

- A. The electrical gear provided and installed as part of this project shall not be series rated.

PART 2 - PRODUCTS

2.1 LOW VOLTAGE SWITCHBOARDS

- A. Switchboards shall consist of completely enclosed metal structures of the required number of formed and welded vertical panel sections incorporating circuit breakers and other associated equipment as indicated on the drawings and/or described herein.
- B. All sections of the switchboards shall be nominally ninety inches (90") high and shall be of the depth shown on the drawings. Switchboards shall be furnished in

SECTION 262713 – ELECTRICAL DISTRIBUTION

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conformance with the dimensions and in the configurations shown on the drawings.

- C. All sections shall align front and back. Internal components shall be removable from the front. Front covers shall be fabricated from sheet steel not less than 12-gauge and shall be sectionalized to permit removal during installation and maintenance. Top and side enclosing plates shall be removable. All of enclosure shall be fabricated of not less than 12-gauge steel and shall be furnished with openings for proper ventilation where required.
- D. All exterior and interior steel surfaces of the switchboard shall be properly cleaned and finished with gray enamel over rust inhibiting phosphatized primer.
- E. Bussing shall be copper. Temperature rise shall not exceed 65° C. Bussing (vertical and horizontal) shall be uniform throughout, not tapered. Bussing shall be braced for short circuit stress level as determined by fault current study.
- F. Sections shall contain group mounted protective devices with trip ratings as shown on the drawings. Circuit Breakers shall be solid-state or molded case type, automatic, with thermal and adjustable magnetic trip elements. Branch breakers shall be mounted in panelboard type construction with bolted connections to the bus and shall be front accessible. Side or rear access shall not be required for proper installation and maintenance. Breakers shall have interchangeable trip units and shall be rated for short circuit stress level as determined by fault current study.
- G. Switchboards shall be completely factory designed, tested, prewired, and assembled all in accordance with the latest applicable NEMA, IEEE, and ANSI standards. Shop drawings shall show front and side views, floor plan and section views, elementary diagram and wiring diagram.
- H. Before energizing, the Contractor shall check all accessible connections for tightness including factory connections and shall tighten those found to be loose.
- I. Switchboard shall be complete with electronic amperage, voltage and power monitor. Monitor shall display amperage per phase, voltage, phase neutral, voltage phase-phase, and maximum kW and kWh. Maximum kW and kWh shall be re-settable. Provide RJ-45 jack, all required software for monitoring/logging of metered parameters via remote PC (PC not provided as part of this project).
- J. Switchboards shall be NEMA Class 1 for indoor locations and NEMA Class 3R plus Gasketing for exterior location as manufactured by General Electric, Square D, Eaton-Cutler Hammer, Siemens or approved equivalent.

2.2 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

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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 22K 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.

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- L. Interior panelboards shall be NEMA 1 unless noted otherwise. All exterior panelboards shall be rated NEMA 3R.

2.3 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

2.4 DRY-TYPE TRANSFORMERS

- A. Dry-type transformers shall be three phase, 60 cycle with 480-volt delta primary windings and 120/208 volt, 4-wire wye secondary windings with capacities and mounting arrangements as indicated on the drawings. Each transformer shall have four (4) 2-1/2% FCBN taps, except that two (2) full current taps above normal and two (2) below normal will be acceptable where this is manufacturer's standard for the particular size.
- B. Transformers shall have internally isolated core and coil and shall be built with 220 Class insulation and shall have a temperature rise not to exceed 115° C where installed indoors or not to exceed 150° C where installed outdoors. Where shown on plans where transformers are stacked, both transformers shall have a temperature rise not to exceed 80° C, under full load in an ambient temperature of 40° C. Windings shall be copper.
- C. Units shall be designed for quiet operation with core and coil completely isolated from the enclosure by vibration absorbing mounts. Sound levels shall not exceed 45 db for 75 KVA or below, or 50 db for units above 75 KVA in an ambient of 24 db.
- D. Enclosures shall be NEMA 1 for secured interior locations, NEMA 3R for secured exterior locations, and totally enclosed for all unsecured locations.

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- E. Enclosures shall be constructed of heavy code gauge steel with terminal compartments located at the bottom of each unit. Circuit connections shall be made through flexible metallic conduit.
- F. Transformers shall be as manufactured by Square D, General Electric, Eaton Electrical, Siemens, or approved equivalent.

2.5 MAGNETIC CONTACTORS

- A. The Contractor shall furnish and install contactors where shown on the drawings except that contactors shown mounted in branch circuit panelboards shall be factory mounted by panelboard manufacturer.
- B. Contactors shall be of the same manufacturer as the panelboards, disconnect switches, etc.
- C. Contactors shall be suitable for use at the voltage rating of the circuits controlled and shall have the number of poles and ampere rating shown on the drawings as a minimum. Where ampere ratings are not shown, ratings shall be 20 amperes minimum, or as required to match the supply feeder protective device.
- D. Main contacts shall be double break silver alloy to silver alloy type protected by arching contacts. Contacts shall be self-aligning and renewable from the front of the panel.
- E. Contactors shall be Underwriters' Laboratories, Inc. listed under UL 508, 11th Edition. Contactors shall be fully rated and marked for use with motor loads, tungsten lamp loads, and ballast lamp loads.
- F. Remote control stations shall be three-wire momentary contact type with indicator light. Stations shall be arranged as indicated on the drawings and shall be furnished by the contactor manufacturer.
- G. Contactors shall be mounted in suitable enclosures for locations shown with hinged cover and latch.

2.6 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

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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.

2.7 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.

2.8 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.

SECTION 262713 – ELECTRICAL DISTRIBUTION

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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 262713

SECTION 265100 – LIGHTING FIXTURES

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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).

SECTION 265100 – LIGHTING FIXTURES

Phase 8 Stadium Improvements – Washington-Marion High

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:

<u>Normal A/C Power</u>	<u>Switch Position</u>	<u>Operation of Lamps/LED's</u>
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

SECTION 265100 – LIGHTING FIXTURES

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- 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.

SECTION 265100 – LIGHTING FIXTURES

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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 3500K to 4000K. The color rendition index (CRI) shall be 80 or greater. 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:

<u>Mounting Surface Material</u>	<u>Anchor type</u>
* Gypsum board (wall)	Toggle bolts or blocking with screws
Gypsum board (ceiling)	Expansion type anchor
Concrete/concrete block	Expansion type anchor
** Wood	Screws

SECTION 265100 – LIGHTING FIXTURES

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*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 265100

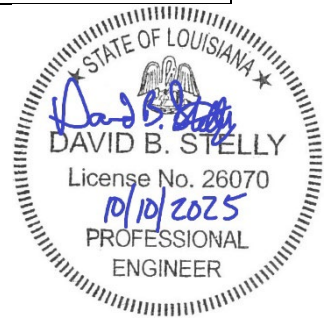
DIVISION 28

**TECHNICAL
SPECIFICATIONS**

**ELECTRONIC SAFETY &
SECURITY**

SECTION 280513 – TELEPHONE/DATA/CATV COMMUNICATION SYSTEM(S)

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**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 90° and extend conduit to accessible ceiling space. Provide nylon bushings at ends of conduits.
 3. Furnish and install two (2) 4-pair EIA - Category 6a 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. Furnish and install two (2) 4" telephone service entrance conduits each with three (3) 1-1/4" innerducts from main telephone equipment room to property line. Refer to site plan
 8. Furnish and install Two (2) 4" telephone service entrance conduits each with three (3) 1-1/4" innerducts, from main CATV equipment room to property line. Refer to site plan.
 9. Install 1-RG6 plenum rated quad shield coax cable from video receivers to each TV outlet and terminate as required on each end.
 10. Contractor shall submit an installation color coding, labeling and testing plan for each floor prior to commencing work.

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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.

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- 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.

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- 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

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- 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 6a specifications (plenum rated when installed in plenum spaces).
 - a. NEC
 - b. UL
 - c. ANSI/ICEA Publication S-80-576
 - d. EIA/TIA 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 EIA 568 physical specifications of CAT 6a physical specification.
 - 3. UTP Patch Cords

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- a. EIA Category 6a 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 6a 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 6a 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, single-mode, OS 2, 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.

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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

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- 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

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- 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 6a 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

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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.

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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.

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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 nm.
- 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

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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:

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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

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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.

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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 280513

DIVISION 31

**TECHNICAL
SPECIFICATIONS**

EARTHWORK

SECTION 311000 – SITE CLEARING

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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. Protecting existing vegetation to remain.
 - 2. Removing existing vegetation.
 - 3. Clearing and grubbing.
 - 4. Stripping and stockpiling topsoil.
 - 5. Removing above- and below-grade site improvements.
 - 6. Disconnecting, capping or sealing, removal, and/or abandoning (in place) of site utilities.
 - 7. Temporary erosion- and sedimentation-control measures.
- B. Related Sections:
 - 1. Section 024116 "Structure Demolition" for demolition of buildings, structures, and site improvements.
 - 2. Section 024119 "Selective Demolition" for partial demolition of buildings or structures.

1.3 DEFINITIONS

- A. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.
- B. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil; but in disturbed areas such as urban environments, the surface soil can be subsoil.
- C. Topsoil: Top layer of the soil profile consisting of existing native surface topsoil or existing in-place surface soil and is the zone where plant roots grow. Its appearance is generally friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 2 inches in diameter; and free of subsoil and weeds, roots, toxic materials, or other non-soil materials.
- D. Plant-Protection Zone: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction, and indicated on Drawings.

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- E. Tree-Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction, and defined by a circle concentric with each tree with a radius 1.5 times the diameter of the drip line unless otherwise indicated.
- F. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.4 MATERIAL OWNERSHIP

- A. Stripped topsoil and other materials indicated to be stockpiled shall remain on the Owner's property, unless noted or otherwise indicated.

1.5 PROJECT CONDITIONS

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing 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. Salvable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises or where indicated.
- C. Utility Locator Service: Notify Louisiana One Call for area where Project is located before site clearing.
- D. Do not commence site clearing operations until temporary erosion control, sedimentation control, and tree/plant-protection measures are in place.
- E. The following practices are prohibited within protection zones:
 - 1. Storage of construction materials, debris, or excavated material.
 - 2. Parking vehicles or equipment.
 - 3. Foot traffic.
 - 4. Erection of sheds or structures.
 - 5. Impoundment of water.
 - 6. Excavation or other digging unless otherwise indicated.
 - 7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.
- F. Prohibit heat sources, flames, and ignition sources within or near protection zones.
- G. Soil Stripping, Handling, and Stockpiling: Perform only when the topsoil is dry or slightly moist.

SECTION 311000 – SITE CLEARING

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PART 2 - PRODUCTS

2.1 MATERIALS

- A. Satisfactory Soil Material: Requirements for satisfactory soil material are specified in Section 312000 "Earth Moving."
 - 1. Obtain approved borrow soil material off-site when satisfactory soil material is not available on-site.
- B. Antirust Coating: Fast-curing, lead- and chromate-free, self-curing, universal modified-alkyd primer complying with MPI #79, Alkyd Anticorrosive Metal Primer.
 - 1. Use coating with a VOC content of 3.5 lb/gallons or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect and maintain benchmarks and survey control points from disturbance during construction.
- B. Locate and clearly identify trees, shrubs, and other vegetation to remain. Flag each tree trunk at 54 inches above the ground.
- C. Protect existing site improvements to remain from damage during construction.
 - 1. Restore damaged improvements to their original condition, as acceptable to Owner.

3.2 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- A. Provide temporary erosion- and sedimentation-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings and requirements of authorities having jurisdiction.
- B. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.
- C. Inspect, maintain, and repair erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
- D. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

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3.3 TREE AND PLANT PROTECTION

- A. Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations, in a manner approved by Architect.

3.4 EXISTING UTILITIES

- A. Locate, identify, disconnect, and seal or cap utilities indicated to be removed or abandoned in place.
 - 1. Arrange with utility companies to shut off indicated utilities.
 - 2. Owner will arrange to shut off indicated utilities when requested by Contractor.
- B. Locate, identify, and disconnect utilities indicated to be abandoned in place.
- C. Interrupting Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
 - 1. Notify Architect not less than two days in advance of proposed utility interruptions.
 - 2. Do not proceed with utility interruptions without Architect's written permission.
- D. Removal of underground utilities is included in earthwork sections and with applicable fire suppression, plumbing, HVAC, electrical, communications, electronic safety and security and utilities sections and Section 024116 "Structure Demolition" and Section 024119 "Selective Demolition."

3.5 CLEARING AND GRUBBING

- A. Remove obstructions, trees, shrubs, and other vegetation to permit installation of new construction.
 - 1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
 - 2. Grind down stumps and remove roots, obstructions, and debris to a depth of 24 inches below exposed subgrade.
 - 3. Use only hand methods for grubbing within protection zones.
 - 4. Remove tree branches and dispose of off-site.
- B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.
 - 1. Place fill material in horizontal layers not exceeding a loose depth as specified in the "Earth Moving" section, and compact each layer to a density equal to adjacent original ground.

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3.6 TOPSOIL STRIPPING

- A. Strip topsoil in a manner to prevent intermingling with underlying subsoil or other waste materials.
 - 1. Remove subsoil and non-soil materials from topsoil, including clay lumps, gravel, and other objects more than 2 inches in diameter; trash, debris, weeds, roots, and other waste materials.
- B. Stockpile topsoil away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust and erosion by water.
 - 1. Limit height of topsoil stockpiles to 72 inches.
 - 2. Do not stockpile topsoil within protection zones.
 - 3. Stockpile surplus topsoil to allow for re-spreading deeper topsoil.

3.7 SITE IMPROVEMENTS

- A. Remove existing above- and below-grade improvements as indicated and necessary to facilitate new construction.
- B. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.
 - 1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut along line of existing pavement to remain before removing adjacent existing pavement. Saw-cut faces vertically.
 - 2. Paint cut ends of steel reinforcement in concrete to remain with two coats of antirust coating, following coating manufacturer's written instructions. Keep paint off surfaces that will remain exposed.

3.8 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.

END OF SECTION 311000

SECTION 312000(S) – EARTH MOVING

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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. 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.

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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.
- C. 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.
- D. Photographic documentation positively identifying depth of excavation.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified testing agency.

1.6 QUALITY ASSURANCE

- A. Geotechnical Testing Agency Qualifications: Qualified according to ASTM E 329 and ASTM D 3740 for testing indicated.

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1.7 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: Silty or sandy clay free of debris, waste, vegetation, and other deleterious matter.
 - 1. Liquid Limit: 30-42
 - 2. Plasticity Index: 12-22
 - 3. Properties shall be verified by testing agency and submitted for approval prior to installation.
- 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.

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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.

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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.

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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.

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

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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 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.
- B. Place backfill on subgrades free of mud, frost, snow, or ice.

3.8 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.

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3.9 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.

3.10 COMPACTION OF SUBGRADE, SOIL BACKFILLS AND FILLS

- A. 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.
- B. Place backfill and fill soil materials evenly on all sides of structures to required elevations and uniformly along the full length of each structure.
- C. 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.

3.11 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.

3.12 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified geotechnical engineering testing agency to perform tests and inspections.

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- 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. 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.

3.13 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.

SECTION 312000(S) – EARTH MOVING

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3.14 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

Phase 8 Stadium Improvements – Washington-Marion High

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. Soil treatment with termiticide.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of termite control product.
 - 1. Include the EPA-Registered Label for termiticide products.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.
- B. Product Certificates: For termite control products, from manufacturer.
- C. Soil Treatment Application Report: After application of termiticide is completed, submit report for Owner's records and include the following:
 - 1. Date and time of application.
 - 2. Moisture content of soil before application.
 - 3. Termiticide brand name and manufacturer.
 - 4. Quantity of undiluted termiticide used.
 - 5. Dilutions, methods, volumes used, and rates of application.
 - 6. Areas of application.
 - 7. Water source for application.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: A specialist who is licensed according to regulations of authorities having jurisdiction to apply termite control treatment and products in jurisdiction where Project is located.
- B. Regulatory Requirements: Formulate and apply termiticides and termiticide devices according to the EPA-Registered Label.

SECTION 313116 – TERMITE CONTROL

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- C. Source Limitations: Obtain termite control products from single manufacturer.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: To ensure penetration, do not treat soil that is water saturated or frozen. Do not treat soil while precipitation is occurring. Comply with requirements of the EPA-Registered Label and requirements of authorities having jurisdiction.
- B. Coordinate soil treatment application with excavating, filling, grading, and concreting operations. Treat soil under footings, grade beams, and ground-supported slabs before construction.

1.7 WARRANTY

- A. Soil Treatment Special Warranty: Manufacturer's standard form, signed by Applicator and Contractor, certifying that termite control work, consisting of applied soil termiticide treatment, will prevent infestation of subterranean termites. If subterranean termite activity or damage is discovered during warranty period, re-treat soil and repair or replace damage caused by termite infestation.
 - 1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS**2.1 SOIL TREATMENT**

- A. Termiticide: Provide an EPA-Registered termiticide, complying with requirements of authorities having jurisdiction, in an aqueous solution formulated to prevent termite infestation. Provide quantity required for application at the label volume and rate for the maximum termiticide concentration allowed for each specific use, according to product's EPA-Registered Label.
 - 1. Subject to compliance with requirements, provide one of the following:
 - a. BASF Corporation, Agricultural Products; Termidor.
 - b. FMC Corporation, Agricultural Products Group; Dragnet FT.
 - c. Syngenta; Demon TC.
 - 2. Service Life of Treatment: Soil treatment termiticide that is effective for not less than five years against infestation of subterranean termites.
 - 3. Other solutions may be used as recommended by Applicator and if acceptable by the Architect and local governing authorities.
 - 4. Use only soil treatment solutions which are not injurious to planting.

SECTION 313116 – TERMITE CONTROL

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PART 3 - EXECUTION**3.1 EXAMINATION**

- A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for moisture content of soil per termiticide label requirements, interfaces with earthwork, slab and foundation work, landscaping, utility installation, and other conditions affecting performance of termite control.
- B. Proceed with application only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. General: Comply with the most stringent requirements of authorities having jurisdiction and with manufacturer's written instructions for preparation before beginning application of termite control treatment. Remove all extraneous sources of wood cellulose and other edible materials such as wood debris, tree stumps and roots, stakes, formwork, and construction waste wood from soil within and around foundations.
- B. Soil Treatment Preparation: Remove foreign matter and impermeable soil materials that could decrease treatment effectiveness on areas to be treated. Loosen, rake, and level soil to be treated except previously compacted areas under slabs and footings. Termiticides may be applied before placing compacted fill under slabs if recommended in writing by termiticide manufacturer.
 - 1. Fit filling hose connected to water source at the site with a backflow preventer, complying with requirements of authorities having jurisdiction.

3.3 APPLICATION, GENERAL

- A. General: Comply with the most stringent requirements of authorities having jurisdiction and with manufacturer's EPA-Registered Label for products.

3.4 APPLYING SOIL TREATMENT

- A. Application: Mix soil treatment termiticide solution to a uniform consistency. Provide quantity required for application at the label volume and rate for the maximum specified concentration of termiticide, according to manufacturer's EPA-Registered Label, to the following so that a continuous horizontal and vertical termiticidal barrier or treated zone is established around and under building construction. Distribute treatment evenly.
 - 1. Slabs-on-Grade: Beneath ground supported slab construction, including footings, building slabs, and attached slabs as an overall treatment. Treat soil materials before concrete footings and slabs are placed.
 - 2. Foundations: Adjacent soil, including soil along the entire inside perimeter of foundation walls; along both sides of interior partition walls; around plumbing pipes and electric conduit penetrating the slab; around interior column footers,

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- piers, and chimney bases; and along the entire outside perimeter, from grade to bottom of footing. Avoid soil washout around footings.
3. Masonry: Treat voids.
 4. Penetrations: At expansion joints, control joints, and areas where slabs will be penetrated.
- B. Avoid disturbance of treated soil after application. Keep off treated areas until completely dry.
- C. Protect termiticide solution, dispersed in treated soils and fills, from being diluted until ground-supported slabs are installed. Use waterproof barrier according to EPA-Registered Label instructions.
- D. Post warning signs in areas of application.
- E. Reapply soil treatment solution to areas disturbed by subsequent excavation, grading, landscaping, or other construction activities following application.

END OF SECTION 313116

DIVISION 32

**TECHNICAL
SPECIFICATIONS**

**EXTERIOR
IMPROVEMENTS**

SECTION 321313 – CONCRETE PAVING

Phase 8 Stadium Improvements – Washington-Marion High

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. Driveways.
 - 2. Parking lots.
 - 3. Curbs and gutters.
 - 4. Walks.
- B. Related Sections:
 - 1. Section 033000 "Cast-in-Place Concrete" for general building applications of concrete.
 - 2. Section 033053 "Miscellaneous Cast-in-Place Concrete" for general building applications of concrete.
 - 3. Section 321373 "Concrete Paving Joint Sealants" for joint sealants in expansion and contraction joints within concrete paving and in joints between concrete paving and asphalt paving or adjacent construction.

1.3 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash and other pozzolans, and ground granulated blast-furnace slag.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Other Action Submittals:
 - 1. Design Mixtures: For each concrete paving mixture. Include alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

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1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An experience installer who has completed pavement work similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- B. Source Limitations: Obtain each type and class of cementitious material of the same brand from the same manufacturer's plant and each aggregate from one source.
- C. Concrete Testing Service: The Owner shall engage a qualified testing agency to perform field tests, material evaluation tests, and prepare test reports.
- D. ACI Publications: Comply with ACI 301 unless otherwise indicated.

1.6 PROJECT CONDITIONS

- A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.
- B. Pavement-Marking Paint: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of 40 deg F for oil-based materials and 55 deg F for water-based materials, and not exceeding 95 deg F.

PART 2 - PRODUCTS

2.1 FORMS

- A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, and smooth exposed surfaces.
 - 1. Use flexible or uniformly curved forms for curves with a radius of 100 feet or less. Do not use notched and bent forms.
- B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and that will not impair subsequent treatments of concrete surfaces.

2.2 STEEL REINFORCEMENT

- A. Plain-Steel Welded Wire Reinforcement: ASTM A 185/A 185M, fabricated from as-drawn steel wire into flat sheets.
- B. Reinforcing Bars: ASTM A 615/A 615M, Grade 60; deformed.
- C. Plain-Steel Wire: ASTM A 82/A 82M, as drawn.
- D. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60 plain-steel bars. Cut bars true to length with ends square and free of burrs.

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- E. Tie Bars: ASTM A 615/A 615M, Grade 60, deformed.
- F. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, welded wire reinforcement, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete of greater compressive strength than concrete specified, and as follows:
 - 1. Equip wire bar supports with sand plates or horizontal runners where base material will not support chair legs.

2.3 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of same type, brand, and source throughout Project:
 - 1. Portland Cement: ASTM C 150, Type I/II. Supplement with the following:
 - a. Fly Ash: ASTM C 618, Class C or Class F. Maximum 15% by volume.
- B. Normal-Weight Aggregates: ASTM C 33, uniformly graded. Provide aggregates from a single source.
 - 1. Maximum Coarse-Aggregate Size: 1-inch nominal maximum size.
 - a. Do not use fine or coarse aggregates containing substances that will cause spalling.
- C. Water: Potable and complying with ASTM C 94.

2.4 ADMIXTURES

- A. Air-Entraining Admixture: ASTM C 260.
- B. Chemical Admixtures: Admixtures certified by manufacturer to be compatible with other admixtures and to contain no more than 0.1 percent water-soluble chloride ions by mass of cementitious material.
 - 1. Water-Reducing Admixture: ASTM C 494, Type A.
 - 2. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
 - 3. Water-Reducing and Accelerating Admixture: ASTM C 494, Type E.
 - 4. High-Range, Water-Reducing Admixture: ASTM C 494, Type F.

2.5 CURING MATERIALS

- A. Absorptive Cover: AASHTO M 182, Class 3, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. dry.

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- B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- C. Water: Potable.
- D. White, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 2, Class B, dissipating.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Anti-Hydro International, Inc.; A-H Curing Compound #2 WP WB.
 - b. Conspec by Dayton Superior; D.O.T. Resin Cure White.
 - c. Kaufman Products, Inc.; Thinfilm 450.
 - d. Lambert Corporation; AQUA KURE - WHITE.
 - e. L&M Construction Chemicals, Inc.; L&M CURE R-2.
 - f. Meadows, W. R., Inc.; 1100-WHITE SERIES.

2.6 RELATED MATERIALS

- A. Joint Fillers: ASTM D 1751, asphalt-saturated cellulosic fiber in preformed strips.
- B. Pavement Marking Paint: Alkyd resin type, ready mixed, complying with FS TT-P-115, Type 1, or AASHTO M 248, Type N.
 - 1. Color: Approved ADA blue for handicapped markings, red for fire lanes, and yellow elsewhere.
- C. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.
- D. Plastic Sheeting or Visqueen: 6 mil thickness, clear.

2.7 CONCRETE MIXTURES

- A. Prepare design mixtures, proportioned according to ACI 301, for each type and strength of normal-weight concrete, and as determined by either laboratory trial mixtures or field experience.
 - 1. Use a qualified independent testing agency for preparing and reporting proposed concrete design mixtures for the trial batch method.
- B. Proportion mixtures to provide normal-weight concrete with the following properties:
 - 1. Compressive Strength (28 Days): 3000psi.
 - 2. Maximum Water-Cementitious Materials Ratio at Point of Placement: 0.50.
 - 3. Slump Limit: 4 inches, plus or minus 1 inch.
- C. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than Portland cement in concrete as follows:

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1. Fly Ash: 15 percent of total cementitious material maximum.

2.8 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94. Furnish batch certificates for each batch discharged and used in the Work.
 1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION**3.1 EXAMINATION**

- A. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.
- B. Proof-roll prepared subbase surface to check for unstable areas and verify need for additional compaction. Proceed with pavement only after non-conforming conditions have been corrected and subgrade is ready to receive pavement.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Remove loose material from compacted subbase surface immediately before placing concrete.

3.3 EDGE FORMS AND SCREED CONSTRUCTION

- A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.
- B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

3.4 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

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- B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.
- C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.
- D. Install welded wire reinforcement in lengths as long as practicable. Lap adjoining pieces at least one full mesh, and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.
- E. Install fabricated bar mats in lengths as long as practicable. Handle units to keep them flat and free of distortions. Straighten bends, kinks, and other irregularities, or replace units as required before placement. Set mats for a minimum 2-inch overlap of adjacent mats.

3.5 JOINTS

- A. General: Form construction, isolation, and contraction joints and tool edges true to line, with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline unless otherwise indicated.
 - 1. When joining existing paving, place transverse joints to align with previously placed joints unless otherwise indicated.
- B. Construction Joints: Set construction joints at side and end terminations of paving and at locations where paving operations are stopped for more than one-half hour unless paving terminates at isolation joints.
 - 1. Butt Joints in Walks (Not for Use in Parking and Drive Paving): Use bonding agent at joint locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
 - 2. Keyed Dowel Joints (For Use in Parking and Drive Paving): Provide preformed galvanized metal keyway sections unless otherwise indicated. Keyways shall embed at least 1-1/2 inches into concrete. Install dowel bars and supports assemblies at joints where indicated. Lubricate or coat with asphalt one half of dowel length to prevent concrete bonding to one side of joint.
- C. Isolation Joints: Form isolation joints of preformed 3/4" wide asphalt impregnated joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, other fixed objects, and where indicated.
 - 1. Where shown, locate expansion joints at intervals of 50 feet unless otherwise indicated.
 - 2. Extend joint fillers full width and depth of joint.
 - 3. Terminate joint filler not less than 1/2 inch or more than 1 inch below finished surface if joint sealant is indicated.
 - 4. Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.
 - 5. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.

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6. During concrete placement, protect top edge of joint filler with metal, plastic, or temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint. Apply pavement sealant to flush with pavement slab.
- D. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas where indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, as follows and to match jointing of existing adjacent concrete paving, if applicable:
 1. Doweled Contraction Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or coat with asphalt one-half of dowel length to prevent concrete bonding to one side of joint.
- E. Scored or Dummy Joints in Walks: Form scored or dummy type joints in walks. Construct to a depth of 1/4", with 1/4" radius both sides. Form when concrete is fresh and strike joints perpendicular or across walk. Score approximately 5 feet on center. Verify scoring layout with Designer.
- F. Edging: After initial floating, tool edges of paving, gutters, curbs, and joints in concrete with an edging tool to a 1/4-inch radius. Repeat tooling of edges after applying surface finishes. Eliminate edging-tool marks on concrete surfaces.

3.6 CONCRETE PLACEMENT

- A. Before placing concrete, inspect and complete formwork installation, steel reinforcement, visqueen placement, and items to be embedded or cast-in.
- B. Comply with ACI 301 requirements for measuring, mixing, transporting, and placing concrete.
- C. Do not add water to concrete during delivery or at Project site. Do not add water to fresh concrete after testing.
- D. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.
- E. Consolidate concrete according to ACI 301 by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.
 1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocating reinforcement, dowels, and joint devices.
- F. Place welded wire fabric or fabricated bar mats immediately into final position, centered in slab unless noted or detailed otherwise.
 1. Remove and replace lower portions of pavement that have been placed for more than 15 minutes without being covered with a top layer of concrete or use a bonding agent if approved by the Designer.

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- G. Screed paving surface with a straightedge and strike off.
- H. Commence initial floating using bull floats or darbies to impart an open-textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.
- I. Curbs and Gutters: When automatic machine placement is used for curbs and gutters, submit revised mix design and laboratory test results that meet or exceed requirements. Produce curbs and gutters to required cross section, lines, grades, finish, and jointing. If results are not approved, remove and replace with formed concrete.
- J. Cold-Weather Placement: Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing, or low temperatures. Comply with ACI 306.1.
- K. Hot-Weather Placement: Comply with ACI 301 when hot-weather conditions exist.

3.7 FLOAT FINISHING

- A. General: Do not add water to concrete surfaces during finishing operations.
- B. Float Finish: Begin the second floating operation when bleed-water sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.
 - 1. Medium-to-Fine-Textured Broom Finish for Walks: Draw a soft-bristle broom across float-finished concrete surface perpendicular to line of traffic to provide a uniform, fine-line texture.
 - 2. Medium-to-Coarse-Textured Broom Finish for Parking and Drives: Provide a coarse finish by striating float-finished concrete surface 1/16 to 1/8-inch deep with a stiff-bristled broom, perpendicular to line of traffic.

3.8 CONCRETE PROTECTION AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
- B. Comply with ACI 306.1 for cold-weather protection.
- C. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete but before float finishing.
- D. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.

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- E. Curing Methods: Cure concrete by moisture curing, moisture-retaining-cover curing, curing compound, or a combination of these as follows:
1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover, placed in widest practicable width, with sides and ends lapped at least 12 inches and sealed by waterproof tape or adhesive. Immediately repair any holes or tears occurring during installation or curing period using cover material and waterproof tape.
 3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas that have been subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating, and repair damage during curing period.

3.9 PAVING TOLERANCES

- A. Comply with tolerances in ACI 117 and as follows:
1. Elevation: 1/4 inch.
 2. Thickness: Plus 3/8 inch, minus 1/4 inch.
 3. Surface: Gap below 10-foot long, unlevelled straightedge not to exceed 1/4 inch.
 4. Joint Spacing: 3 inches.
 5. Contraction Joint Depth: Plus 1/4 inch, no minus.
 6. Joint Width: Plus 1/8 inch, no minus.

3.10 PAVEMENT MARKING

- A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with the Designer.
- B. Allow concrete paving to cure for a minimum of 28 days and be dry before starting pavement marking.
- C. Sweep and clean surface to eliminate loose material and dust.
- D. Apply paint with mechanical equipment to produce markings of dimensions indicated with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils.
1. Apply graphic symbols and lettering with paint-resistant, die-cut stencils, firmly secured to concrete surface. Mask an extended area beyond edges of each

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stencil to prevent paint application beyond stencil. Apply paint so that it cannot run beneath stencil.

2. Broadcast glass beads uniformly into wet markings at a rate of 6 pounds per gallon.

3.11 WHEEL STOPS

- A. Refer to Specification Section 321713 – Parking Bumpers for project requirements.

3.12 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Testing Services: Representative samples of fresh concrete shall be obtained according to ASTM C 172, according to the following requirements:
 1. Testing Frequency: ASTM C 69; one (1) set for each day's pour of each concrete class exceeding 5 cubic yards, but less than 25 cubic yards, plus one (1) set for each additional 50 cubic yards. One (1) sample shall be tested at 7 days and two (2) samples at 28 days. One (1) sample shall be retained in reserve for later testing if required.
 - a. When total quantity of a given class of concrete is less than 50 cubic yards, the Designer may waive compressive strength testing if adequate evidence of satisfactory strength is provided.
 - b. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
 2. Slump: ASTM C 143; one test at point of placement for each compressive strength test, but not less than one test for each day's pour of each concrete mixture. Additional tests shall be required when concrete consistency appears to change.
 3. Compression Test Specimens: ASTM C 31; cast and laboratory cure one set of four (4) standard cylinder specimens for each compressive strength test, unless otherwise indicated. Additional tests will be required when concrete consistency changes.
 4. Compressive-Strength Tests: ASTM C 39/C 39M; test one specimen at seven days and two specimens at 28 days.
 - a. A compressive-strength test shall be the average compressive strength from two specimens obtained from same composite sample and tested at 28 days.
- C. Strength of each concrete mixture will be satisfactory if average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
- D. Test results shall be reported in writing to Designer, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain

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Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.

- E. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
- F. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect.
- G. Concrete paving will be considered defective if it does not pass tests and inspections.
- H. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- I. Prepare test and inspection reports.

3.13 REPAIRS AND PROTECTION

- A. Remove and replace concrete paving that is broken, damaged, or defective or that does not comply with requirements in this Section. Remove work in complete sections from joint to joint unless otherwise approved by Designer.
- B. Drill test cores, where directed by Designer, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory paving areas with Portland cement concrete bonded to paving with epoxy adhesive.
- C. Protect concrete paving from damage. Exclude traffic from paving for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.
- D. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep paving not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION 321313

SECTION 321373 – CONCRETE PAVING JOINT SEALANTS

Phase 8 Stadium Improvements – Washington-Marion High

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. Cold-applied, fuel-resistant joint sealants.
 - 2. Joint-sealant backer materials.
 - 3. Primers.
- B. Related Requirements:
 - 1. Section 321313 "Concrete Paving".

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
- B. Product Testing: Test joint sealants using a qualified testing agency.

1.5 FIELD CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
 - 1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40F.
 - 2. When joint substrates are wet.
 - 3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
 - 4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

SECTION 321373 – CONCRETE PAVING JOINT SEALANTS

Phase 8 Stadium Improvements – Washington-Marion High

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, backing materials, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.

2.2 COLD-APPLIED FUEL RESISTANT JOINT SEALANTS

- A. Single Component, Pourable, Urethane, Elastomeric Joint Sealant: ASTM C 920, Type S, Grade P, Class 25, for Use T.
 - 1. Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Meadows, W.R., Inc; Pourthane SL.
 - 2. Color: Grey.

2.3 JOINT-SEALANT BACKER MATERIALS

- A. Joint-Sealant Backer Materials: Non-staining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by joint-sealant manufacturer, based on field experience and laboratory testing.
- B. Round Backer Rods for Cold-Applied Joint Sealants: ASTM D 5249, Type 3, of diameter and density required to control joint-sealant depth and prevent bottom-side adhesion of sealant.

2.4 PRIMERS

- A. Primers: Product recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine joints to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

SECTION 321373 – CONCRETE PAVING JOINT SEALANTS

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3.2 PREPARATION

- A. Surface Cleaning of Joints: Before installing joint sealants, clean out joints immediately to comply with joint-sealant manufacturer's written instructions.
 - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
- B. Joint Priming: Prime joint substrates where indicated or where recommended in writing by joint-sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

3.3 INSTALLATION OF JOINT SEALANTS

- A. Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated unless more stringent requirements apply.
- B. Joint-Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions.
- C. Install joint-sealant backings to support joint sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 - 1. Do not leave gaps between ends of joint-sealant backings.
 - 2. Do not stretch, twist, puncture, or tear joint-sealant backings.
 - 3. Remove absorbent joint-sealant backings that have become wet before sealant application and replace them with dry materials.
- D. Install joint sealants immediately following backing installation, using proven techniques that comply with the following:
 - 1. Place joint sealants so they fully contact joint substrates.
 - 2. Completely fill recesses in each joint configuration.
 - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- E. Tooling of Non-sag Joint Sealants: Immediately after joint-sealant application and before skinning or curing begins, tool sealants according to the following requirements to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint:
 - 1. Remove excess joint sealant from surfaces adjacent to joints.
 - 2. Use tooling agents that are approved in writing by joint-sealant manufacturer and that do not discolor sealants or adjacent surfaces.

SECTION 321373 – CONCRETE PAVING JOINT SEALANTS

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- F. Provide joint configuration to comply with joint-sealant manufacturer's written instructions unless otherwise indicated.

3.4 CLEANING AND PROTECTION

- A. Clean off excess joint sealant as the Work progresses, by methods and with cleaning materials approved in writing by joint-sealant manufacturers.
- B. Protect joint sealants, during and after curing period, from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately and replace with joint sealant so installations in repaired areas are indistinguishable from the original work.

END OF SECTION 321373

SECTION 321713 – PARKING BUMPERS

Phase 8 Stadium Improvements – Washington-Marion High

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 wheel stops.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples for Initial Selection: For each type of exposed finish requiring color selection.

PART 2 - PRODUCTS

2.1 WHEEL STOPS

- A. Resilient Wheel Stops: Solid, integrally colored, 96 percent postconsumer or commingled postconsumer and pre-consumer recycled rubber; UV stabilized; minimum 4 inches high, minimum 6 inches wide, minimum 72 inches long. Provide chamfered corners and a minimum of three factory-formed or -drilled vertical holes through wheel stop for anchoring to substrate.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Barco Products.
 - b. Checkers Industrial Safety Products, Inc.
 - c. Encore Commercial Products (Post Guard).
 - d. GNR Technologies.
 - e. RubberForm Recycled Products, LLC.
 - 2. Color: Yellow.
 - 3. Embedded Markings: Molded-in, white reflective markings, permanently inset in exposed surface.
 - 4. Mounting Hardware: Lag screw, shield, and washers; 5/8-inch diameter, 8-inch minimum length.
 - 5. Adhesive: As recommended by wheel-stop manufacturer for adhesion to pavement.

SECTION 321713 – PARKING BUMPERS

Phase 8 Stadium Improvements – Washington-Marion High

PART 3 - EXECUTION**3.1 EXAMINATION**

- A. Verify that pavement is in suitable condition to begin installation according to manufacturer's written instructions.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install wheel stops according to manufacturer's written instructions unless otherwise indicated.
- B. Install wheel stops in bed of adhesive before anchoring.
- C. Securely anchor wheel stops to pavement with hardware in each preformed vertical hole in wheel stop as recommended in writing by manufacturer. Recess head of hardware beneath top of wheel stop.

3.3 CLEANING AND PROTECTING

- A. Clean wheel stops at the time of final inspection and near the time of acceptance by the Owner. Remove marring and markings that are deleterious to the product. Products that can't be cleaned shall be replaced at no additional cost to the Owner.
- B. Protect wheel stops until the final acceptance. Replace damaged wheel stops up until the date of final acceptance.

END OF SECTION 321713

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The general provisions of the contract, including the Conditions of the Contract (General and Supplementary) and Division 1 Specification section, as appropriate, shall apply to work of this section.

1.2 DESCRIPTION OF WORK

- A. Provide all labor and material necessary for installation of detectable warning tactile panels where shown on the drawings and specified hereinafter.
- B. The types of detectable warning tactile panels specified in this section shall be as follows:
 - 1. Surface Applied, Truncated Dome.

1.3 REFERENCE STANDARDS

- A. ADA (Americans with Disability Act) Standards for Accessible Design, 2010 or latest American Society for Testing and Materials (ASTM International): B117 Practice for Operating Salt Spray (Fog) Apparatus
- B. D570 Test Method for Water Absorption of Plastics.
- C. D638 Test Method for Tensile Properties of Plastics.
- D. D695 Test Method for Compressive Properties of Rigid Plastics.
- E. D790 Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
- F. D1308 Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes.
- G. D5420 Test Method for Impact Resistance of Flat, Rigid Plastic Specimen by Means of a Striker Impacted by a Falling Weight (Gardner Impact).
- H. E84 Test Method for Surface Burning Characteristics of Building Materials.

1.4 SUBMITTALS

- A. Shop Drawings: Showing fabrication details; panel surface profile; fastener locations; plans of panel placement including joints, and material to be used as well as outlining

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installation materials and procedure. Include procedures for containment and disposal of milling and saw-cutting waste water.

- B. Product Data: Manufacturer's literature describing products and installation procedures. Include product data for adhesives and sealants.
- C. Samples:
 - 1. Samples of panels measuring at least 12 inches x 12 inches. Panel sample shall include longitudinal edge with integral flange and transverse shiplap edges.
 - 2. Samples of panels and sealant for verification of color match.
- D. Maintenance Instructions: Manufacturer's specified maintenance practices for each type of panel and accessory as required.
- E. Quality Assurance Submittals:
 - 1. Material Test Reports: Test reports from qualified independent testing laboratory indicating that materials proposed for use are in compliance with requirements and meet the properties specified in this Section. Tests which indicate performance for the panels shall have been performed within three (3) years of the Invitation to Bid.

1.5 QUALITY ASSURANCE

- A. Panels and accessories, including panel adhesive, fasteners, and sealants, shall be from a single source. Products shall have been in successful service for a period of five (5) years.
- B. Installer's Qualifications: Engage an experienced Installer certified in writing by panel manufacturer as qualified for installation, who has successfully completed panel installations similar in material, design, and extent to that indicated for Project. Only persons who are thoroughly trained and experience in the installation of the panels shall perform the work.
- C. Provide services of manufacturer's field representative who shall be present at all times during installation.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Panel type shall be identified by part number on packages.

1.7 SITE CONDITIONS

- A. Environmental Conditions and Protection: Perform field work only when environmental conditions fall within those recommended by manufacturers of the products.
- B. WARRANTY

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1. Panels shall be covered by a written warranty for a period of five (5) years from date of final completion. The warranty includes defective work, breakage, deformation, delamination, fading and chalking of finishes, and loosening of panels. Warranty shall include furnishing new materials, removal of existing panels, and installation of new panels.

C. EXTRA STOCK

1. Furnish two (2) additional panels of each type of installed panels and corresponding fasteners. Furnish extra stock materials from same manufactured lot as materials installed and enclose in protective packaging with appropriate identification.

PART 2 - PRODUCTS

2.1 PANELS

- A. Manufacturers: Subject to compliance with requirements of this Section, provide one of the following products:
 1. ADA Solutions, Inc.; Surface Applied Tactile.
 2. ArmorTile by Engineered Plastics, Inc.; Surface Applied System.
- B. Panels shall be homogenous glass and carbon reinforced composite or an epoxy polymer composition which is color and UV stabilized.
- C. Color: As selected from manufacturer's full range and shall be homogenous throughout the panel thickness.
- D. Truncated Dome Geometry:
 1. Truncated dome surface shall comply with ADA and ABA guidelines, 705, Detectable Warnings. (Title 49 CFR Transportation, Part 37.9 Standards for Accessible Transportation Facilities, Appendix A, Section 4.29.2 – Detectable Warnings on Walking Surfaces).
 2. Truncated Dome Description:
 - a. Staggered Dome and In-Line Patterns (nominal dimensions): The truncated dome shall measure 0.45 inch diameter at the top of the dome, 0.90 inch diameter at the base of the dome, 0.20 inch high, and 1.6 inch on center (staggered pattern) and 2.35 inch on center (inline pattern).
 - b. In order to ensure a uniform appearance of the detectable warning surface throughout the system, equivalent facilitation findings or alternate patterns will not be acceptable.
 3. Truncated dome pattern shall align properly from Panel to Panel.
- E. Panel Configuration:

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1. Panel thickness: 3/8 inches minimum, solid thickness for all type of panels.
 2. Butt Joint, Staggered Truncated Domes:
 - a. For pedestrian crossings at vehicular crossings (inline pattern): Nominal 24 inches × width as called for with a 7/16-inch thick deep flange along both long sides. The perimeter of the standard panel features a chamfer (no 90 degree return).
 3. The panel shall feature a butt joint detail from tactile warning panel to panel.
- F. Fastener Holes in the Panel:
1. Holes for fasteners shall be formed in the factory. The holes shall be located only at the centers of the truncated domes.
- G. Performance characteristics: Panels shall meet the following standards.
1. Accelerated Weathering (2000 hours): Delta E of 5.0 maximum per ASTM G 155.
 2. Chemical Resistance: No stain or discoloration per ASTM D 1308.
 3. Flexural Strength: 25,000 psi minimum per ASTM D 790.
 4. Compressive Strength: 20,000 psi minimum per ASTM D 695.
 5. Tensile Strength: 10,000 psi minimum per ASTM D 638.
 6. Gardner Impact Test: 110 in-lb. minimum per ASTM D 5420.
 7. Flame Spread: 25 maximum per ASTM E 84.
 8. Smoke Development: 150 maximum per ASTM D 84.
 9. Slip Resistance: Friction Coefficient of 0.80 minimum per ASTM C 1028.
 10. Wear Resistance: 500 minimum per ASTM C 501.
 11. Water Absorption (2 weeks): 0.20% maximum per ASTM D 570.
 12. Salt Spray (120 hours): No change per ASTM B 117.

2.2 ACCESSORIES

- A. Fasteners for Concrete: Color matched nylon expansion sleeves with 1/4 inch diameter by 1-1/2 inch long stainless steel drive pins or as recommended by panel manufacturer for specific job conditions and accepted by the Architect or Engineer.
- B. Adhesive: Type approved by the panel manufacturer.
- C. Sealant: Urethane sealant of type approved by the panel manufacturer.
- D. Backer Rod: Acceptable to sealant manufacturer. Where required, such as at platform expansion joints.

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PART 3 - EXECUTION

3.1 INSTALLATION

- A. Apply adhesives, sealants and mechanical fasteners in accordance with the guidelines provided by their respective manufacturers.
- B. The detectable warning tactile panels specified herein shall be installed only on concrete surfaces.
- C. Utilize manufacturer provided template to lay out area to receive panels.
- D. Contain and remove slurry resulting from concrete milling and saw-cutting. Do not wash slurry into track bed area. Slurry contaminates and stains track structure and impedes drainage.
- E. Immediately prior to application of the setting adhesive, inspect surfaces to receive panel to ensure that they are clean, dry, free of voids, curing compounds, projections, loose material, dust, oils, grease, sealers, and other contaminants. Verify that surfaces are structurally sound and that concrete has cured a minimum of 30 days.
- F. Air entrapment: Apply generous amount of adhesives to eliminate air entrapment between the panels and the concrete surfaces.
- G. Set panels and install fasteners in accordance with panel manufacturer's instructions and as follows:
 - 1. Set the tile true and square as detailed in the design drawings.
 - 2. Wherever possible, install full size (uncut) panels. Do not install panel sections measuring less than 24 inches in length. Only cut panels where absolutely necessary.
 - 3. Maintain gap between panels for expansion and contraction in accordance with manufacturer's instructions.
 - 4. At platform expansion joints, cut panels on their short sides, finish cut edges smoothly, and lay panels with cut edges aligned with the edges of the substrate along the joints. Install fasteners on either side of the expansion joint at the time of initial installation. After a minimum of 4 hours, make a saw cut measuring 5/16 inch wide across the composite detectable warning surface panel and fill with sealant. Make saw-cut in the zone between truncated domes.
 - 5. Cutting through panel domes shall be kept to a minimum. Where less than half of the truncated dome remains, grind off balance of dome; where over half of the truncated dome remains, feather dome so as not to present a tripping hazard.
- H. Install sealant in accordance with manufacturer recommendations.

3.2 CLEANING AND PROTECTING

- A. After the area has been fully tiled and sealant system applied, clean panel surface, following the manufacturer recommended maintenance and cleaning procedures.

SECTION 321726 – DETECTABLE WARNING TACTILES

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- B. Protect sealant and panels against damage during construction period. Comply with panel and sealant manufacturers' recommendations.
- C. Protect panels against damage from rolling loads following installation by covering with plywood or hardwood.
- D. Clean panel by method specified by the manufacturer.
- E. Maintain cleaning and protection until the date of project acceptance.
- F. Replace any damaged product.

END OF SECTION 321726

SECTION 323119 – DECORATIVE METAL FENCES AND GATES

Phase 8 Stadium Improvements – Washington-Marion High

PART 1 - GENERAL**1.1 RELATED DOCUMENTS**

- A. The general provisions of the contract, including the Conditions of the Contract (General and Supplementary) and Division 1 Specification section, as appropriate, shall apply to work of this section.

1.2 DESCRIPTION OF WORK

- A. Provide all labor and material necessary for installation of decorative metal fences and gates where shown on the drawings and specified hereinafter.
- B. The types of decorative metal fences and gates specified in this section shall be as follows:
 - 1. Heavy industrial decorative aluminum fencing, gates, and accessories.
- C. The manufacturer shall supply a total ornamental aluminum fence system of the style, strength, size, and color defined herein. The system shall include all components (pickets, posts, rails, gates, hardware, and accessories) as required, and shall be fabricated, coated, and assembled in the United States.
- D. Related Sections:
 - 1. Section 033050 "Miscellaneous Cast In Place Concrete".

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Include elevations, sections, component connections, methods of joining, and attachments to other work.

1.4 QUALITY ASSURANCE

- A. The contractor shall provide laborers and supervisors who are familiar with the type of construction involved, and the materials and techniques specified.
- B. Manufacturer of fence system must have ten (10) years of documented experience in manufacturing the products specified in this section.

SECTION 323119 – DECORATIVE METAL FENCES AND GATES

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1.5 REFERENCES

- A. AAMA 2604 – Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels.
- B. AAMA 2603 – Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels.
- C. ASTM B117 – Practice for Operating Salt Spray (Fog) Apparatus.
- D. ASTM D2247 – Standard Practice for Testing Water Resistance of Coatings in 100% Relative Humidity.
- E. ASTM B221 – Specification for Aluminum Alloy Extruded Bars, Shapes, and Tubes.
- F. ASTM B85 – Standard Specification for Aluminum-Alloy Die Castings.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Upon receipt, materials should be checked for damage that may have occurred in shipping to the job site. Damaged materials and components will not be accepted.
- B. Each package shall bear the name of the manufacturer.
- C. Store products in manufacturer's unopened packaging.
- D. Store materials in a secure and dry area to protect against damage, weather, vandalism, and theft.
- E. Transport, handle and store products with care to protect against damage before installation.

1.7 WARRANTY

- A. The entire fence system shall have a written Limited Lifetime Warranty against rust and defects in workmanship and materials. In addition, the finish shall be warranted not to crack, chip, peel, or blister for the same period.

PART 2 - PRODUCTS

2.1 MANUFACTURER

- A. Products: Subject to compliance with requirements, provide one of the following:
 - 1. Elite; Style EFF20.
 - 2. Jerith Manufacturing; Style 1401.

SECTION 323119 – DECORATIVE METAL FENCES AND GATES

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- a. Fence height: 7 feet.
- b. Color: Black.

2.2 MATERIALS

- A. Aluminum Extrusions: All posts and rails used in the fence system shall be extruded from HS-35™ aluminum alloy having minimum yield strength of 35,000 psi. All pickets shall have minimum yield strength of 25,000 psi. 6063-T5 and 6063-T52 Alloys (in accordance with ASTM B221) are not acceptable for any components.
- B. Fasteners: All fasteners shall be stainless steel. Square drive screws shall be used to connect the pickets to the horizontal rails. Rail to post connections shall be made using self-drilling hex-head screws.
- C. Accessories: Aluminum sand and die castings shall be used for all scrolls, post caps, finials, and miscellaneous hardware. Die castings shall be made from Alloy A360.0 as per ASTM B85 for superior corrosion resistance. Alloy A380.0 is not acceptable.

2.3 FINISH

- A. Pretreatment: A three stage non-chrome pretreatment shall be applied. The first step shall be a chemical cleaning, followed by a water rinse. The final stage shall be a dry-in-place activator which produces a uniform chemical conversion coating for superior adhesion.
- B. Coating: Fence materials shall be coated with polyester powder-coat finish system. Epoxy powder coatings, baked enamel or acrylic paint finishes are not acceptable. The finish shall have a cured film thickness of at least 2.0 mils. In addition, any screw heads shall be painted to match the color of the fence.
- C. Tests: The cured finish shall meet or exceed AAMA 2604, which includes the following requirements:
 - 1. Humidity resistance of 3,000 hours using ASTM D2247.
 - 2. Salt-spray resistance of 3,000 hours using ASTM B117.
 - 3. Outdoor weathering shall show no adhesion loss, checking or crazing, with only a slight fade and chalk when exposed for 5 years in Florida facing south at a 45 degree angle.
 - 4. Finishes which only meet AAMA 2603 (or the previous version - AAMA 603) are not acceptable.

2.4 FABRICATION

- A. Horizontal rails shall be 1-5/8" channels formed in a modified "U" shape. Pickets shall pass through holes punched in the top of the rail. The top wall shall be .070" thick and the side walls .100" thick for superior vertical load strength. There shall be 3 horizontal rails in each section.

SECTION 323119 – DECORATIVE METAL FENCES AND GATES

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- B. Pickets shall be fastened to the rails using painted stainless steel screws. Screws shall be used on only one side of the rail, leaving the other side with a clean appearance.
- C. Pickets shall be 1" square and have a wall thickness of .062". Welding the pickets to the rails is not permitted.
- D. Posts shall be 3" and 4" square with .25" wall thickness, see plan for size locations. Gate posts shall be 4" square with .25" walls and used on both sides of a double gate. Single gate shall use 4" square post on each side. Die cast aluminum caps shall be provided with all posts.
- E. Swing gates shall have welded frames and shall support a 300 lb. vertical load on the latch side of the gate without collapsing. Walk gates shall be self-closing and self-latching.
 - 1. Refer to drawings for specified panic kit surface plate & strike.
- F. Assembled sections shall support a 1,000 lb. vertical load at the midpoint of any horizontal rail.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Verify areas to receive fencing are completed to final grades and elevations.
- B. Ensure property lines and legal boundaries are clearly established.
- C. Prepare the grade and remove any surface irregularities which may cause interference with the installation of the aluminum fence.

3.2 FENCE INSTALLATION

- A. Install fence in accordance with the manufacturer's instructions.
- B. Excavate post holes to proper depth to suit local conditions for stability and support of the fence system without disturbing the underlying materials. Excavate deeper as required for adequate support in soft and loose soils.
- C. Set fence posts in concrete footings per gate post layout. See plan for fence post locations.
- D. Insert notched horizontal rails in pre-punched holes in post and fasten in place.
- E. Center and align posts in holes to required depth. Place concrete around posts and tamp for consolidation. After tamping, check alignment of posts, and make necessary corrections before the concrete hardens.

SECTION 323119 – DECORATIVE METAL FENCES AND GATES

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3.3 GATE INSTALLATION

- A. Set gate posts plumb and level for gate openings specified in construction drawings.
- B. Install gates to allow full opening without interference after concrete has hardened around gate posts. Adjust hardware for smooth operation. Install two drop rods for double gates and one drop rod for single gates.

3.4 ACCESSORIES

- A. Install post caps and other accessories to complete fence.

3.5 GATE LOCKS, AND HANDLES

- A. Provide and install
- B. Provide and install D & D Technologies LL3GB series or equal polymer handles. Install two (2) on each gate, one inside and one outside.

3.6 CLEANING

- A. Contractor shall clean site of debris and excess materials.
- B. If necessary, clean fence system with mild household detergent and clean water. Excess concrete must be removed from posts and other fencing material before it hardens.

END OF SECTION 323119

SECTION 324000 – BENCHES

Phase 8 Stadium Improvements – Washington-Marion High

PART 1 - GENERAL**1.1 RELATED DOCUMENTS**

- A. The general provisions of the contract, including the Conditions of the Contract (General and Supplementary) and Division 1 Specification section, as appropriate, shall apply to work of this section.

1.2 DESCRIPTION OF WORK

- A. Provide all labor and material necessary for installation of perforated metal benches where indicated and specified hereinafter.
- B. The types of benches specified in this section shall be as follows:
 - 1. Steel, With Back.

1.3 SUBMITTALS

- A. Shop Drawings: Indicate product, material, length, mounting, finish, width, height, features, and color selections.
- B. Submit manufacturer's warranty.

PART 2 - PRODUCTS**2.1 BENCHES**

- A. Subject to compliance with requirements of this Section, provide products from the following or a pre-approved equal:
 - 1. DuMor, Inc.
 - a. DuMor #59-60, with backrest.
 - b. DuMor #59-80
 - 1) Seating Surface: 10-gauge, perforated.
 - 2) Fasteners: Stainless Steel.
 - 3) Finish: Zinc rich epoxy finish, with polyester powder coating.
 - 4) Color: As selected from manufacturer's standard colors.
 - 5) Mounting: Type S-2, surface.
 - 6) Locations: See plans.

SECTION 324000 – BENCHES

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2.2 ACCESSORIES

- A. Provide all fasteners and other accessories as required for a complete and secure installation as recommended by the manufacturer.

PART 3 - EXECUTION**3.1 INSTALLATION**

- A. Install in accordance with shop drawings and manufacturer's recommendations.
- B. Install square, level and secure.
- C. Contractor shall verify exact placement in field with Designer.

END OF SECTION 324000

SECTION 329200 – TURFS AND GRASSES

Phase 8 Stadium Improvements – Washington-Marion High

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. Sodding.
 - a. Re-grade and provide turfgrass sod with topsoil to all areas disturbed by construction around the stadium area which include, but is not limited to, the following:
 - 1) Areas around and along: paved sidewalks, paved parking and drive areas, areas north of the new concession building (Area 12) to the field house, south of the new restroom building (Area 13, around new visitor ticket booth (Area 15).

1.3 DEFINITIONS

- A. Finish Grade: Elevation of finished surface of planting soil.
- B. Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.
- C. Subgrade: The surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.

1.4 PREINSTALLATION MEETINGS

- A. Pre-installation Conference: Conduct conference at Project Site.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For landscape Installer.
- B. Certification of Grass Seed: From seed vendor for each grass-seed monostand or mixture, stating the botanical and common name, percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.

SECTION 329200 – TURFS AND GRASSES**Phase 8 Stadium Improvements – Washington-Marion High**

1. Certification of each seed mixture for turfgrass sod. Include identification of source and name and telephone number of the supplier.
- C. Product Certificates: For fertilizers, from manufacturer.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: Recommended procedures to be established by Owner for maintenance of turf during a calendar year. Submit before expiration of required maintenance periods.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful turf establishment.
 1. Professional Membership: Installer shall be a member in good standing of either the Professional Landcare Network or the American Nursery and Landscape Association.
 2. Experience: Five years' experience in turf installation.
 3. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Sod: Harvest, deliver, store, and handle sod according to requirements in "Specifications for Turfgrass Sod Materials" and "Specifications for Turfgrass Sod Transplanting and Installation" sections in TPI's "Guideline Specifications to Turfgrass Sodding." Deliver sod within 24 hours of harvesting and in time for planting promptly. Protect sod from breakage and drying.
- B. Bulk Materials:
 1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
 2. Provide erosion-control measures to prevent erosion or displacement of bulk materials; discharge of soil-bearing water runoff; and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
 3. Accompany each delivery of bulk materials with appropriate certificates.

1.9 FIELD CONDITIONS

- A. Planting Restrictions: Apply turfgrass sod during the summer and maintain such for duration of project and until current spring/summer growing ceases in the fall of this year.

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- B. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply fertilizer products during favorable weather conditions according to manufacturer's written instructions.

PART 2 - PRODUCTS

2.1 TURFGRASS SOD

- A. Turfgrass Sod: Certified and Number 1 Quality/Premium, including limitations on thatch, weeds, diseases, nematodes, and insects, complying with "Specifications for Turfgrass Sod Materials" in TPI's "Guideline Specifications to Turfgrass Sodding." Furnish viable sod of uniform density, color, and texture that is strongly rooted and capable of vigorous growth and development when planted.
- B. Turfgrass Species: Palmetto St. Augustine.

2.2 FERTILIZERS

- A. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:
 - 1. Composition: 1 lb/1000 sq. ft. of actual nitrogen, 4 percent phosphorous, and 2 percent potassium, by weight.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas to be planted for compliance with requirements and other conditions affecting installation and performance of the Work.
 - 1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
 - 2. Suspend planting operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
 - 3. Uniformly moisten excessively dry soil that is not workable or which is dusty.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

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- C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Architect and replace with new planting soil.

3.2 PREPARATION

- A. Protect structures; utilities; sidewalks; pavements; and other facilities, trees, shrubs, and plantings from damage caused by planting operations.
- B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.3 TURF AREA PREPARATION

- A. General: Prepare planting area for soil placement and mixing of planting soil.
- B. Placing Planting Soil: Place and mix planting soil in place over exposed subgrade.
 - 1. Reduce elevation of planting soil to allow for soil thickness of sod.
- C. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.
- D. Before planting, obtain Architect's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

3.4 SODDING

- A. Lay sod within 24 hours of harvesting. Do not lay sod if dormant or if ground is frozen or muddy.
- B. Lay sod to form a solid mass with tightly fitted joints. Butt ends and sides of sod; do not stretch or overlap. Stagger sod strips or pads to offset joints in adjacent courses. Avoid damage to soil or sod during installation. Tamp and roll lightly to ensure contact with soil, eliminate air pockets, and form a smooth surface. Work sifted soil or fine sand into minor cracks between pieces of sod; remove excess to avoid smothering sod and adjacent grass.
 - 1. Lay sod across slopes exceeding 1:3.
 - 2. Anchor sod on slopes exceeding 1:6 with wood pegs spaced as recommended by sod manufacturer but not less than two anchors per sod strip to prevent slippage.
- C. Saturate sod with fine water spray within two hours of planting. During first week after planting, maintain watering as necessary to maintain moist soil to a minimum depth of 1-1/2 inches below sod.

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3.5 SATISFACTORY TURF

- A. Turf installations shall meet the following criteria as determined by Architect:
 - 1. Satisfactory Sodded Turf: At end of maintenance period, a healthy, well-rooted, even-colored, viable turf has been established, free of weeds, open joints, bare areas, and surface irregularities.
- B. Use specified materials to reestablish turf that does not comply with requirements, and continue maintenance until turf is satisfactory.

3.6 CLEANUP AND PROTECTION

- A. Promptly remove soil and debris created by turf work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.
- B. Remove surplus soil and waste material, including excess subsoil, unsuitable soil, trash, and debris, and legally dispose of them off Owner's property.
- C. Erect temporary fencing or barricades and warning signs as required to protect newly planted areas from traffic. Maintain fencing and barricades throughout initial maintenance period and remove after plantings are established.
- D. Remove nondegradable erosion-control measures after grass establishment period.

END OF SECTION 329200

DIVISION 33

**TECHNICAL
SPECIFICATIONS**

UTILITIES

SECTION 334100 – STORM DRAINAGE PIPING

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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 gravity flow storm drainage piping outside the building:
 - 1. High Density Polypropylene Pipe (PP)

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Product Certificates: For each type of pipe and fitting from the manufacturer.
- C. Field quality control reports

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Do not store plastic pipe or fittings in direct sunlight.
- B. Protect pipe, pipe fittings, and seals from dirt and damage.
- C. Handle pipe and fittings to avoid damage during the installation and backfilling.

1.5 PROJECT CONDITIONS

- A. Interruption of Existing Storm Drainage Service: Do not interrupt service to facilities occupied by the Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:
 - 1. Notify Architect and Owner no fewer than two (2) days in advance of proposed interruption of service.
 - 2. Do not proceed with interruption of service without Architect's and Owner's written permission.

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PART 2 - PRODUCTS**2.1 PP PIPE AND FITTINGS**

- A. PP Pipe and Fittings: Provide sizes indicated.
 - 1. Manufacturers: Subject to compliance with requirements, provide products from one of the following:
 - a. ADS Pipe; HP Storm Dual Wall.
 - b. Prinsco; Goldpro Storm Dual Wall.
- B. Substitutions: Comply with requirements of Specification Section 013350.
- C. Source Limitations: Obtain all components of PP pipe and fittings from single manufacturer.
- D. Corrugated PP Drainage Pipe and Fittings: AASHTO M330 and ASTM F2881.
 - 1. Bell fittings shall be integral with gaskets for watertight joint in accordance with ASTM D3212.

2.2 MISCELLANEOUS MATERIALS

- A. PE Sheeting: ASTM D 4397 with at least 10-mil thickness.

PART 3 - EXECUTION**3.1 EARTHWORK**

- A. Excavation, trenching, and backfilling are specified in Division 31.

3.2 PIPING INSTALLATION

- A. General Locations and Arrangements: Drawings and details indicate general location and arrangement of underground storm drainage piping. Location and arrangement of piping layout take design considerations into account. Install piping as indicated to extent practical. Where specific installations are not indicated, follow piping manufacturer's written instructions.
- B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for installation requirements.

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- C. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.
- D. Install gravity flow, non-pressure storm drainage piping according to the following:
 - 1. Install piping pitched down in direction of flow.
 - 2. Install piping NPS 8 or larger with restrained joints at tee fittings and at changes in direction. Use corrosion resistant rods, pipe, or fittings manufacturer's proprietary restraint system, or cast-in-place concrete supports or anchors.
 - 3. Install piping with 12-inch minimum cover.
 - 4. Install PP corrugated piping according to ASTM D 2321.

3.3 PIPE JOINT CONSTRUCTION

- A. Join gravity flow, non-pressure storm drainage piping according to the following:
 - 1. Join gravity storm drainage piping according to ASTM D 2321 for gasketed joints.

3.4 CONCRETE PLACEMENT

- A. Place cast-in-place concrete according to ACI 318.

3.5 CLOSING ABANDONED STORM DRAINAGE SYSTEMS

- A. Abandoned Piping: Close open ends of abandoned piping indicated to remain in place. Include closures strong enough to withstand hydrostatic and earth pressures that may result after ends of abandoned piping have been closed. Use either procedure below:
 - 1. Close open ends of piping with at least 8-inch-thick brick masonry bulkheads.
 - 2. Close open ends of piping with threaded metal caps, plastic plugs, or other acceptable methods suitable for size and type of material being closed. Do not use wood plugs.
- B. Backfill to grade according to Division 31, Section "Earth Moving".

3.6 FIELD QUALITY CONTROL

- A. Inspect interior of piping to determine whether line placement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of the project.
 - 1. Replace defective piping using new materials and repeat inspections until defects are within allowances specified.
 - 2. Re-inspect and repeat procedure until results are satisfactory.

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- B. Test new piping systems and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.
 - 1. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.

3.7 CLEANING

- A. Clean interior or piping of dirt and superfluous materials. Flush with water.

END OF SECTION 334100