



DRAW Project Number: 22-S49-01B

NEW DISTRICT MAINTENANCE & BUS DEPOT FACILITY

3600 Old Oakdale Road, South Fayette Township, Allegheny County, Pennsylvania

OWNER: South Fayette Township School District
3680 Old Oakdale Road
McDonald, PA 15057

ARCHITECT:



DRAW Collective
470 Washington Road, Pittsburgh PA 15228



ENGINEERS:



Keystone Structural Solutions
8150 Perry Highway, Suite 302, Pittsburgh PA 15237



Tower Engineering
115 Evergreen Heights Drive, Suite 400, Pittsburgh PA 15229



Civil & Environmental Consultants, Inc
4530 Northern Pike, Suite 141, Monroeville PA 15146



Herbert, Rowland & Grubic, Inc.
220 West Kensinger Drive, Suite 100, Cranberry Township PA 16066

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END OF DOCUMENT 00 0110

DOCUMENT 00 1113 - ADVERTISEMENT FOR BIDS

The South Fayette Township School District, McDonald PA, will receive signed and sealed Bids, appropriately identified, for the following project:

NEW DISTRICT MAINTENANCE & BUS DEPOT FACILITY

3600 Old Oakdale Road , South Fayette Township, Allegheny County, Pennsylvania

Contracts: **01 – General Construction**
 02 – HVAC Construction
 03 – Plumbing Fire Protection Construction
 04 – Electrical Construction

The Owner will receive Bids until **11:00 AM** prevailing time, on **Thursday, November 6, 2025**, at the School District Administrative Offices, 3680 Old Oakdale Road, McDonald PA 15057-3597, c/o Dr. Michelle Miller, Superintendent. Promptly thereafter, they will be publically opened and read aloud in the Pride Room at the District Administrative Offices. Bids received after this time will not be accepted.

Each Bid shall be submitted in a sealed, opaque envelope and individually marked with the following:

Project Name (as noted above)
Prime Construction Contract Number and Name (eg. "02 – HVAC Construction")
Company Name
BID ENCLOSED – Do Not Open

Bids shall be made upon the form provided and shall be accompanied by a bid bond, certified check, or cashier's check in the amount of ten percent (10%) of the Base Bid amount made payable to or indemnifying the South Fayette Township School District. In addition, submit the following with each bid: Non-Collusion Affidavit, Contractors Qualification Statement, and Certificate of Authority (if applicable). Owner reserves the right to waive any informalities in bids and to accept or reject any or all Bids.

Prime Bidders will be required to REGISTER to receive notification of Addenda and project information updates, and to obtain access to the PrintScape Website. Registration as a Prime Bidder is automatic upon request and purchase of the complete Project Manual and Drawing sets by contacting Tom Santia at PrintScape, 412-788-0641, x115. Bidders shall submit registration request on company letterhead to include the following: 1) Company Name, 2) Contract(s) being bid, and 3) Contact person, email address and phone number. Notification of addenda and updates will be via e-mail to registered bidders. Addenda, question and responses, and other update information will be posted on the DFS Plan Room Project Folder at www.myPrintScape.com. The purchase of additional bidding documents may be arranged directly through PrintScape. The cost of the Project Manual and Drawings is non-refundable.

Each bid must be accompanied by a proposal guaranty of not less than ten percent (10%) of the total of the Base Bid; and by a Non-Collusion Affidavit, Qualification Questionnaire, and a Pennsylvania Certificate of Authority (if applicable).

Project is subject to applicable provisions of the Pennsylvania Prevailing Wage Act, Act of August 15, 1961, P.L. 987, as amended and supplemented.

Owner reserves the right to accept or reject any or all Bids or parts thereof or items therein and to waive any informality in the bidding.

A **Pre-Bid Conference** will be held in the Pride Room at the District Administrative Offices at **10:00am** prevailing time, on **Monday, October 13, 2025**. After the meeting, Bidders will be permitted to examine the areas of the Work.

Questions pertaining to the content of the Bidding Documents shall be directed to Mr. Timothy Reidy, DRAW Collaborative, by email at TimR@DRAWCollective.com. Questions must be submitted using the Pre-Bid RFI form available on the DFS Website, phone calls will not be accepted.

By order of the Board of School Directors
South Fayette Township School District

END OF DOCUMENT 00 1113

DOCUMENT 00 2113 - INSTRUCTIONS TO BIDDERS

PART 1 - GENERAL

1.1 DOCUMENTS

- A. See "Instructions to Bidders", AIA Document A701-2018, Articles 1 through 14 inclusive, standard form as modified for this project, following this page.
- B. Supplemental Instructions to Bidders, in the form of additions and other revisions to standard form text, are incorporated in the modified Document A701 attached.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

DOCUMENT CONTINUES ON NEXT PAGE

AIA® Document A701® – 2018

Instructions to Bidders

for the following Project:

Project No. 24-S49-01B

NEW DISTRICT MAINTENANCE & BUS DEPOT FACILITY

3600 Old Oakdale Road, South Fayette Township, Allegheny County, Pennsylvania

THE OWNER:

South Fayette Township School District

3680 Old Oakdale Road, McDonald, PA 15157

THE ARCHITECT:

DRAW Collective
470 Washington Road
Pittsburgh, PA 15228

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ADDITIONS AND DELETIONS:

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

FEDERAL, STATE, AND LOCAL LAWS MAY IMPOSE REQUIREMENTS ON PUBLIC PROCUREMENT CONTRACTS. CONSULT LOCAL AUTHORITIES OR AN ATTORNEY TO VERIFY REQUIREMENTS APPLICABLE TO THIS PROCUREMENT BEFORE COMPLETING THIS FORM.

It is intended that AIA Document G612™–2017, Owner's Instructions to the Architect, Parts A and B will be completed prior to using this document.

ARTICLE 1 DEFINITIONS

§ 1.1 Bidding Documents include the Bidding Requirements and the Proposed Contract Documents. The Bidding Requirements consist of the advertisement or invitation to bid, these Instructions to Bidders, the bid form, the Bid Bond, the Non-Collusion Affidavit, the Contractor's Qualification Statement and all attachments, whether submitted on AIA A305 or another equivalent Contractor's Qualification Statement, and any other procurement forms as identified in the Project Manual. The Proposed Contract Documents consist of the unexecuted form of Agreement between the Owner and Contractor and that Agreement's Exhibits, Conditions of the Contract (standard form as modified for this Project), Drawings, Specifications, all Addenda issued prior to execution of the Contract, and all other documents enumerated in Article 8 of these Instructions.

§ 1.2 Definitions set forth in the General Conditions of the Contract for Construction, or in other Proposed Contract Documents apply to the Bidding Documents.

§ 1.3 Addenda are written or graphic instruments issued by the Architect, which, by additions, deletions, clarifications, or corrections, modify or interpret the Bidding Documents.

§ 1.4 A Bid is a complete and properly executed proposal to do the Work for the sums stipulated therein, submitted in accordance with the Bidding Documents.

§ 1.5 The Base Bid is the sum stated in the Bid for which the Bidder offers to perform the Work described in the Bidding Documents, to which Work may be added or deleted by sums stated in Alternate Bids.

§ 1.6 An Alternate Bid (or Alternate) is an amount stated in the Bid to be added to or deducted from, or that does not change, the Base Bid if the corresponding change in the Work, as described in the Bidding Documents, is accepted.

§ 1.7 A Unit Price is an amount stated in the Bid as a price per unit of measurement for materials, equipment, or services, or a portion of the Work, as described in the Bidding Documents.

§ 1.8 A Bidder is a person or entity who submits a Bid and who meets the requirements set forth in the Bidding Documents.

§ 1.9 A Sub-bidder is a person or entity who submits a bid to a Bidder for materials, equipment, or labor for a portion of the Work.

ARTICLE 2 BIDDER'S REPRESENTATIONS

§ 2.1 By submitting a Bid, the Bidder represents that:

- .1 the Bidder has read and understands the Bidding Documents;
- .2 the Bidder understands how the Bidding Documents relate to other portions of the Project, if any, being bid concurrently or presently under construction;
- .3 the Bid complies with the Bidding Documents;
- .4 the Bidder has visited the site, become familiar with local conditions under which the Work is to be performed, and has correlated the Bidder's observations with the requirements of the Proposed Contract Documents; No allowance or contract adjustment will be made for the lack of such information on the part of the Contractor. Becoming familiar with local conditions includes, but is not limited to, the location, accessibility, and general character of the site, the building, and the areas of the Work and the character and extent of existing work within or adjacent to the areas of the new Work, including field checking of existing Work which interferes with new Work. Visits to the site of the Work are permitted only under the conditions described in Section 2.2.
- .5 the Bid is based upon the materials, equipment, and systems required by the Bidding Documents without exception; and a bid based upon an alternative that does not comply with the Bidding or Contract Documents may be declared non-responsive.
- .6 the Bidder has read and understands the provisions for liquidated damages set forth in the form of Agreement between the Owner and Contractor.

- .7 the bid does not include any sales or use tax on "building machinery and equipment" (or services to such property) as defined by Act 1998-45. The Bidder has used its best efforts to identify "building machinery and equipment" (or services to such property) that can be purchased exempt from Pennsylvania sales and use tax.
- .8 Contractor will require each Subcontractor and each Sub-subcontractor, through legally enforceable written Contracts, to meet all of the responsibilities of the Contractor with respect to any portion of the Work performed by any Subcontractor or Sub-subcontractor.
- .10 Except as otherwise indicated, the Base Bid is made without applicable cost for Workers' Compensation, General Liability, Umbrella/Excess, or Builder's Risk insurance being included, in accordance with contract documents.
- .11 The Bidder is aware and has been advised that the Contractor is solely responsible for initiating, maintaining and supervising all safety precautions and programs required under its portion of the Work and their Subcontractors and Sub-subcontractors Work and that the Contractor shall review, evaluate and take into consideration these requirements when making its bid.
- .12 The Bidder is aware and has been advised that Subcontractors and Sub-subcontractors ought to be given these requirements for bidding purposes so as to ensure consistency and contract adherence.
- .13 The Bidder will require each Subcontractor and each Sub-subcontractor, through legally enforceable written Contracts, to meet all of the responsibilities of the Contractor with respect to any portion of the Work performed by any Subcontractor or Sub-subcontractor.
- .14 By submitting the bid, the Contractor is certifying that it has excluded all insurance costs from the Base Bid, Alternates and Unit Prices with respect to those insurance coverages that will be provided because the School District is implementing the OCIP as set forth in the Contract Documents. The Contractor further certifies and represents that the School District may rely on the Contractor's representation that it has removed all such insurance costs from the Base Bid, Alternates and Unit Prices and that the School District is justified in relying upon said representation.
- .15 Based on historical data, the School District expects that the Base Bids, "net of insurance" will be less by approximately 3% to 6% or higher for general construction; 2.5% to 4.5% for plumbing; 2.5% to 4.5% for heating and ventilating; and 2.5% to 4.5% for lighting, electrical and wiring. . The Owner reserves the right to view the insurance cost data of any bidder to ensure that the School District has been provided with the proper credits with respect to the Contractor's bids without insurance.

§ 2.2 To avoid interference with the established routine of the Owner, access to the site in order to prepare a bid is permitted only at times and in groups as the Owner may determine, and then only when accompanied by an attendant. For appointments to visit the site, the Bidder applies to the following individual:

Steve Timmins, Director of Facilities
South Fayette Township School District
3700 Old Oakdale Road, McDonald PA 15057
412-221-4542 x 129
sjtimmins@southfayette.org

§ 2.3 The Bidder acknowledges that the Project for which construction proposals are being solicited is a project constituting public works and is subject to applicable provisions of the statutes and regulations of the Commonwealth of Pennsylvania, including the Pennsylvania Human Relations Act, the Antbid-Rigging Law, the Bid Withdrawal Act, the Public Works Contractors Bond Law, the Resident Labor Statute, the Trade Practices Act, the Utilities Protection Act ("Pa. One-Call"), the Public Works Employment Verification Act, and the Act 114 FBI Fingerprint Report.

ARTICLE 3 BIDDING DOCUMENTS

§ 3.1 Distribution

§ 3.1.1 Bidders shall obtain complete Bidding Documents, as indicated below, from the issuing office designated in the advertisement or invitation to bid, for the deposit sum, if any, stated therein.

(Indicate how, such as by email, website, host site/platform, paper copy, or other method Bidders shall obtain Bidding Documents.)

Prime Bidders will be required to REGISTER to receive notification of Addenda and project information updates, and to obtain access to the PrintScope Website. Registration as a Prime Bidder is automatic upon request and purchase of the

complete Project Manual and Drawing sets by contacting Tom Santia at PrintScape, 412-788-0641, x115. Bidders shall submit registration request on company letterhead to include the following: 1) Company Name, 2) Contract(s) being bid, and 3) Contact person, email address and phone number

§ 3.1.2 The cost of the Project Manual and Drawings is non-refundable.

§ 3.1.3 Bidding Documents will not be issued directly to Sub-bidders unless specifically offered in the advertisement or invitation to bid, or in supplementary instructions to bidders.

§ 3.1.4 Bidders shall use complete Bidding Documents in preparing Bids. Neither the Owner nor Architect assumes responsibility for errors or misinterpretations resulting from the use of incomplete Bidding Documents.

§ 3.1.5 The Bidding Documents will be available for the sole purpose of obtaining Bids on the Work. No license or grant of use is conferred by distribution of the Bidding Documents.

§ 3.2 Modification or Interpretation of Bidding Documents

§ 3.2.1 The Bidder shall carefully study all Bidding Documents, shall examine the site and local conditions, and shall notify the Architect of errors, inconsistencies, or ambiguities discovered and request clarification or interpretation pursuant to Section 3.2.2.

§ 3.2.2 Requests for clarification or interpretation of the Bidding Documents shall be submitted via email by a Prime Bidder in writing and must be received by the Architect prior to the time and date for receipt of Bids.

Submit simultaneously to Architect and Construction Manager via email using the DRAW Collective "*Request for Interpretation*" form included in the Project Manual

§ 3.2.3 Modifications and interpretations of the Bidding Documents shall be made by Addendum. Modifications and interpretations of the Bidding Documents made in any other manner shall not be binding, and Bidders shall not rely upon them.

§ 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.

§ 3.3.1.1 Particular names or descriptions of materials and products are given to establish such standard of performance, function, dimension, appearance, and quality, as well as of cost for bidding purposes. Alternatives of a quality necessary to meet the specifications may be presented for consideration in accordance with 3.3.2. Where substitutions are specifically disallowed in a specification, alternatives will not be considered. Otherwise, by naming products or manufacturers, it is not the intent to limit the bidder, the bid or the evaluation of the bid to any one material or product specified but rather to describe the minimum standard. A bid that is based upon any alternative which does not meet the specifications may be declared non-responsive.

§ 3.3.2 Substitution Process

§ 3.3.2.1 Written requests for substitutions must be made by a Prime Bidder, and must be received by the Architect and Construction Manager at least five working days prior to the date for receipt of Bids in order to be considered. Requests shall be submitted via email in the same manner as that established for submitting requests for clarification and interpretation in Section 3.2.2, using the DRAW Collective "*Pre-Bid Substitution Request*" form included in the Project Manual.

§ 3.3.2.2 A request shall include (1) the name of the material or equipment specified in the Bidding Documents; (2) the reason for the requested substitution; (3) a complete description of the proposed substitution including the name of the material or equipment proposed as the substitute, performance and test data, and relevant drawings; and (4) any other information necessary for an evaluation. The request shall include a statement setting forth changes in other materials, equipment, or other portions of the Work, including changes in the work of other contracts or the impact on any Project Certifications (such as LEED), that will result from incorporation of the proposed substitution.

(Paragraph deleted)

§ 3.3.3 The burden of proof of the merit of the proposed substitution 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 a proposed substitution prior to receipt of Bids, such approval shall be set forth in an Addendum. Approvals made in any other manner shall not be binding, and Bidders shall not rely upon them.

(Paragraph deleted)

§ 3.4 Addenda

§ 3.4.1 Addenda will be transmitted to Bidders known by the issuing office to have received complete Bidding Documents.

(Indicate how, such as by email, website, host site/platform, paper copy, or other method Addenda will be transmitted.)

Notification of Addenda will be via e-mail to registered Prime Bidders. Addenda, question and responses, and other update information will be posted on the DFS Plan Room Project Folder at www.myPrintScape.com

§ 3.4.2 Addenda, or notification of Addenda that have been posted to the Project Center website, will be emailed to all who are registered as prime bidders, and will be available where Bidding Documents are on file.

§ 3.4.3 Addenda may be issued up to noon, prevailing local time, on the day prior to the date for receipt of Bids, except an Addendum withdrawing the request for Bids or one which includes postponement of the date for receipt of Bids may be issued without time limit.

§ 3.4.4 Prior to submitting a Bid, each Bidder shall ascertain that the Bidder has received all Addenda issued, and the Bidder shall acknowledge their receipt in the Bid, on the Bid Form.

ARTICLE 4 BIDDING PROCEDURES

§ 4.1 Preparation of Bids

§ 4.1.1 Bids shall be submitted on the forms included with the Bidding Documents.

§ 4.1.2 All blanks on the bid form shall be legibly executed. Paper bid forms shall be executed in a non-erasable medium.

§ 4.1.3 Sums shall be expressed in both words and numbers, unless noted otherwise on the bid form. In case of discrepancy, the amount entered in words shall govern.

§ 4.1.4 Edits to entries made on paper bid forms must be initialed by the signer of the Bid. Failure to initial may make the Bid non-responsive and may subject the Bid to rejection.

§ 4.1.5 All requested Alternates shall be bid. If no change in the Base Bid is required, enter "No Change" or as required by the bid form.

§ 4.1.6 Where two or more Bids for designated portions of the Work have been requested, the Bidder may, without forfeiture of the bid security, state the Bidder's refusal to accept award of less than the combination of Bids stipulated by the Bidder. The Bidder shall neither make additional stipulations on the bid form nor qualify the Bid in any other manner.

§ 4.1.7 Each copy of the Bid shall state the legal name and the nature of legal form of the Bidder. As part of the documentation submitted with the Bid, the Bidder shall provide evidence of its legal authority to perform the Work in the jurisdiction of the Work. Each copy of the Bid shall be signed in his own hand and usual manner by the person or persons legally authorized to bind the Bidder to a contract. A Bid by a corporation shall further name the state of incorporation and have the corporate seal affixed. A Bid submitted by an agent shall have a current power of attorney attached, certifying the agent's authority to bind the Bidder.

§ 4.1.7.1 When the Bid is executed by or on behalf of a partnership, at least one partner must sign the Bid in his own hand and usual manner and the names and addresses of all members of the partnership must accompany the Bid.

§ 4.1.7.2 When the Bid is executed by or on behalf of a corporation, the Bid must be signed by at least two officers in their own hand and usual manner thereof, one of whom is the President or Vice President of said corporation, and must have the corporate seal affixed.

§ 4.1.7.3 If the Bidder is incorporated in a state other than Pennsylvania, the Bidder must state on the Bid whether the corporation is registered to do business in Pennsylvania. If the Bidder is not so registered, it must state thereon that upon acceptance of its bid it will immediately register to do business in Pennsylvania or forfeit any right to the Contract.

§ 4.1.7.4 If the Bidder operates under an assumed or fictitious name, it must identify the fictitious or assumed name and state whether such a name has been registered in Pennsylvania.

§ 4.1.7.5 No Contract will be awarded to a Bidder unless it has complied with or agrees to comply with proper registration under the laws of the Commonwealth of Pennsylvania.

§ 4.1.7.6 Upon written request to the Owner, and with its approval prior to the filing of a Bid, a Bidder may submit a Bid signed by and on behalf of the Bidder by an attorney-in-fact authorized to so act by the Bidder by a written and notarized power of attorney filed with the Owner.

§ 4.1.7.7 When the Bid is executed by or on behalf of an individual or sole proprietorship, the owner must sign the Bid in his own hand and usual manner.

§ 4.1.8 Any requested separate prices and unit prices must be bid. When appropriate, estimated quantities to be included by the bidder in the Base Bid are provided for unit prices. Where a blank is given on the form for estimated quantities, Bidder shall write in his estimate of Base-Bid quantities.

§ 4.1.9 Bids shall be submitted on the Procurement and Contracting Requirements forms in the Project Manual or otherwise furnished, including the Contractor Qualification Statement, or an approved copy thereof, and shall be signed in ink. All unsigned Bidding Documents and Bidding Documents that are not completely and properly executed on the signature page may be rejected by the Owner, or the Owner's authorized representative. Each Bid must include the full business address of the Bidder and must be signed by the required individual or individuals, in their usual hand using their usual signatures. Bidding Documents containing any conditions, omissions, unexplained erasures, blanks, unanswered items, or alterations, or items not called for in the proposal, or irregularities of any kind, may be rejected by the Owner and subject to a determination by the Owner that the Bid is non-responsive.

§ 4.1.10 A Bidder shall incur all costs associated with the preparation of its Bid.

§ 4.2 Bid Security

§ 4.2.1 Each Bid shall be accompanied by the following bid security:

(Paragraph deleted)

Bid security of not less than ten percent of the amount of each Base Bid, which may be in the form of a certified check, bank cashier's check trust company treasurer's check, Bid Security on the form enclosed or otherwise furnished by the Owner, or other form of security permitted by law, made payable to the Owner.

§ 4.2.2 The Bidder pledges to enter into a Contract with the Owner on the terms stated in the Bid and shall, if required, furnish bonds covering the faithful performance of the Contract and payment of all obligations arising thereunder. Should the Bidder refuse to enter into such Contract or fail to furnish such bonds if required, the amount of the bid security shall be forfeited to the Owner as liquidated damages, not as a penalty.

§ 4.2.3 If a surety bond is required as bid security, it shall be written on AIA Document A310™, Bid Bond, unless otherwise provided in the Bidding Documents. The attorney-in-fact who executes the bond on behalf of the surety shall affix to the bond a certified and current copy of an acceptable power of attorney. The Bidder shall provide surety bonds from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located.

§ 4.2.4 Bid securities not forfeited under the terms of bidding, except for those furnished by the 3 lowest responsible Bidders on each Contract, are to be returned immediately. The security of the 3 lowest responsible Bidders, except where forfeiture is required, are to be returned upon execution of the Contract and delivery of the required bonds and insurance

coverage by the successful Bidder; or before 60 days after the designated date for receipt of Bids, unless an extension of time is granted by them.

§ 4.3 Submission of Bids

§ 4.3.1 A Bidder shall submit its Bid as indicated below:

(Paragraph deleted)

paper copy as indicated in 4.3.2 below

§ 4.3.2 Paper copies of the Bid, the bid security, and any other documents required to be submitted with the Bid shall be enclosed in a sealed opaque envelope. The envelope shall be addressed to the party receiving the Bids and shall be identified with the Project name, the Bidder's name and address, and, if applicable, the designated portion of the Work for which the Bid is submitted. If the Bid is sent by mail, the sealed envelope shall be enclosed in a separate mailing envelope with the notation "SEALED BID ENCLOSED" on the face thereof.

§ 4.3.3 Bids shall be submitted by the date and time and at the place indicated in the invitation to bid. Bids submitted after the date and time for receipt of Bids, or at an incorrect place, will be returned unopened.

§ 4.3.4 The Bidder shall assume full responsibility for timely delivery at the location designated for receipt of Bids.

§ 4.3.5 A Bid submitted by any method other than as provided in this Section 4.3 will not be accepted.

§ 4.3.6 The failure to submit all required documents and materials with the Bid, including but not limited to the Non-Collusion affidavit, the Bid Bond or other acceptable form of Bid Security, and the Contractor's Qualification Statement, AIA A305 or another equivalent form of Contractor Qualification Statement, may result in the rejection of the Bid on the grounds that the Bid is non-responsive.

§ 4.3.7 Each Bidder shall submit with its bid evidence of its experience, qualifications and financial ability to carry out the terms of the Contract in the form of a completed Contractor's Qualification Statement. AIA-A305 or another equivalent Contractor's Qualification Statement and provide additional information thereafter as requested by the Owner. Each Bidder must submit answers to each and every one of the questions on the Contractor's Qualification Statement and all other Contract Documents and Bidding Documents at the time of bidding, with complete answers to questions concerning the Bidder's capability, its financial integrity, and its past conduct. The Owner may make such investigations as it deems necessary to evaluate the responsiveness of the Bidder's answers to the questionnaires and submissions and as it deems necessary to determine the ability of the Bidder to perform the Work and the Bidder's responsibility and responsiveness generally. The Owner, after investigation, may determine that the Bid is non-responsive and, after such determination, may reject the Bid. The Owner need not contact the Bidder prior to bid rejection provided that the Owner has engaged in an investigation it deems necessary to evaluate the Bid's responsiveness. However, to the extent that the Owner elects to contact the Bidder to obtain more information prior to bid rejection, the Bidder must furnish to the Owner all information and data as may be requested by the Owner after the submission of the Bid. The Owner reserves the right to reject any Bid from a Bidder that is not responsive and/or not responsible in accordance with the Public Procurement Code, the Public School Code, these Bidding Documents or other applicable and governing law. Evidence of the failure of the Bidder to properly respond, after the submission of its Bid, to any request from Owner for additional information, documents, and data, may be considered by Owner in determining the Bidder's responsibility and responsiveness.

§ 4.4 Modification or Withdrawal of Bid

§ 4.4.1 Prior to the date and time designated for receipt of Bids, a Bidder may submit a new Bid to replace a Bid previously submitted, or withdraw its Bid entirely, by notice to the party designated to receive the Bids. Such notice shall be received and duly recorded by the receiving party on or before the date and time set for receipt of Bids. The receiving party shall verify that replaced or withdrawn Bids are removed from the other submitted Bids and not considered. Notice of submission of a replacement Bid or withdrawal of a Bid shall be worded so as not to reveal the amount of the original Bid.

§ 4.4.2 Withdrawn Bids may be resubmitted up to the date and time designated for the receipt of Bids in the same format as that established in Section 4.3, provided they fully conform with these Instructions to Bidders. Bid security shall be in an amount sufficient for the Bid as resubmitted.

§ 4.4.3 After the date and time designated for receipt of Bids, a Bidder who discovers that it made a clerical error in its Bid shall notify the Architect of such error and submit credible evidence that the reason for the lower price was a clerical mistake, due to an unintentional and substantial arithmetical error or an unintentional omission of a substantial quantity of work, labor, material or services made directly in the compilation of the bid, within two business days, pursuant to 73 P.S. §1602 requesting withdrawal of its Bid. Upon providing evidence of such error to the reasonable satisfaction of the Owner, the Bid shall be withdrawn and not resubmitted. If a Bid is withdrawn pursuant to this Section 4.4.3, the bid security will be attended to as follows:

Bid security will be held based on Bid rank and returned as provided in Section 4.2.4

ARTICLE 5 CONSIDERATION OF BIDS

§ 5.1 Opening of Bids

If stipulated in an advertisement or invitation to bid, or when otherwise required by law, Bids properly identified and received within the specified time limits will be publicly opened and read aloud. A summary of the Bids may be made available to Bidders.

§ 5.2 Rejection of Bids

To the maximum extent permitted by law, the Owner shall have the right to reject any or all Bids. A Bid not accompanied by a required bid security or by other data required herein, or a Bid which is in any way incomplete or irregular, is subject to rejection

To the maximum extent permitted by law, the Owner reserves the right to waive any defects in a bid, including, but not limited to, a bidder's failure to strictly comply with the bid requirements, if such waiver does not give one bidder a material or competitive advantage over another bidder.

§ 5.2.1 The Bids of any Bidders who engage in collusive bidding are rejected. Any Bidder who submits more than one Bid for a Contract, directly or indirectly, and makes it appear that the Bids are on a competitive basis from different parties, is considered a collusive Bidder.

§ 5.2.2 Submit a completed and properly executed copy of the document "*Non-Collusion Affidavit*" (Document 00 4519) with accompanying attachments with your Bid. Failure to provide this information with the Bid shall result in the Bidder's disqualification and rejection of its Bid.

§ 5.3 Acceptance of Bid (Award)

§ 5.3.1 It is the intent of the Owner to award a Contract to the lowest responsible Bidder with a responsive bid, provided the Bid has been submitted in accordance with the requirements of the Bidding Documents and does not exceed the funds available. Owner shall have the right to waive informalities and irregularities in a Bid received and to accept the Bid which, in the Owner's judgment and discretion, is in the Owner's best interests. It is the intent of the Owner to award a Contract within 60 calendar days from the date when the Bids are due

§ 5.3.2 Owner shall have the right to accept Alternates in any order or combination, unless otherwise specifically provided in the Bidding Documents, and to determine the lowest responsive and responsible Bidder on the basis of the sum of the Base Bid and Alternates accepted.

§ 5.3.3 The Bidder to whom the Contract has been awarded shall execute and return the Contract to the Architect within 10 business days after Notice of Award. The Bidder shall also furnish at that time to the Architect properly executed (1) Performance, Maintenance Bond (if required) and Payment Bonds in the form included or referenced in the Project Manual, (2) insurance certificates including endorsements and riders, evidencing insurance of the required types and in the required amounts, (3) a breakdown of the Bidder's schedule of values using the forms provided at the time, (4) the Form of Owner-Contractor Agreement, and (5) a corporate resolution, if appropriate.

- .1 Name as additional insureds on Insurance Certificate the Certificate Holder (South Fayette Township School District), The Commonwealth of Pennsylvania, DRAW Collective, PJ Dick Incorporated, Civil & Environmental Consultants, Inc., and Tower Engineering, including Completed Operations on a Primary and Non-Contributory basis for the same limits required under General Liability.

§ 5.3.4 When separate Base Bids are requested for different products and systems of construction, the Owner has the right to accept the product or system of construction which, in its judgment, is in its own best interests, and to determine the lowest responsible Bidder with a responsive bid on the basis of the accepted product and/or system of construction.

ARTICLE 6 POST-BID INFORMATION

§ 6.1 not used

§ 6.2 not used

§ 6.3 Submittals

§ 6.3.1 After notification of selection for the award of the Contract, the Bidder shall, as soon as practicable or as stipulated in the Bidding Documents, submit in writing to the Owner through the Architect:

- .1 a designation of the Work to be performed with the Bidder's own forces;
- .2 names of the principal products and systems proposed for the Work and the manufacturers and suppliers of each; and
- .3 names of persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for the principal portions of the Work.

§ 6.3.2 The Bidder will be required to establish to the satisfaction of the Architect and Owner the reliability and responsibility of the persons or entities proposed to furnish and perform the Work described in the Bidding Documents.

§ 6.3.3 Prior to the execution of the Contract, the Architect or Construction Manager will notify the Bidder in writing if either the Owner or Architect, after due investigation, has reasonable objection to a person or entity proposed by the Bidder. If the Owner or Architect has reasonable objection to a proposed person or entity, the Bidder may submit an acceptable substitute person or entity and any required adjustment in the Base Bid or Alternate Bid to account for the difference in cost occasioned by such substitution. The Owner may accept the adjusted bid price or disqualify the Bidder. In the event of disqualification, bid security will not be forfeited.

§ 6.3.4 Persons and entities proposed by the Bidder and to whom the Owner and Architect have made no reasonable objection must be used on the Work for which they were proposed and shall not be changed except with the written consent of the Owner and Architect.

ARTICLE 7 PERFORMANCE BOND AND PAYMENT BOND AND MAINTENANCE BOND

§ 7.1 Bond Requirements

§ 7.1.1 The Bidder shall furnish bonds covering the faithful performance of the Contract and payment of all obligations arising thereunder.

§ 7.1.2 The cost of furnishing required bonds shall be included in the Bid. If the furnishing of such bonds is required after receipt of bids and before execution of the Contract, the cost of such bonds shall be added to the Bid in determining the Contract Sum.

§ 7.1.3 Provide the required bonds by a company or companies licensed to do business in the Commonwealth of Pennsylvania which have a minimum Best rating of "A-", a minimum policy holder's surplus of \$100 million, are listed on the current U.S. treasury Circular No. 570 (sureties acceptable for federally financed construction projects), and against which the Owner has no reasonable objection.

§ 7.1.4 The Penal Sum of the Payment and Performance Bonds shall be the amount of the Contract Sum.

§ 7.1.5 The Maintenance Bond shall be written in the amount of ten percent of the Contract Sum.

§ 7.2 Time of Delivery and Form of Bonds

§ 7.2.1 The Bidder shall deliver the required bonds to the Owner not later than three days following the date of execution of the Contract. If the Work is to commence sooner in response to a letter of intent, the Bidder shall, prior to commencement of the Work, submit evidence satisfactory to the Owner that such bonds will be furnished and delivered in accordance with this Section 7.2.1.

§ 7.2.2 Unless otherwise provided, the bonds shall be written on AIA Document A312, Performance Bond and Payment Bond.

§ 7.2.2.1 The Maintenance Bond shall be written in a form acceptable to the Owner to guarantee that the Contractor remedies without cost to the Owner any defects in the Work which may develop during a period of one year from the Date of Substantial Completion of the Work performed under the Contract.

§ 7.2.3 The bonds shall be dated on or after the date of the Contract.

§ 7.2.4 The Bidder shall require the attorney-in-fact who executes the required bonds on behalf of the surety to affix to the bond a certified and current copy of the power of attorney.

ARTICLE 8 PROPOSED CONTRACT DOCUMENTS

§ 8.1 Copies of the proposed Contract Documents, as defined in the Conditions of the Contract and enumerated in the Agreement, have been made available to the
(Paragraphs deleted)
Bidder.

- .1 **Conditions of the Contract:** AIA Document A232–2019, *General Conditions of the Contract for Construction, Construction Manager as Adviser Edition*, as modified for this Project and located in Draft form at Document 00 7213 in the Project Manual.

(Paragraphs deleted)

- .2 **Agreement Between Owner and Contractor:** Agreement for the Work will be written on AIA Document A132-2019, *Standard Form of Agreement Between Owner and Contractor, Construction Manager as Adviser Edition*, as modified for this Project and located in Draft form at Document 00 5213 in the Project Manual.

ARTICLE 9 PUBLIC WORKS EMPLOYMENT VERIFICATION ACT

§ 9.1 All Contractors and Subcontractors of whatever tier are required to comply with the Public Works Employment Verification Act, 43 P.S §§ 167.1-167.11 and its Chapter 66 implementing guidelines. All Contractors and Subcontractors performing work on this Project are required to comply with Federal Employment Eligibility Requirements through the United States Department of Homeland Security's E-Verify Program. For each employee hired on or after January 1, 2013, Contractors and subcontractors must submit a Public Works Employment Verification Form to the South Fayette Township School District prior to being awarded a Public Works Contract and throughout the duration of the Project, regardless of whether such employees will work onsite or offsite. Contractors and subcontractors shall update the Verification Forms throughout the duration of the Project. Contractors shall include the requirement to comply with this Act in each and every subcontract into which they enter on this Project. The School District will maintain the Form for the duration of the Project. The Form may be accessed at: www.dgs.state.pa.us. The Chapter 66 implementing guidelines are located at: <http://www.pabulletin.com/secure/data/vol42/42-52/index.html>. Information on the E-Verify program can be found at: www.dhs.gov/e-verify.

ARTICLE 10 EMPLOYEE BACKGROUND CHECKS

§10.1 Bidders are advised that the Owner will require employee background checks in accordance with applicable law including Pennsylvania State Police Request for Criminal Record Check, Form SP4-164, Federal Bureau of Investigation criminal history and the Department of Public Welfare, Pennsylvania Child Abuse History Clearance, Form CY-113. Contractors shall provide all documentation to the Owner.

(Table deleted)

§10.2 The Owner shall require a criminal history background check prior to hiring an applicant or accepting the services of a contractor, if the applicant, contractor or contractor's employees shall have direct contact with children. The criminal history check shall not be more than 1 year old at the time of employment or engagement of contracted services. Contractors shall provide all documentation to the Owner.

ARTICLE 11 PENNSYLVANIA PREVAILING MINIMUM WAGE RATES

(Table deleted)

§11.1 This regulation and the general Pennsylvania prevailing minimum wage rates, (Act 442 of 1961, P.L. 987, amended), as determined by the Secretary of Labor and Industry, which shall be paid for each craft or classification of all workers needed to perform the contract during the anticipated term therefor in the locality in which public work is performed, are made part of this specification. If bidders proposal is less than \$25,000, the Bidder shall not be required to meet Prevailing Wage Requirements.

(Table deleted)

ARTICLE 12 DISCRIMINATION (SECTION 755)

§12.1 DISCRIMINATION PROHIBITED: According to 62 Pa. C.S.A. § 3701, the contractor agrees that:

- .1 In the hiring of employees for the performance of work under the contract or any subcontract, no contractor, subcontractor or any person acting on behalf of the contractor or subcontractor shall by reason of gender, race, creed or color discriminate against any citizen of this Commonwealth who is qualified and available to perform the work to which the employment relates.
- .2 No contractor or subcontractor or any person on their behalf shall in any manner discriminate against or intimidate any employee hired for the performance of work under the contract on account of gender, race, creed or color.
- .3 The contract may be canceled or terminated by the government agency, and all money due or to become due under the contract may be forfeited for a violation of the terms or conditions of that portion of the contract.

§12.2 COMPLIANCE WITH HUMAN RELATIONS ACT NO. 222

§12.1The provisions of the Pennsylvania Human Relations Act, Act 222 of October 27, 1955 (P.L. 744) (43 P.S. Section 951, et. Seq.) of the Commonwealth of Pennsylvania prohibit discrimination because of race, color, religious creed, ancestry, age, sex, national origin, handicap or disability, by employers, employment agencies, labor organizations, contractors and others. The Contractor shall agree to comply with the provisions of this Act as amended that is made part of this specification. Your attention is directed to the language of the Commonwealth's non-discrimination clause n 16 PA. Code 49.101.

ARTICLE 13 BUY U.S. STEEL, CAST IRON, MACHINERY, AND EQUIPMENT

(Table deleted)

§13.1 Provision for the Use of Steel and Steel Products Made in the U.S.: In accordance with Act 3 of the 1978 General Assembly of the Commonwealth of Pennsylvania, if any steel or steel products are to be used or supplied in the performance of the contract, only those produced in the United States as defined therein shall be used or supplied in the performance of the contract or any subcontracts thereunder.

(Table deleted)

§13.2 In accordance with Act 161 of 1982, cast iron products shall also be included and produced in the United States. Act 141 of 1984 further defines "steel products" to include machinery and equipment. The act also provides clarification and penalties.

ARTICLE 14 PENNSYLVANIA ONE-CALL

§14.1 Bidders shall acquaint themselves with Act 287 and Amendment Act 172, creating the "One Call System. The successful Contractor shall give notification using the "One Call System" (telephone number 1-800-242-1776) whenever the work includes excavation, tunneling or other potential subsurface disturbances using powered equipment.

DOCUMENT 00 3100 - AVAILABLE PROJECT INFORMATION

Reports and data identified below and referenced as part of this Document are for Bidders' convenience, and are available FOR REFERENCE ONLY for viewing or download by visiting the website of Printscape Imaging and Graphics; Website: <https://printscope.com/>.

South Fayette Township School District and DRAW Collective make no claim to the completeness or accuracy of this available information and will not be held responsible for such. Referenced documents and reports are included for information only and do not constitute part of the Contract Documents.

1.1 SURVEY INFORMATION

- A. Topographic surveys with respect to project site, by Civil and Environmental Consultants, Inc., are available for viewing, titled as follows:

SV-02 OVERALL PLAN OF BOUNDARY & TOPOGRAPHY TAX PARCEL ID: 405-G-7
CEC Project 336-102.3100
Dated January 11, 2024

1.2 SUBSURFACE INVESTIGATION INFORMATION

- A. Reports by Civil and Environmental Consultants, Inc. is available for viewing, titled as follows:

GEOTECHNICAL REPORT
Prepared For: SOUTH FAYETTE SCHOOL DISTRICT
CEC Project 336-102, dated June 9, 2025, revised August 15, 2025

- B. Driller's logs and soil testing information are included in subsurface investigation. Subsurface investigation identifies properties of below grade conditions directed to Architect and Owner for their use and corresponding geotechnical report and recommendations are made available to Bidders for information only.
- C. Subsurface investigation information available to bidders and described herein shall not be construed as Contract Documents. Do not construe recommendations described as a requirement of this Contract, unless specifically referenced in Contract Documents.
- D. Use of Data: Subsurface investigation by its nature cannot reveal all conditions that exist at site. Do not consider data to be representative of entire site. Owner represents that core locations on Drawings show tests boring locations as reported by consultant performing the subsurface investigation. Data is accurate only for the location of the associated core, and only for the date of the core sampling and that conditions may vary in the subgrade, these various conditions do not alter in any way any responsibilities of any contractors to fully continue and complete their site work responsibilities.

1.3 ENVIRONMENTAL ASSESSMENT

- A. Report by Civil and Environmental Consultants, Inc., dated January 5, 2023, is available for viewing, titled as follows:

PHASE I ENVIRONMENTAL SITE ASSESSMENT REPORT
Prepared For: SOUTH FAYETTE SCHOOL DISTRICT
CEC Project 336-102
Dated January 5, 2023

1.4 SITE VISITATIONS

- A. In accordance with the General Conditions of the Contract, Bidders are required to visit the site and become familiar with existing and local conditions.
- B. Those visiting project site are hereby informed that whether or not school is in session, students and children may be present. Those visiting the project site shall coordinate visit with Construction Manager. Visits will be conducted at times convenient to Owner and so as to avoid interference with activities.

- C. Bidders shall comply with all rules and regulations established by Owner. Take adequate precautions and care to prevent disruptions to Owner activities.
- D. Once coordinated with the Construction Manager, those visiting the project site shall sign in at District administration office and leave a business card or neatly printed name, firm name, address, and business telephone number.
- E. A prebid conference will occur as referenced in Document 00 1113 *"Advertisement for Bids."*

END OF DOCUMENT 00 3100

DOCUMENT 00 4313 – BID SECURITY

STANDARD FORM: See sample AIA A310-Bid Bond, 2010 Ed., following this Document page.

As a Proposal Guaranty, a certified check, bank cashier's check, trust company treasurer's check, bid bond on AIA A310 or other approved form, or other form of security permitted by applicable law, in an amount of not less than ten percent (10%) of the Bidder's Base Bid Proposal amount, payable to or indemnifying the SOUTH FAYETTE TOWNSHIP SCHOOL DISTRICT. Proposal Guaranty will be forfeited to and retained by the Owner, as liquidated damages, if this proposal or any part thereof is acceptable by the Owner, and the Bidder fails to furnish approved bonds, other required documents, and the executed contract within the time period required.

END OF DOCUMENT 00 4313

DRAFT

AIA® Document A310™ – 2010

Bid Bond

CONTRACTOR:

(Name, legal status and address)

« »« »
« »

SURETY:

(Name, legal status and principal place of business)

« »« »
« »

OWNER:

(Name, legal status and address)

«South Fayette Township School District »
«3680 Old Oakdale Road, McDonald PA 15057»

BOND AMOUNT: \$ « »

PROJECT:

(Name, location or address, and Project number, if any)

«Project No. 22-S49-01B»
«NEW DISTRICT MAINTENANCE & BUS DEPOT FACILITY
3600 Old Oakdale Road, South Fayette Township, Allegheny County, Pennsylvania »

The Contractor and Surety are bound to the Owner in the amount set forth above, for the payment of which the Contractor and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, as provided herein. The conditions of this Bond are such that if the Owner accepts the bid of the Contractor within the time specified in the bid documents, or within such time period as may be agreed to by the Owner and Contractor, and the Contractor either (1) enters into a contract with the Owner in accordance with the terms of such bid, and gives such bond or bonds as may be specified in the bidding or Contract Documents, with a surety admitted in the jurisdiction of the Project and otherwise acceptable to the Owner, for the faithful performance of such Contract and for the prompt payment of labor and material furnished in the prosecution thereof; or (2) pays to the Owner the difference, not to exceed the amount of this Bond, between the amount specified in said bid and such larger amount for which the Owner may in good faith contract with another party to perform the work covered by said bid, then this obligation shall be null and void, otherwise to remain in full force and effect. The Surety hereby waives any notice of an agreement between the Owner and Contractor to extend the time in which the Owner may accept the bid. Waiver of notice by the Surety shall not apply to any extension exceeding sixty (60) days in the aggregate beyond the time for acceptance of bids specified in the bid documents, and the Owner and Contractor shall obtain the Surety's consent for an extension beyond sixty (60) days.

If this Bond is issued in connection with a subcontractor's bid to a Contractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

When this Bond has been furnished to comply with a statutory or other legal requirement in the location of the Project, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

ADDITIONS AND DELETIONS:

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

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

Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.

ELECTRONIC COPYING of any portion of this AIA® Document to another electronic file is prohibited and constitutes a violation of copyright laws as set forth in the footer of this document.

Signed and sealed this « » day of « », « »

(Witness)

(Witness)

« »

(Contractor as Principal) (Seal)

« »

(Title)

« »

(Surety) (Seal)

« »

(Title)





ADDRESS
470 WASHINGTON ROAD
PITTSBURGH, PA 15228

DRAWCOLLECTIVE.COM

CONTACT
PHONE 412.561.7117
FAX 412.561.9025

00 4325		PRE-BID SUBSTITUTION REQUEST	
Project:	New District Maintenance & Bus Depot Facility	Date:	
DRAW Project No.:	24-S49-01B	To: Jason Day Jason.Day@ pjdick.com	
Contract No.:	24-S49-01B- <u> </u> (01 through 04)	cc: Timothy Reidy TimR @ DRAWcollective.com	
Contract Type:)	GC HC PC EC (circle one)	DRAW Redirect to:	
From: Company Name: Contact Person:		Date:	
		E-mail Address:	
		Telephone:	Fax:

Section No.	Paragraph	SPECIFIED ITEM	PROPOSED SUBSTITUTION

Signature:

Date:

Note: Request for Substitutions received less than five days prior to the Bid Date or by entities other than registered Prime Bidders may be summarily rejected.

Supporting documentation: (required)

The attached data includes product description, specifications, drawings, photographs, and performance and test data and warranty information, as applicable, adequate for evaluation of the request; applicable portions of the data are clearly identified and variation from the specified products are clearly identified.

The attached data also includes a description of changes to the proposed Contract Documents which the requested substitution will require for its proper installation and/or coordination with other work.

The Bidder certifies that the following paragraphs are correct unless clearly noted otherwise in the attachments.

1. The requested substitution does not affect the dimensions shown on the Drawings.
2. The requested substitution does not change the building design, including engineering design or detailing.
3. The requested substitution has no adverse effect (including additional scope of work or cost increase) on any other trades, the contractor's Construction Schedule or any specified warranty requirements.

APPROVED	NOT APPROVED	COMMENTS

Name:	Date:
Company:	

NEW DISTRICT MAINTENANCE & BUS
DEPOT FACILITY

SOUTH FAYETTE TOWNSHIP SCHOOL DISTRICT
DRAW Collective Project No. 24-S49-01B

SECTION 00 4512 - CONTRACTOR'S QUALIFICATIONS STATEMENT

PART 1 - GENERAL

1.1 COMPETENCY CRITERIA

- A. In determining the lowest responsible bidder, the Owner will consider the bidder's integrity, efficiency, financial responsibility, experience, promptness, and ability to successfully, fully, and promptly complete the Project, as set forth more fully in the form below. The Owner will scrutinize the low bidder's information for full disclosure before a bid is awarded.
- B. Failure to provide complete and accurate responses to all inquiries, with supporting documentation where requested, may result in the disqualification of the bidder and/or rejection of the bid.
- C. Failure to disclose a past or current School or Public Work Project Contract may subject the bidder to disqualification and/or its bid to rejection.
- D. Any failure to timely complete work or perform work in accordance with the Construction Contract Documents may result in the disqualification of the bidder and/or rejection of the bid.
- E. Any prior contract termination for cause or convenience and/or default may result in the disqualification of the bidder and/or rejection of the bid.
- F. A bidder whose EMR exceeded 1.0 in any quarter may be subject to disqualification and/or its bid subject to rejection.
- G. Prior construction experience on school projects or projects of equivalent size, nature, and work will be considered. If a bidder lacks prior experience in projects of a similar size or nature, or in work to be performed, it may result in the disqualification of the bidder and/or rejection of the bid.
- H. A bidder who has failed to comply with the Occupational Safety Health Act (OSHA) or its implementing regulations, or who has been the subject of any other regulatory investigation for safety and/or health concerns, and/or was fined or otherwise subjected to civil penalties as a result of such noncompliance, investigation or other malfeasance may be subject to disqualification and its bid subject to rejection.
- I. Failure to comply fully with applicable federal or state statutes and regulations prohibiting discrimination on a Pennsylvania public works project may subject the bidder to disqualification and/or its bid to rejection.
- J. Failure to comply fully with federal, state or local statutes, ordinances or regulations applicable to a Pennsylvania Public School District construction project may subject to the bidder disqualification and/or its bid to rejection.
- K. The filing of voluntary or involuntary bankruptcy within five (5) years of the date of submission of a bid, may subject the bidder to disqualification and/or its bid to rejection. This provision shall encompass predecessor corporations, related entities, partnerships and other entities, and each of the principals of bidder.
- L. Any prior criminal conviction in any federal or state court of a crime relating to the prosecution of a public works project in any jurisdiction within the United States, may subject the bidder to disqualification and its bid

to rejection. These provisions shall apply to the entity submitting the bid, as well as to any of the principals of bidder, or any related entity involved.

- M. A bidder who has a significant history of insurance claims paid, including but not limited to worker's compensation claims, may be subject to disqualification and its bid subject to rejection.

1.2 BIDDER'S RESPONSIBILITY

It is each bidder's responsibility to demonstrate its competency. Accordingly, as part of its bid, each bidder shall furnish to the South Fayette Township School District, the following information and materials:

A. ORGANIZATION

1. List the names, titles, and experience of officers, principals and other key individuals in your organization.
2. Identify how long your organization has been in business as a Contractor.
3. Identify how long your organization has been in business under its present name.
4. List all former and/or other names under which your organization operated.
5. If your organization is a corporation, identify:
 - a. Date of Incorporation;
 - b. State of Incorporation; and
 - c. Names and Contact Information of all Officers.
6. If your organization is a partnership, identify:
 - a. Date of Organization;
 - b. Type of Partnership; and
 - c. Names and Contact Information of all General Partners.
7. If your organization is individually owned, identify:
 - a. Date of Organization; and
 - b. Name of Owner.
8. If your organization operates in a form other than those listed above, describe it and provide the names and contact information of all principals.
9. Provide a copy of each Contractor's Qualification Statement or similar document that you completed and submitted on every project where such disclosure was required during the last year, including current or pending projects.
10. Indicate whether your EMR exceeded 1.0 in any quarter. If so, identify the quarter(s) at issue and your EMR for those quarters.
11. Identify whether you have ever been rejected by any Owner or other contractor because your EMR rating exceeded 1.0. If so, identify your EMR, the project, the project date and the name, address and telephone number of the Owner and/or other contractor who rejected you.

B. REFERENCES

1. Provide three (3) project references for different Owners, including their names, addresses, telephone numbers, contact person(s), name and date of the project and current status of the project.

2. Provide three (3) project Architect references, including their names, addresses, telephone numbers, contact person(s) ad name and date of the project.
3. Provide two (2) trade references, including names, addresses, telephone numbers, and contact person(s).
4. Provide two (2) bank references, including name, addresses, telephone numbers, and contact person(s).

C. LICENSING

1. List all jurisdictions and trade categories in which your organization is legally qualified to do business.
2. List all jurisdictions in which your organization's partnership or trade name is filed.

D. EXPERIENCE

1. List all categories of work that your organization normally performs with its own forces.
2. List all construction projects completed within one (1) year of the bid date, identifying:
 - a. The dollar amount of the original Contract;
 - b. The number of Change Orders that resulted in the extension of time of completion of the project, and the aggregate number of days by which the original substantial completion date was extended;
 - c. The dollar amount of the Change Orders;
 - d. The original substantial completion date;
 - e. The actual substantial completion date;
 - f. The percentage of self-performed work;
 - g. The name, address, telephone number, and contact person(s) of the Architect, Construction Manager, and Clerk of Works;
 - h. Whether you filed any claims or proceedings against any other entity, person or organization involved in the project, providing the identity and contact information of the party against whom you proceeded, a brief description of the claim, the jurisdiction and caption of the case, if applicable and the ultimate disposition;
 - i. Whether any other person, entity or organization involved in the project filed a claim or proceeding against you, providing the identity and contact information of the plaintiff or filing party, a brief description of the claim, the jurisdiction and caption of the case, if applicable and the ultimate disposition; and
 - j. Whether you were terminated for cause or for convenience, or were defaulted on the project, providing the name and contact information of the terminating party and/or the party declaring you in default, cited reason(s) for contract termination and/or default, and whether your Surety paid any money or claim on your behalf.
3. List all construction projects currently pending or under contract, identifying:
 - a. The dollar amount of the original Contract;
 - b. The total worth of work in progress or under contract;
 - c. The number of Change Orders that resulted in the extension of time of completion of the project, and the aggregate number of days by which the original substantial completion date was extended;
 - d. The dollar amount of the Change Orders;
 - e. The original substantial completion date;
 - f. The actual substantial completion date;
 - g. The percentage of self-performed work;

- h. The name, address, telephone number, and contact person(s) of the Architect, Construction Manager, and Clerk of Works;
 - i. Whether you filed or presented any claims or proceedings against any other entity, person or organization involved in the project, providing the identity and contact information of the party against whom you proceeded, a brief description of the claim, the jurisdiction and caption of the case, if applicable and the ultimate disposition;
 - j. Whether any other person, entity or organization involved in the project filed or presented a claim or proceeding against you, providing the identity and contact information of the plaintiff or filing party, a brief description of the claim, the jurisdiction and caption of the case, if applicable and the ultimate disposition; and
 - k. Whether you are terminated for cause or for convenience, or are defaulting or placed on notice of default on the project, providing the name and contact information of the terminating party and/or the party declaring you in default, cited reason(s) for contract termination and/or default, and whether your Surety paid any money on your behalf.
4. List all Public School work completed or in progress during the last calendar year and identify:
- a. The dollar amount of the original Contract;
 - b. The dollar amount of all Change Orders and their percentage of the Project total cost;
 - c. The required substantial completion date;
 - d. The actual substantial completion date;
 - e. The date of final payment;
 - f. The percentage of self-performed work;
 - g. The name, address, telephone number, and contact person(s) of the Architect and/or Construction Manager, project representative or project coordinator, if any;
 - h. The name, address, and telephone number of the School District's Superintendent;
 - i. Whether any other person, entity or organization involved in the project filed or presented a claim or proceeding against you, providing the identity and contact information of the plaintiff or filing party, a brief description of the claim, the jurisdiction and caption of the case, if applicable and the ultimate disposition; and
 - j. Whether you filed or presented a claim or proceeding against any other entity, person or organization involved in the Project, providing the identity and contact information of the party against whom you proceeded, a brief description of the claim, the jurisdiction and caption of the case, if applicable and the ultimate disposition;
 - k. Whether you were terminated for cause or for convenience, or defaulted on the project, providing the name and contact information of the terminating party and/or the party declaring you in default, cited reason(s) for contract termination and/or default, and whether your Surety paid any money on your behalf.
5. Identify whether any work on any project performed in the last year was performed by any entity:
- a. In which you have an Ownership interest,
 - b. That is related to you;
 - c. That was managed by any of your current or former employees; or
 - d. That was a predecessor in interest to you.
6. If you were Subcontractor on any project in the last year, provide the name, address, telephone number and contact person(s) for all of the general contractors for whom you worked.

7. State whether the bidder, either as a principal or an officer of any predecessor or current entity, has defaulted or failed to complete work on a construction project within the previous five (5) calendar years and, if so, identify:
 - a. The project;
 - b. The project Owner;
 - c. The Architect and/or Construction Manager, project representative, or project coordinator, if any; and
 - d. The circumstances of such default.
8. State whether any officer, project superintendent or project manager employed by you in the last five (5) years was employed by any entity that failed to complete work, was placed on notice of default, or was terminated from any project. If so, identify the employer, the project date and the Owner.

E. BONDING

1. Identify the name and address of the bonding company, bonding agent, and surety for each project on which you submitted a bid/performance/maintenance/payment bond in the last year.
2. Provide a statement from the bidder's surety or insurance agent of the bidder's current bonding limit and proof of the rating and level of retained earnings/surplus.

F. INSURANCE

1. Provide the names of every worker's compensation insurance carrier that provided you coverage in each of the last two (2) years.
2. Provide the names, address, telephone number and contact person(s) at each producer and broker for each worker's compensation insurance carrier that provided you coverage in the last two (2) years.

G. CLAIMS/PROCEEDINGS

1. List any and all arbitration proceedings or court proceedings completed or in process during the last two (2) calendar years involving the bidder's performance of any Construction Contract or warranty. Identify:
 - a. The parties to such arbitration or litigation;
 - b. The arbitrator, court or forum of such arbitration or litigation; and
 - c. The case or docket number of such arbitration or litigation.
2. List all judgments and claims awarded, pending and outstanding against your organization within the last two (2) years. Identify:
 - a. The parties to the action;
 - b. The dollar amount of the award;
 - c. The arbitrator, court or forum of the action; and
 - d. The case or docket number of the action.

3. List all claims made against bidder's worker's compensation and general liability insurance policies, and paid by bidder's insurance carrier(s) arising from construction projects on which bidder was awarded a Contract, within the past year. Identify:
 - a. The project and project Owner;
 - b. The type of insurance(s) (workers' compensation or general liability);
 - c. The insurance carrier(s);
 - d. The claimant;
 - e. The date of the claim;
 - f. The event giving rise to the claim;
 - g. The amount of the claim; and
 - h. The final disposition of resolution.
4. State whether the bidder is currently in receipt of any claim of default under any bond. If so, identify:
 - a. The project and project Owner;
 - b. The name of the surety; and
 - c. The name, address, and telephone number of the party declaring default;
 - d. Whether the notice of default resulted in a termination for convenience or for cause;
 - e. Whether the Surety was required to make payment under the bond; and
 - f. Whether you were terminated from the project.

H. FINANCES

1. Provide a current audited financial statement, if available, PROVIDED; HOWEVER, the Owner will respect a bidder's request that the audited financial statement not be provided until, if ever, it is determined that the bidder is one (1) of the three (3) apparent lowest responsible bidders, and will maintain the confidentiality of such information to the extent permitted by law. If a current audited financial statement for the bidder has not been prepared, the bidder must so notify the Owner in writing at the time of submission of the bid, and if the bidder is otherwise one (1) of the three (3) apparent lowest responsible bidders, the bidder must timely provide such other documentation of the bidder's financial status, prepared in accordance with generally accepted accounting principles, as the Owner shall direct. The financial statement and/or other documentation of bidder's financial status must include the most recent balance sheet and income statement showing: current assets; net fixed assets; other assets; current liabilities; and other liabilities. The bidder must identify and provide the name and address of the firm preparing the financial statement or other documentation of a bidder's financial status, as well as the date of the statement.
2. Identify whether the bidder will act as Guarantor of the contract for construction.
3. Provide evidence of a satisfactory credit rating.
4. Have you cross-collateralized security for your bonding with any other entity?
5. Identify by name, address and telephone number any persons, entities or other organizations that pledged security for the benefit of your bonding.

1.3 BID REJECTION

- A. By the submission of any bid, the bidder agrees that in the event that either the bidder is determined not to be the lowest responsible bidder or its bid is rejected by the Owner for any reason and either determination by the Owner is contested by the bidder through the commencement of legal proceedings, whether in law or in equity, the Owner shall be entitled to an award of reasonable attorney fees and costs if the Owner's rejection of the bidder on the basis of the bidder's qualifications or on the basis of its bid is upheld, affirmed, or otherwise not set aside.

1.4 RELEASE

- A. The following statement must be signed and dated by the bidder; failure to do so may, in the Owner's discretion, result in disqualification of the bidder's bid as incomplete.

THIS IS TO AUTHORIZE THE PERSONS AND REFERENCES IDENTIFIED HEREIN, AS WELL AS ANY OTHER REPRESENTATIVES WITH PROJECTS WITH WHICH I OR MY COMPANY HAS BEEN INVOLVED, TO SPEAK FREELY AND WITHOUT HESITATION TO REPRESENTATIVES OF SOUTH FAYETTE TOWNSHIP AREA SCHOOL DISTRICT, INCLUDING ITS SUPERINTENDENT, BUSINESS MANAGER, FACILITIES MANAGEMENT DIRECTOR, ARCHITECT, BOARD OF SCHOOL DIRECTORS, AND ATTORNEY RELATIVE TO ANY OF THE ABOVE MATTERS, OR ANY OTHER SUCH PROJECTS HEREBY RELEASING ALL PERSONS, FIRMS AND CORPORATIONS WHETHER NAMED HEREIN OR NOT, FROM LIABILITY OR FROM ANY ACTION, SUIT, CLAIM OR DEMAND ARISING OUT OF THE RELEASE OF SUCH INFORMATION.

(Signature)

(Title)

(Address)

END OF DOCUMENT 00 4512

State of _____:

:S.S.

County of _____:

I state that I am _____ of
(Title)

_____ and that I am authorized to
(Name of my firm)

make this affidavit on behalf of my firm, and its owners, directors, and officers. I am the person responsible in my firm for the price(s) and the amount of this bid.

I state that:

(1) The price(s) and amount of this bid have been arrived at independently and without consultation, communication, or agreement with any other contractor, bidder, or potential bidder.

(2) Neither the price(s) nor the amount of this bid, and neither the appropriate price(s) nor approximate amount of this bid, have been disclosed to any other firm or person who is a bidder or potential bidder, and they will not be disclosed before bid opening.

(3) No attempt has been made or will be made to induce any firm or person to refrain from bidding on this contract, or to submit a bid higher than this bid, or to submit any intentionally high or noncompetitive bid or other form of complementary bid.

(4) The bid of my firm is made in good faith and not pursuant to any agreement or discussion with, or inducement from, any firm or person to submit a complementary or other noncompetitive bid.

(5) _____
(Name of my firm)

its affiliates, subsidiaries, officers, directors, and employees are not currently under investigation by any governmental agency and have not in the last four years been convicted or found liable for any act prohibited by State or Federal law in any jurisdiction, involving conspiracy or collusion with respect to bidding on any public contract, except as follows:

INSTRUCTIONS FOR NON-COLLUSION AFFIDAVIT

1. This Non-Collusion Affidavit is material to any contract awarded pursuant to this bid. According to the Pennsylvania Antirigging Act, 73 P.S. §§ 1611 et. seq., governmental agencies may require Non-Collusion Affidavits to be submitted together with bids.
2. This Non-Collusion Affidavit must be executed by the member, officer, or employee of the bidder who makes the final decision on prices and the amount quoted in the bid.
3. Bid rigging and other efforts to restrain competition, and the making of false sworn statements in connection with the submission of bids are unlawful and may be subject to criminal prosecution. The person who signs the Affidavit should examine it carefully before signing and assure himself or herself that each statement is true and accurate, making diligent inquiry, as necessary, of all other persons employed by or associated with the bidder with responsibilities for the preparation, approval, or submission of the bid.
4. In the case of a bid submitted by a joint venture, each party to the venture must be identified in the bid documents, and an Affidavit must be submitted separately on behalf of each party.
5. The term "complementary bid" as used in the Affidavit has the meaning commonly associated with that term in the bidding process, and includes the knowing submission of bids higher than the bid of another firm, any intentionally high or noncompetitive bid, and any other form of bid submitted for the purpose of giving a false appearance of competition.
6. Failure to file an Affidavit in compliance with these instructions will result in disqualification of the bid.

I state that _____
(Name of my firm)

understands and acknowledges that the above representations are material and important, and will be relied on by South Fayette Township School District in awarding the contracts for which this bid is submitted. I understand and my firm understands that any misstatement in this affidavit is and is treated as fraudulent concealment from the School District the true facts relating to the submission of bids for this contract.

(Name and Company Position)

SWORN TO AND SUBSCRIBED BEFORE ME THIS _____ DAY

OF _____ 2025.

Notary Public

My Commission Expires

END OF DOCUMENT 00 4519

SECTION 00 5213 – AGREEMENT

PART 1 - GENERAL

1.1 DOCUMENTS

- A. “Standard Form of Agreement Between Owner and Contractor”, AIA Document A132-2019, Articles 1 through 9 inclusive, standard form as modified for this project, will form the basis of Contract between the Owner and Prime Contractor.
- B. Additions and other revisions to standard form text, are incorporated in the modified Document A132 attached.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

DOCUMENT CONTINUES ON NEXT PAGE



AIA® Document A132® – 2019

Standard Form of Agreement Between Owner and Contractor, Construction Manager as Adviser Edition

AGREEMENT made as of the day of in the year
(In words, indicate day, month, and year.)

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

South Fayette Township School District
3680 Old Oakdale Road, McDonald, PA 15157

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

TBD

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

Project No. 24-S49-01B
NEW DISTRICT MAINTENANCE & BUS DEPOT FACILITY
3600 Old Oakdale Road, South Fayette Township, Allegheny County, Pennsylvania

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

PJ Dick Incorporated
225 North Shore Drive,
Pittsburgh, PA 15212

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

DRAW Collective
470 Washington Road
Pittsburgh, PA 15228

The Owner and Contractor agree as follows.

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.

This document is intended to be used in conjunction with AIA Documents A232™–2019, General Conditions of the Contract for Construction, Construction Manager as Adviser Edition; B132™–2019, Standard Form of Agreement Between Owner and Architect, Construction Manager as Adviser Edition; and C132™–2019, Standard Form of Agreement Between Owner and Construction Manager as Adviser. AIA Document A232™–2019 is adopted in this document by reference. Do not use with other general conditions unless this document is modified.

TABLE OF ARTICLES

1	THE CONTRACT DOCUMENTS
2	THE WORK OF THIS CONTRACT
3	DATE OF COMMENCEMENT AND DATES OF SUBSTANTIAL COMPLETION
4	CONTRACT SUM
5	PAYMENTS
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9	ENUMERATION OF CONTRACT DOCUMENTS
	<i>(Paragraph deleted)</i>

ARTICLE 1 THE CONTRACT DOCUMENTS

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

ARTICLE 2 THE WORK OF THIS CONTRACT

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

ARTICLE 3 DATE OF COMMENCEMENT AND DATES OF SUBSTANTIAL COMPLETION

§ 3.1 The date of commencement of the Work shall be:

(Check one of the following boxes.)

- ☐ The date of this Agreement.
- ☒ A date set forth in a notice to proceed issued by the Owner.
- ☐ Established as follows:
(Insert a date or a means to determine the date of commencement of the Work.)

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

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

§ 3.3 Substantial Completion of the Project or Portions Thereof

§ 3.3.1 Subject to adjustments of the Contract Time as provided in the Contract Documents, the date of Substantial Completion of the Work of all of the Contractors for the Project will be:

(Insert the date of Substantial Completion of the Work of all Contractors for the Project.)

As summarized in the Project Manual Division 01, "Summary" Section 01 1000

§ 3.3.2 If the Contractor fails to substantially complete the Work of this Contract, or portions thereof, as provided in this Section 3.3, liquidated damages, if any, shall be assessed as set forth in Section 4.5.

(Table deleted)

(Paragraph deleted)

(Table deleted)

(Paragraphs deleted)

ARTICLE 4 CONTRACT SUM

§ 4.1 The Owner shall pay the Contractor the Contract Sum in current funds for the Contractor's performance of the Contract. The Contract Sum shall be one of the following:

(Check the appropriate box.)

☒ Stipulated Sum, in accordance with Section 4.2

(Paragraphs deleted)

below

§ 4.2 Stipulated Sum

§ 4.2.1 The Contract Sum shall be TBD (\$ TBD), subject to additions and deductions as provided in the Contract Documents.

§ 4.2.2 Alternates

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

Item	Price
TBD	

§ 4.2.2.2 Subject to the conditions noted below, the following alternates may be accepted by the Owner following execution of this Agreement. Upon acceptance, the Owner shall issue a Modification to this Agreement.

(Insert below each alternate and the conditions that must be met for the Owner to accept the alternate.)

Item	Price	Conditions for Acceptance
TBD		

§ 4.2.3 Allowances, if any, included in the Contract Sum:

(Identify each allowance.)

Item	Price
N/A	

§ 4.2.4 Unit prices, if any:

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

Item	Units and Limitations	Price per Unit (\$0.00)
TBD		

(Paragraphs deleted)

(Table deleted)

(Paragraphs deleted)

(Table deleted)

(Paragraphs deleted)

(Table deleted)

(Paragraphs deleted)

(Table deleted)

Init.

(Paragraphs deleted)

(Table deleted)

(Paragraphs deleted)

§ 4.5 Liquidated damages, if any:

(Insert terms and conditions for liquidated damages, if any, to be assessed in accordance with Section 3.4.)

See General Conditions, §8.2.4 through 8.2.8 and 9.11.

(Paragraphs deleted)

ARTICLE 5 PAYMENTS

§ 5.1 Progress Payments

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

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

§ 5.1.3 Provided that an Application for Payment is received by the Construction Manager not later than the first day of a month, the Owner shall make payment of the amount certified to the Contractor not later than the 15th day of the next month. If an Application for Payment is received by the Construction Manager after the application date fixed above, payment of the amount certified shall be made by the Owner not later than Forty-Five (45) days after the Construction Manager receives the Application for Payment.

(Federal, state or local laws may require payment within a certain period of time.)

§ 5.1.4 Progress Payments Where the Contract Sum is Based on a Stipulated Sum

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

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

§ 5.1.4.3 In accordance with AIA Document A232™–2019, General Conditions of the Contract for Construction, Construction Manager as Adviser Edition, and subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

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

- .1 That portion of the Contract Sum properly allocable to completed Work;
- .2 That portion of the Contract Sum properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction, or, if approved in advance by the Owner, suitably stored off the site at a location agreed upon in writing; and
- .3 That portion of Construction Change Directives that the Architect determines, in the Architect's professional judgment, to be reasonably justified.

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

- .1 The aggregate of any amounts previously paid by the Owner;
- .2 The amount, if any, for Work that remains uncorrected and for which the Architect has previously withheld a Certificate for Payment as provided in Article 9 of AIA Document A232–2019;
- .3 Any amount for which the Contractor does not intend to pay a Subcontractor or material supplier, unless the Work has been performed by others the Contractor intends to pay;

- .4 For Work performed or defects discovered since the last payment application, any amount for which the Architect may withhold payment, or nullify a Certificate of Payment in whole or in part, as provided in Article 9 of AIA Document A232–2019; and
- .5 Retainage withheld pursuant to Section 5.1.7.

(Paragraphs deleted)

§ 5.1.7 Retainage

§ 5.1.7.1 For each progress payment made prior to when the Work of this Contract is substantially complete, the Owner may withhold the following amount, as retainage, from the payment otherwise due:

(Insert a percentage or amount to be withheld as retainage from each Application for Payment. The amount of retainage may be limited by governing law.)

Ten Percent.

§ 5.1.7.1.1 All items are not subject to retainage:

§ 5.1.7.2 Reduction or limitation of retainage, if any, shall be as follows:

(If the retainage established in Section 5.1.7.1 is to be modified prior to when the entire Work of this Contract is substantially complete, including modifications for completion of portions of the Work as provided in Section 3.4.2, insert provisions for such modifications.)

When the Project is 51% complete, retainage will be withheld at 5% until the Project has been certified as attaining Final Completion. Owner reserves the right to withhold amounts, in its discretion, that will be sufficient to complete and/or correct the Contractor's Work. In the event a dispute arises between the Owner and any Contractor, which dispute is based upon increased costs claimed by one Prime Contractor occasioned by delays or other actions of another Contractor, additional retainage in the sum of one and one-half times the amount of possible liability may be withheld until such time as a final resolution is agreed to by all parties directly or indirectly involved unless the Contractor causing the additional claim furnished a bond satisfactory to the Owner to indemnify the Owner against the claim.

(Paragraphs deleted)

§ 5.2 Final Payment

§ 5.2.1 Final Payment Where the Contract Sum is Based on a Stipulated Sum

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

- .1 the Contractor has fully performed the Contract except for the Contractor's responsibility to correct Work as provided in Article 12 of AIA Document A232–2019, and to satisfy other requirements, if any, which extend beyond final payment; and
- .2 a final Certificate for Payment or Project Certificate for Payment has been issued by the Architect.

§ 5.2.1.2 The Owner's final payment to the Contractor shall be made no later than 30 days after the issuance of the final Certificate for Payment or Project Certificate for

(Paragraphs deleted)

Payment.

(Paragraphs deleted)

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

(Paragraphs deleted)

ARTICLE 6 DISPUTE RESOLUTION

§ 6.1 Initial Decision Maker

The Architect will serve as Initial Decision Maker pursuant to Article 15 of AIA Document

(Paragraphs deleted)

A232–2019.

§ 6.2 Binding Dispute Resolution

For any Claim subject to, but not resolved by, mediation pursuant to Article 15 of AIA Document A232–2019, the method of binding dispute resolution shall be as follows:

(Check the appropriate box.)

☐ Arbitration pursuant to Article 15 of AIA Document A232–2019.

☐ Litigation in a the Court of Common Pleas of Allegheny County, Pennsylvania.

☐

(Paragraphs deleted)

☒ Other: *(Specify)* As provided in Article 15 of AIA Document A232–2019 as modified.

ARTICLE 7 TERMINATION OR SUSPENSION

§ 7.1 Where the Contract Sum is a Stipulated Sum

§ 7.1.1 The Contract may be terminated by the Owner or the Contractor as provided in Article 14 of AIA Document A232–2019.

§ 7.1.1.1 If the Contract is terminated for the Owner’s convenience in accordance with Article 14 of AIA Document A232–2019, then the Owner shall pay the Contractor a termination fee as follows:

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

The Contractor shall be entitled to receive payment for all accepted and/or approved work, and expenses actually incurred.

§ 7.1.2 The Work may be suspended by the Owner as provided in Article 14 of AIA Document A232–2019.

§ 7.2 Where the Contract Sum is Based on the Cost of the Work with or without a Guaranteed Maximum Price

§ 7.2.1 Termination

§ 7.2.1.1 The Contract may be terminated by the Owner or the Contractor as provided in Article 14 of AIA Document A232–2019.

§ 7.2.1.2 Termination by the Owner for Cause

§ 7.2.1.2.1 If the Owner terminates the Contract for cause as provided in Article 14 of AIA Document A232–2019, the Owner shall then only pay the Contractor an amount as follows:

- .1 Take the Cost of the Work incurred by the Contractor to the date of termination;
- .2 Add the Contractor’s Fee, computed upon the Cost of the Work to the date of termination at the rate stated in Section 4.3.2 or 4.4.2, as applicable, or, if the Contractor’s Fee is stated as a fixed sum in that Section, an amount that bears the same ratio to that fixed-sum Fee as the Cost of the Work at the time of termination bears to a reasonable estimate of the probable Cost of the Work upon its completion;
- .3 Subtract the aggregate of previous payments made by the Owner; and
- .4 Subtract the costs and damages incurred, or to be incurred, by the Owner under Article 14 of AIA Document A232–2019.

(Paragraph deleted)

§ 7.2.1.2.3 The Owner shall also pay the Contractor fair compensation, either by purchase or rental at the election of the Owner, for any equipment owned by the Contractor that the Owner elects to retain and that is not otherwise included in the Cost of the Work under Section 7.2.1.2.1.1. To the extent that the Owner elects to take legal assignment of subcontracts and purchase orders (including rental agreements), the Contractor shall, as a condition of receiving the payments referred to in this Article 7, execute and deliver all such papers and take all such steps, including the legal assignment of such subcontracts and other contractual rights of the Contractor, as the Owner may require for the purpose of fully vesting in the Owner the rights and benefits of the Contractor under such subcontracts or purchase orders. All Subcontracts, purchase orders and rental agreements entered into by the Contractor will contain provisions allowing for assignment to the Owner as described above.

(Paragraphs deleted)

§ 7.3 Suspension

The Work may be suspended by the Owner as provided in Article 14 of AIA Document A232–2019; in such case, the Contract Sum and/or Contract Time shall be adjusted as provided in Article 14 of AIA Document A232–2019,

ARTICLE 8 MISCELLANEOUS PROVISIONS

§ 8.1 Where reference is made in this Agreement to a provision of AIA Document A232–2019 or another Contract Document, the reference refers to that provision as amended or supplemented by other provisions of the Contract Documents.

§ 8.2 The Owner's representative:

(Name, address, email address, and other information)

Mr. Ryan Neely, Director of Finance.
South Fayette Township School District
3680 Old Oakdale Road
McDonald PA 15057
Phone: 412-221-4542 x 421
Email: RKNeeley@southfayette.org

§ 8.3 The Contractor's representative:

(Name, address, email address, and other information)

TBD

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

§ 8.5 Insurance and Bonds

§ 8.5.1 The Owner and the Contractor shall purchase and maintain insurance as set forth in AIA Document A232™–2019, General Conditions of the Contract for Construction, Construction Manager as Adviser Edition, ARTICLE 11 INSURANCE AND BONDS, and elsewhere in the Contract Documents.

§ 8.5.2 The Contractor shall provide bonds as set forth in AIA Document A232™–2019, General Conditions of the Contract for Construction, Construction Manager as Adviser Edition, ARTICLE 11 INSURANCE AND BONDS, and elsewhere in the Contract Documents.

(Paragraphs deleted)

ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS

§ 9.1 This Agreement is comprised of the following documents:

- .1 AIA Document A132™–2019, Standard Form of Agreement Between Owner and Contractor, Construction Manager as Adviser Edition as modified.

(Paragraph deleted)

- .2 AIA Document A232™–2019, General Conditions of the Contract for Construction, Construction Manager as Adviser Edition as modified, including attached Project Safety Plan.

- .3 Drawings: **As listed on Drawing Cover Sheet – CS 100**

- .4 Specifications: **As listed in Project Manual Document 00 0110 – Table of Contents**

- .5

(Paragraphs deleted)

Init.

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User Notes:

(1431586135)

Addenda, if any:

Number	Date	Pages
TBD		

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

(Paragraphs deleted)

.6 Other documents, if any, listed below:
(List here any additional documents that are intended to form part of the Contract Documents. AIA Document A232–2019 provides that the advertisement or invitation to bid, Instructions to Bidders, sample forms, the Contractor’s bid or proposal, portions of Addenda relating to bidding or proposal requirements, and other information furnished by the Owner in anticipation of receiving bids or proposals, are not part of the Contract Documents unless enumerated in this Agreement. Any such documents should be listed here only if intended to be part of the Contract Documents.)

Contractor’s Qualification Statement

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

OWNER *(Signature)*

CONTRACTOR *(Signature)*

President, South Fayette Township School District
Board of School Directors
(Printed name and title)

(Printed name and title)

DOCUMENT 00 6100 – BOND FORMS

PERFORMANCE AND PAYMENT BOND FORMS

STANDARD FORM: See the following AIA standard forms following this page:

1. PERFORMANCE BOND (AIA Document A312 – 2010).
2. PAYMENT BOND (AIA Document A312 – 2010).

Submit the appropriate bond forms, properly executed, after notification of award, in accordance with Articles 6 and 7 of the Instructions to Bidders. Separate Performance and Payment Bond forms will be required.

Performance Bond and Payment Bonds shall each be written in full contract amount for the benefit of Owner.

Alternatively, AIA Document A312 Payment Bond, December 1984 edition may be acceptable, modified as follows:

Change Paragraph 6 to read as follows:

6. After the Claimant has satisfied the conditions of Paragraph 4, and has submitted all supporting documentation, sworn statement, or other such substantiation of its claim as requested by the Surety, the Surety shall, within a reasonable period of time but not exceeding one year from receipt of initial claim in compliance with Paragraph 4, take the following actions:

6.1 Notify the Claimant of the amounts that are undisputed and the basis for challenging any amounts that are disputed, including, but not limited to, the lack of substantiating documentation to support the claim as to entitlement or amount.

6.2 Pay or make arrangements for payment of undisputed amounts; provided, however, that the failure of the Surety to timely dispute or identify any specific defense to all or any part of a claim shall not be deemed to constitute a waiver of the Contractor's or Surety's defenses to, or right to dispute, such claim. Rather, the Claimant shall have the immediate right, without further notice, to bring suit against the Surety to enforce any remedy available to it under this Bond.

END OF DOCUMENT 00 6100

AIA[®] Document A312[™] – 2010

Performance Bond

CONTRACTOR:

(Name, legal status and address)

**SURETY:**

(Name, legal status and principal place of business)

**OWNER:**

(Name, legal status and address)

**CONSTRUCTION CONTRACT**

Date:

Amount: \$

Description:

(Name and location)

**BOND**

Date:

(Not earlier than Construction Contract Date)

Amount: \$

Modifications to this Bond: ☐ None ☐ See Section 16

CONTRACTOR AS PRINCIPAL

Company: (Corporate Seal)

SURETY

Company: (Corporate Seal)

Signature:

Name and

Title:

(Any additional signatures appear on the last page of this Performance Bond.)

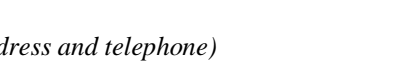


Signature:

Name and

Title:

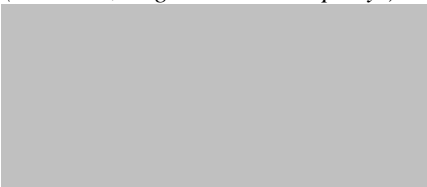
(Any additional signatures appear on the last page of this Performance Bond.)



(FOR INFORMATION ONLY — Name, address and telephone)

AGENT or BROKER:**OWNER'S REPRESENTATIVE:**

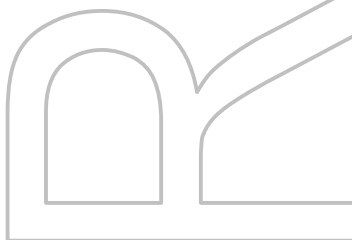
(Architect, Engineer or other party:)

**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.

Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.



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§ 1 The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Owner for the performance of the Construction Contract, which is incorporated herein by reference.

§ 2 If the Contractor performs the Construction Contract, the Surety and the Contractor shall have no obligation under this Bond, except when applicable to participate in a conference as provided in Section 3.

§ 3 If there is no Owner Default under the Construction Contract, the Surety's obligation under this Bond shall arise after

- .1 the Owner first provides notice to the Contractor and the Surety that the Owner is considering declaring a Contractor Default. Such notice shall indicate whether the Owner is requesting a conference among the Owner, Contractor and Surety to discuss the Contractor's performance. If the Owner does not request a conference, the Surety may, within five (5) business days after receipt of the Owner's notice, request such a conference. If the Surety timely requests a conference, the Owner shall attend. Unless the Owner agrees otherwise, any conference requested under this Section 3.1 shall be held within ten (10) business days of the Surety's receipt of the Owner's notice. If the Owner, the Contractor and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Construction Contract, but such an agreement shall not waive the Owner's right, if any, subsequently to declare a Contractor Default;
- .2 the Owner declares a Contractor Default, terminates the Construction Contract and notifies the Surety; and
- .3 the Owner has agreed to pay the Balance of the Contract Price in accordance with the terms of the Construction Contract to the Surety or to a contractor selected to perform the Construction Contract.

§ 4 Failure on the part of the Owner to comply with the notice requirement in Section 3.1 shall not constitute a failure to comply with a condition precedent to the Surety's obligations, or release the Surety from its obligations, except to the extent the Surety demonstrates actual prejudice.

§ 5 When the Owner has satisfied the conditions of Section 3, the Surety shall promptly and at the Surety's expense take one of the following actions:

§ 5.1 Arrange for the Contractor, with the consent of the Owner, to perform and complete the Construction Contract;

§ 5.2 Undertake to perform and complete the Construction Contract itself, through its agents or independent contractors;

§ 5.3 Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract for performance and completion of the Construction Contract, arrange for a contract to be prepared for execution by the Owner and a contractor selected with the Owner's concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract, and pay to the Owner the amount of damages as described in Section 7 in excess of the Balance of the Contract Price incurred by the Owner as a result of the Contractor Default; or

§ 5.4 Waive its right to perform and complete, arrange for completion, or obtain a new contractor and with reasonable promptness under the circumstances:

- .1 After investigation, determine the amount for which it may be liable to the Owner and, as soon as practicable after the amount is determined, make payment to the Owner; or
- .2 Deny liability in whole or in part and notify the Owner, citing the reasons for denial.

§ 6 If the Surety does not proceed as provided in Section 5 with reasonable promptness, the Surety shall be deemed to be in default on this Bond seven days after receipt of an additional written notice from the Owner to the Surety demanding that the Surety perform its obligations under this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner. If the Surety proceeds as provided in Section 5.4, and the Owner refuses the payment or the Surety has denied liability, in whole or in part, without further notice the Owner shall be entitled to enforce any remedy available to the Owner.

§ 7 If the Surety elects to act under Section 5.1, 5.2 or 5.3, then the responsibilities of the Surety to the Owner shall not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surety shall not be greater than those of the Owner under the Construction Contract. Subject to the commitment by the Owner to pay the Balance of the Contract Price, the Surety is obligated, without duplication, for

- .1 the responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;
- .2 additional legal, design professional and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under Section 5; and
- .3 liquidated damages, or if no liquidated damages are specified in the Construction Contract, actual damages caused by delayed performance or non-performance of the Contractor.

§ 8 If the Surety elects to act under Section 5.1, 5.3 or 5.4, the Surety's liability is limited to the amount of this Bond.

§ 9 The Surety shall not be liable to the Owner or others for obligations of the Contractor that are unrelated to the Construction Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than the Owner or its heirs, executors, administrators, successors and assigns.

§ 10 The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders and other obligations.

§ 11 Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and shall be instituted within two years after a declaration of Contractor Default or within two years after the Contractor ceased working or within two years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this Paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

§ 12 Notice to the Surety, the Owner or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears.

§ 13 When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

§ 14 Definitions

§ 14.1 **Balance of the Contract Price.** The total amount payable by the Owner to the Contractor under the Construction Contract after all proper adjustments have been made, including allowance to the Contractor of any amounts received or to be received by the Owner in settlement of insurance or other claims for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Construction Contract.

§ 14.2 **Construction Contract.** The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and changes made to the agreement and the Contract Documents.

§ 14.3 **Contractor Default.** Failure of the Contractor, which has not been remedied or waived, to perform or otherwise to comply with a material term of the Construction Contract.

§ 14.4 **Owner Default.** Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

§ 14.5 **Contract Documents.** All the documents that comprise the agreement between the Owner and Contractor.

§ 15 If this Bond is issued for an agreement between a Contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

§ 16 Modifications to this bond are as follows:

(Space is provided below for additional signatures of added parties, other than those appearing on the cover page.)

CONTRACTOR AS PRINCIPAL

Company: _____ (Corporate Seal)

Signature: _____
Name and Title: _____
Address: _____

SURETY

Company: _____ (Corporate Seal)

Signature: _____
Name and Title: _____
Address: _____



ADDRESS
470 WASHINGTON ROAD
PITTSBURGH, PA 15228

DRAWCOLLECTIVE.COM

CONTACT
PHONE 412.561.7117
FAX 412.561.9025

00 6313		REQUEST FOR INTERPRETATION	
Project:	Additions and Alterations South Fayette Intermediate School	Date:	
DRAW Project No.:	24-S49-01B	To: Jason Day Jason.Day @ pjdict.com	
Contract No.:	24-S49-01B – _____ (01 through 04)	cc: Timothy Reidy TimR @ DRAWcollective.com	
Contract Type:	GC HC PC EC (circle one)	DRAW Redirect to:	
From:		Date:	
Company Name:	E-mail Address:		
Contact Person:	Telephone:	Fax:	

Ref: Section/ Drawing No.	No.	QUESTION
	1.	
Signature:		Date:

No.	RESPONSE
1.	
Name:	
Company:	
Date:	

SECTION 00 7213 – CONDITIONS OF THE CONTRACT

PART 1 - GENERAL

1.1 DOCUMENTS

- A. “General Conditions of the Contract for Construction”, AIA Document A232-2019, Articles 1 through 16 inclusive, as modified for this Project, attached following this document, will be incorporated as part of the Contract.
- B. Supplementary Conditions of the Contract, in the form of additions and other revisions to standard form text, are integral with the modified Document A232 attached.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

DOCUMENT CONTINUES ON NEXT PAGE



AIA[®] Document A232[®] – 2019

General Conditions of the Contract for Construction, Construction Manager as Adviser Edition

for the following PROJECT:

Project No. 24-S49-01B

NEW DISTRICT MAINTENANCE & BUS DEPOT FACILITY

3600 Old Oakdale Road, South Fayette Township, Allegheny County, Pennsylvania

THE CONSTRUCTION MANAGER:

PJ Dick Incorporated

225 North Shore Drive,
Pittsburgh, PA 15212

THE OWNER:

South Fayette Township School District

3680 Old Oakdale Road, McDonald, PA 15157

THE ARCHITECT:

DRAW Collective

470 Washington Road
Pittsburgh, PA 15228

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.

This document is intended to be used in conjunction with AIA Documents A132[™]–2019, Standard Form of Agreement Between Owner and Contractor, Construction Manager as Adviser Edition; B132[™]–2019, Standard Form of Agreement Between Owner and Architect, Construction Manager as Adviser Edition; and C132[™]–2019, Standard Form of Agreement Between Owner and Construction Manager as Adviser.

TABLE OF ARTICLES

1	GENERAL PROVISIONS
2	OWNER
3	CONTRACTOR
4	ARCHITECT AND CONSTRUCTION MANAGER
5	SUBCONTRACTORS
6	CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS
7	CHANGES IN THE WORK
8	TIME
9	PAYMENTS AND COMPLETION
10	PROTECTION OF PERSONS AND PROPERTY
11	INSURANCE AND BONDS
12	UNCOVERING AND CORRECTION OF WORK
13	MISCELLANEOUS PROVISIONS
14	TERMINATION OR SUSPENSION OF THE CONTRACT
15	CLAIMS AND DISPUTES
16	EQUAL EMPLOYMENT OPPORTUNITY

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), Contractor's Qualification Statement, 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 portions of addenda relating to bidding requirements. Prime contractors shall require each and every one of their subcontractors to be bound by the terms of these Contract documents and shall make them available to subcontractors at the time of bidding and as necessary throughout construction to complete Project work.

§ 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 the Construction Manager or the Construction Manager's consultants, (3) between the Owner and the Architect or the Architect's consultants, (4) between the Contractor and the Construction Manager or the Construction Manager's consultants, (5) between the Owner and a Subcontractor or Sub-subcontractor (6) between the Construction Manager and the Architect, or (7) between any persons or entities other than the Owner and Contractor. The Construction Manager and Architect shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of their duties.

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

§ 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.

§1.1.3.1 The Work shall include the obligation of the Contractor to visit the site of the project before submitting a proposal. Such site visit shall be for the purpose of familiarizing the Contractor with the conditions as they exist and the character of the operations to be carried on under the Contract Documents, including all existing site conditions, access to the site, physical characteristics of the site and surrounding areas.

§ 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 other Contractors, and by the Owner's own forces and Separate Contractors.

§ 1.1.5 Contractors. Contractors are persons or entities, other than Separate Contractors, who perform Work under contracts with the Owner that are administered by the Architect and Construction Manager. "Lead Contractor" is applicable to a Contractor on a single project with multiple prime contracts as defined in the Project Manual "Multiple Contract Summary" Section 01 1200 of the Project Manual.

§ 1.1.6 Separate Contractors. Separate Contractors are persons or entities who perform construction under separate contracts with the Owner not administered by the Architect and Construction Manager.

§ 1.1.7 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.

§ 1.1.8 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.

§ 1.1.9 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.

§ 1.1.10 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 defined in Division 01 Section "References" or elsewhere 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.

§ 1.2.4 Sections of Division 01 – General Requirements govern the execution of all Work of all sections of the Specifications.

§ 1.3 Capitalization

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

§ 1.4 Interpretation

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

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

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

§ 1.5.2 The Contractor, Subcontractors, Sub-subcontractors, and suppliers are authorized to use and reproduce the Instruments of Service provided to them, subject to any protocols established pursuant to Sections 1.7 and 1.8, solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and suppliers may not

use the Instruments of Service on other projects or for additions to the Project outside the scope of the Work without the specific written consent of the Owner, Architect, and the Architect's consultants.

§ 1.6 Notice

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

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

§ 1.7 Digital Data Use and Transmission

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

§ 1.8 Building Information Models Use and Reliance

Any use of, or reliance on, all or a portion of a building information model without agreement to protocols governing the use of, and reliance on, the information contained in the model and without having those protocols set forth in AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, and the requisite AIA Document G202™–2013, Project Building Information Modeling Protocol Form, shall be at the using or relying party's sole risk and without liability to the other party and its contractors or consultants, the authors of, or contributors to, the building information model, and each of their agents and employees.

ARTICLE 2 OWNER

§ 2.1 General

§ 2.1.1 The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Owner may from time to time designate in writing a representative who shall have limited authority with respect to Owner responsibilities and decisions on behalf of the Owner. Otherwise, authority to bind the Owner with respect to matters requiring the Owner's approval is reserved by the Owner's Board of School Directors. Except as otherwise provided in Section 4.2.1, the Construction Manager and the Architect do not have such authority. The term "Owner" means the Owner or the Owner's authorized representative.

(Paragraph deleted)

§ 2.2 [Not used]

(Paragraphs deleted)

§ 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. Unless otherwise provided under the Contract Documents, the Owner, assisted by the Construction Manager, shall secure and pay for the building permit.

§ 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 The Owner shall retain a construction manager adviser lawfully practicing construction management in the jurisdiction where the Project is located. That person or entity is identified as the Construction Manager in the Agreement and is referred to throughout the Contract Documents as if singular in number.

§ 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.

§ 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.

§ 2.3.7 The Owner shall forward all communications to the Contractor through the Construction Manager. Other communication shall be made as set forth in Section 4.2.6.

(Paragraph deleted)

§ 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 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.

§ 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 review by the Construction Manager and prior approval of the Architect, and the Construction Manager or 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 Construction Manager's and Architect's and their respective consultants' 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 Construction Manager or Architect in their administration of the Contract, or by tests, inspections or approvals required or performed by persons or entities other than the Contractor.

§ 3.1.4 **Mutual Responsibility of Contractors** Should the Contractor, in the performance of this Contract, cause or allow to be caused, damage to any persons, property or work of another Prime Contractor working on this Project, they shall upon due notice to do so from the Owner or other party to the damage, arrange for prompt and amicable settlement thereof. It is agreed by all parties herein that such disputes shall not delay completion of the Work, nor be cause for claims against the Owner. The Owner, its officers, Board members, agents and employees, shall not be liable to Contractor for any increased costs or damages resulting from defective work, interference, or delays of any other contractor or its subcontractors. Work shall be continued by the party claiming damages at his expense, subject to such damages as may be obtained by due course of law.

§3.1.5 **Separate Contracts** The Owner reserves the right to let other contracts in connection with this Project. If any part of a Contractor's work depends upon Work being done by another not under the jurisdiction of the Contractor, the latter shall inspect and promptly report to the Architect and Construction Manager, any defects in the Work done or

being done by the other as well as delays in the progress of the Work. Failure on the part of the Contractor to so inspect and report such defects of delays in sufficient time to prevent any added costs or damage therefrom shall constitute an acceptance of this Work by the Contractor and the Contractor shall be liable for such increased cost or damage.

§ 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 2.3.5, 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 Construction Manager and Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information submitted to the Construction Manager in such form as the Construction Manager and 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 Construction Manager and Architect any nonconformity discovered by or made known to the Contractor as a request for information submitted to Construction Manager in such form as the Construction Manager and 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, the Construction Manager, and the 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. The Construction Manager shall review the proposed alternative for sequencing, constructability, and coordination impacts on the other Contractors. Unless the Architect or the Construction Manager 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 the Project 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 (excluding premium for Workers' Compensation and General Liability insurance in the event such insurance is provided by the Owner in accordance with the insurance provisions hereinafter), 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 After the Contract has been executed, the Owner, the Construction Manager, and the Architect will consider a formal request for the substitution of products in place of those specified only under the conditions set forth in the General Requirements (Division 01 of the Specifications). By making requests for substitutions, the Contractor:

- .1 represents that the Contractor has personally investigated the proposed substitute product and determined that it is equal or superior in all respects to that specified;
- .2 represents that the Contractor will provide the same warranty for the substitution that the Contractor would for that specified;
- .3 certifies that the cost data presented is complete and includes all related costs under this Contract except the Architect's redesign costs, and waives all claims for additional costs related to the substitution which subsequently become apparent; and
- .4 will coordinate the installation of the accepted substitute, making such changes as may be required for the Work to be complete in all respects.

§ 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.

§ 3.4.4 The Owner is entitled to deduct from the Contract Sum amounts paid to the Architect to evaluate the Contractor's proposed substitutions and to make agreed-upon changes in the Drawings and Specifications made necessary by the Owner's acceptance of such substitutions.

§ 3.5 Warranty

§ 3.5.1 The Contractor warrants to the Owner, Construction Manager, 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 Construction Manager or 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.

§ 3.5.3 All material and workmanship shall be guaranteed for a minimum of eighteen (18) months from date of Substantial Completion, except where a longer period is specified, and each Contractor shall make good without cost to the Owner any defective portion of the Work of which the Contractor is notified within eighteen (18) months of the date of final payment of the Contract. Repair or replacement of such defects shall extend to other work damaged thereby. This warranty does not limit or waive Owner's rights arising from defective or non-conforming work regardless of when discovered and Owner's rights and remedies hereunder shall be in addition to any other rights and remedies which Owner may have pursuant to law or this Contract. Owner shall be entitled to all other rights and remedies provided by this Contract and by law, in addition to the Warranty rights and remedies set forth in this paragraph.

§ 3.5.4 The Contractor shall forward guarantee and warranty registration cards to the manufacturers in the name of the Owner showing date of acceptable substantial completion of the Work as the beginning date for the guarantee and warranty periods.

§ 3.6 Taxes

The Contractor shall pay sales, consumer, use and similar taxes for the Work or portions thereof 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.

§3.6.1 The Contractor pays wage and occupation taxes as required by local municipality at project site.

§3.6.2 The Contractor must not pay sales or use tax on "building machinery and equipment" (or services to such property) which is transferred to the Owner under this Contract. Remit any tax savings not contemplated in the Contractor's original bid from the Contractor to the Owner as each Application for payment is submitted to the Owner for payment or upon earlier or later identification. In the event that the Owner identifies property that was or could have been purchased exempt from tax by the Contractor for which the Owner has not received a refund, the Owner is authorized to reduce the Final payment by the amount of the sales and use tax savings that was or should have been realized on "building machinery and equipment." Building machinery and equipment are defined as generation equipment, storage equipment, conditioning equipment, distribution equipment, and termination equipment, whether or not: (a) the item constitutes a fixture or is otherwise affixed to the real estate; (b) damage would be done to the item or its surroundings upon removal; (c) the item is physically located within a real estate structure. The exemption is limited to the following types of machinery and equipment:

- .1 air conditioning limited to heating, cooling, purification, humidification, dehumidification, and ventilation;
- .2 electrical (not including wire, conduit, receptacle and junction boxes);
- .3 plumbing (not including pipes, fittings, pipe supports and hangers);
- .4 communications limited to voice, video, data and sound;
- .5 alarms limited to fire, security, and detection;
- .6 control systems limited to energy management, traffic, and parking lot and building access;
- .7 medical systems limited to diagnosis and treatment, medical gas, nurse call, and doctor paging;
- .8 laboratory system;
- .9 cathodic protection system;
- .10 furniture, cabinetry, and kitchen equipment.

§3.6.3 The Contractor checks all materials, equipment, and labor entering into the Work and keeps full and detailed accounts and exercises such controls as may be necessary for proper financial management under this Contract; the accounting and control systems must be satisfactory to the Owner. The Owner and the Owner's Representative must be afforded access to the Contractor's records, books, correspondence, instructions, drawings, receipts, subcontracts, purchase orders, vouchers, memoranda and other data relating to this Contract, and the Contractor preserves these for a period of 3 years after final payment, or for such longer period as may be required by law.

3.6.4 Refund Claims:

The Owner may be entitled to claim refunds of sales or use tax paid on other purchases of tangible personal property or service required in connection with the Work. The Owner or its agent shall have the right at the Owner's expense to review the books and records of the Contractor and all subcontractors for the purpose of documenting and substantiating any such refund claim. Contractor and all subcontractors hereby assign to the Owner any rights to refund claims and to any resulting refund and hereby appoint the Owner as their attorney-in-fact to execute and to acknowledge in their respective names and to prosecute such refund claims before administrative agencies and courts in Pennsylvania having jurisdiction over such claims. The Contractor and all subcontractors shall cooperate fully with Owner in pursuing any such refund claim and shall make available to Owner any applicable documents. The Contractor and its sub-contractors shall not file a claim for refund for any sales or use tax which is the subject of this assignment.

§ 3.7 Permits, Fees, Notices, and Compliance with Laws

§ 3.7.1 Unless otherwise provided in the Contract Documents, the Owner, assisted by the Construction Manager, shall secure and pay for the building permit. The Contractor shall secure and pay 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. The Contractor shall at all times observe, comply with, and post as required all Federal, State, and local laws, ordinances, and regulations in any manner affecting conduct of work or applying to employees on project, as well as all orders or decrees which have been or may be promulgated or enacted by any legal bodies or tribunals having authority or jurisdiction over work, materials, employees, or contract. Contractor protects and indemnifies Owner and its representatives, the Construction Manager and its representatives, and Architect and its representatives against any claim or liability arising from or based on violation of any such law, ordinance, regulation, order, or decree, whether by contractor or its employees.

§ 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 subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents the Contractor shall promptly provide notice to the Owner, the Construction Manager, and the Architect before conditions are disturbed and in no event later than 21 days after first observance of the conditions. The Construction Manager and the Architect will promptly investigate such conditions and, if they determine that the conditions 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 an equitable adjustment in the Contract Sum or Contract Time, or both. If the Construction Manager and the Architect determine 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 Construction Manager shall promptly notify the Owner and Contractor in writing, stating the reasons. If either party disputes the determination or recommendation, that party may proceed 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, Construction Manager, 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

Not Applicable.

(Paragraphs deleted)

§ 3.9 Superintendent

§ 3.9.1 The Contractor shall provide continuous supervision at the project site by a duly authorized and competent superintendent, who shall be acceptable to the Owner, when any work is being performed at the project site by any Prime Contractor or any Subcontractor. At the Owner's request, the Contractor shall assign a different superintendent to the Project. The assignment of a new superintendent shall be without cost to the Owner. The Contractor shall submit to the Owner the name and qualifications of their superintendent at the Initial Job Conference. The Contractor shall not change their superintendent without written approval of the Owner, and must submit to the Owner, in writing, justification for the change, along with the name and qualifications of the individual whom the Contractor proposes to be the new superintendent. The Owner may withhold any payments which are pending or may suspend the work at the Contractor's expense, if the Contractor fails to comply with the provisions of this paragraph.

§ 3.9.2 The Superintendent shall represent the Contractor and all directions and communications given to the Superintendent shall be as binding as if given to the Contractor. Important communications shall be confirmed in writing. Other communications shall be similarly confirmed on written request in each case.

§ 3.9.3 The Contractor shall not employ a proposed superintendent to whom the Owner, Construction Manager, 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, and the Construction Manager's use in developing the Project schedule, a Contractor's ("CPM") 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. The Contractor shall cooperate with the Construction Manager in scheduling and performing the Contractor's Work to avoid conflict with, and as to cause no delay in, the work or activities of other Contractors, or the construction or operations of the Owner's own forces or Separate Contractors.

§ 3.10.1.1 By submitting its bid and by executing the Contract, the Contractor represents that it understands that the scheduling requirements are intended to place the burden of early planning, active coordination and communication regarding the planned work on the Contractor and that the purpose of the scheduling requirements is an essential part of meeting that contractual burden. Any failure by the Contractor to comply with any scheduling requirement shall be a material breach of this Contract and if the Contractor fails to comply strictly with any such requirements, the Contractor shall not be entitled to make any claim for any damages that occur because of impacts to its Work, inefficiencies or delays, whether or not the Owner has also materially breached its contract by failing to perform in accordance with its obligations or by actively interfering with the Contractor's Work on the project.

Further, by submitting an application for payment, Contractor represents that it has met each and every scheduling requirement up to that period covered in the application. Contractor agrees that no waiver of any scheduling requirement can occur unless the Contractor indicates in writing that it does not intend to perform such requirement before such requirement is due to be met and Owner acknowledges in writing that the Contractor is relieved of its obligation to perform the requirement.

§3.10.1.2 Contractor and its subcontractors are expected to execute their work in accordance with the baseline schedule and to maintain the dates indicated as Early Start and Early Finish dates on the schedule. If after updating the schedule and in the opinion of the Architect and Construction Manager, the Contractor is not maintaining the planned progress for the work according to the updated schedule, the Contractor may be required to submit to the Architect and Construction Manager within 7 days of the request, a schedule for the recovery of the progress for that portion of the Work. The Contractor shall provide any and all resources that are required to maintain the progress of the Work according to the updated schedule at no additional cost to the Owner. These resources include but are not limited to personnel, material, and equipment, extended working hours or workdays, additional crews and additional shift work in order to maintain the required progress at no additional cost to the Owner. Any requests for payment from that Contractor may be held in suspense until the recovery schedule is submitted and approved by the other Contractors, the Construction Manager and the Architect.

§3.10.1.3 The Owner shall have the right to use or occupy any completed or partially completed portions of the Work, whether or not the time may have expired for completing the entire Work or said portions of Work, but such use or occupancy shall not be deemed as acceptance of the Work or portion thereof. Prior to such use or occupancy, an inspection shall be made by the Owner to determine conformity of the Work with the Contract, and any subsequent damage thereto due solely to the use and occupancy of the completed portion, will not be the responsibility of the Contractor.

§ 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 Construction Manager's and Architect's approval. The Architect and Construction Manager'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 Construction Manager and 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 participate with other Contractors, the Construction Manager, and the Owner in reviewing and coordinating all schedules for incorporation into the Project schedule that is prepared by the Construction Manager. The Contractor shall make revisions to the construction schedule and submittal schedule as deemed necessary by the Construction Manager to conform to the Project schedule.

§ 3.10.4 The Contractor shall perform the Work in general accordance with the most recent schedules submitted to the Owner, Construction Manager, and Architect, and incorporated into the approved Project schedule.

§3.10.5 The Prime Contractors and their subcontractors are expected to execute their work in accordance with the baseline schedule and to maintain the dates indicated as Early Start and Early Finish dates on the schedule. If after updating the schedule and in the opinion of the Construction Manager, and/or the Owner or the Owner's representative, the Prime Contractor is not maintaining the planned progress for the work according to the updated schedule, the Prime Contractor may be required to submit to the Construction Manager within 3 days of the request, a schedule for the recovery of the progress for that portion of the Work. The Prime Contractor shall provide any and all resources that are required to maintain the progress of the Work according to the updated schedule at no additional cost to the Owner. These resources include but are not limited to personnel, material, and equipment, extended working hours or workdays, additional crews and additional shift work in order to maintain the required progress at no additional cost to the Owner. Any requests for payment from that Prime Contractor will be held in suspense until the recovery schedule is submitted and approved by the other Prime Contractors and the Construction Manager.

§3.10.6 The Lead Contractor for this Project is as identified in the Project Manual Division 01 Section "Summary" 01 1000. The Lead contractor is responsible for making all coordination decisions not mutually agreed to by the affected Prime Contractors. Disputes between the Lead Contractor and one or more other Prime Contractors, and disputes between two or more Prime Contractors pertaining to the creation of the Project schedule, the furnishing of additional resources to meet the Project schedule, job coordination, and all aspects of the coordination, means and methods of construction shall be submitted promptly to the lead Contractor for final construction decision as coordinated with the Construction Manager.

§3.10.7 The final construction decision of the Lead Contractor must at all times be consistent with the Contract Documents. The final construction decision of the Lead Contractor will be observed, accepted, and fully followed by all Prime Contractors and their Subcontractors and Sub-Subcontractors on the Project. The progress of the Work in accordance with the final construction decision of the Lead Contractor shall not be delayed, pending any Court proceedings against other Prime Contractor(s). The damage remedy through litigation in the Court of Common Pleas shall be the exclusive remedy for disputes between the Contractors. The Contractors, including the Lead Contractor, shall have no right of action against the Owner in connection with any such disputes. Each Prime Contractor is financially responsible to the other Prime Contractors for undue delay. Each Prime contractor shall defend and hold harmless the Owner for any claims, losses or delays of any kind whatsoever made by other Contractors arising from delays caused by such Prime Contractor.

§3.10.8 The Owner, its officers, Board members, agents and employees shall not be liable to any Prime contractor for any increased costs or damages resulting from defective work, interference, or delays of other prime contractors or their subcontractors. The Owner, its officers, Board members, agents and employees, and the Architect shall not be a party to disputes or actions between prime contractors or subcontractors concerning such additional expense, damage or other claims or disputes. It is agreed by all parties that disputes or actions between Contractors concerning the additional expense or damage mentioned above shall not delay completion of the Project.

§ 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 Construction Manager, Architect, and Owner, and delivered to the Construction Manager 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 and Construction Manager is subject to the limitations of Sections 4.2.10 through 4.2.12. Informational submittals upon which the Construction Manager and Architect are 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 Construction Manager or Architect without action.

§ 3.12.5 The Contractor shall review for compliance with the Contract Documents, approve, and submit to the Construction Manager, Shop Drawings, Product Data, Samples, and similar submittals required by the Contract Documents, in accordance with the Project submittal schedule approved by the Construction Manager and Architect or, in the absence of an approved Project submittal schedule, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of other Contractors, Separate Contractors, or the Owner's own forces. The Contractor shall cooperate with the Construction Manager in the coordination of the Contractor's Shop Drawings, Product Data, Samples, and similar submittals with related documents submitted by other Contractors.

§ 3.12.6 By submitting Shop Drawings, Product Data, Samples, and similar submittals, the Contractor represents to the Owner, Construction Manager, 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 reviewed and 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 Construction Manager and 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 Construction Manager and 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, the Architect, and the Construction Manager 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. The Construction Manager shall review submittals for sequencing, constructability, and coordination impacts on other Contractors.

§ 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 Construction Manager and Architect at the time and in the form specified by the Architect.

§ 3.13 Use of Site

§ 3.13.1 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.

§ 3.13.2 The Contractor shall coordinate the Contractor's operations with, and secure the approval of, the Construction Manager before using any portion of the site.

§ 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, Separate Contractors, or of other Contractors by cutting, patching, or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter construction by the Owner, Separate Contractors, or by other Contractors except with written consent of the Construction Manager, Owner, and such other Contractors or Separate Contractors. Consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold, from the Separate Contractors, other Contractors, or the Owner, 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 The Contractor shall clean the Work areas daily and should the occasion arise that the Construction Manager, Owner, or Architect must direct the Contractor to clean an area, the Contractor shall do so within 24 hours. If the Contractor fails to clean up the specific area within the allotted time, the Owner may do so immediately, and the cost thereof shall be charged to the Contractor.

§ 3.16 Access to Work

The Contractor shall provide the Owner, Construction Manager, 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, Construction Manager, 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, Architect, or Construction Manager. 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 through the Construction Manager.

§ 3.18 Indemnification

§ 3.18.1 To the fullest extent permitted by law and to the extent claims, damages, losses or expenses are not covered by insurance supplied by either the Owner, the Contractor, or the Subcontractors as required by Article 11 of this Contract, the Contractor shall indemnify, defend (at Owner's request and through counsel reasonably acceptable to Owner), and hold harmless the Owner, Construction Manager, Architect, Construction Manager's and 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), including loss of use resulting therefrom, but only to the extent caused by the negligent or otherwise wrongful 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. To the fullest extent permitted by law, the Contractor, for itself and for its Subcontractors and suppliers and their respective agents, employees and servants, expressly waives any and all immunity or damage limitation provisions available to any agent, employee or servant under any workers compensation acts, disability benefit acts or other employee benefit acts, to the extent such statutory or case law would otherwise limit the amount recoverable pursuant to this indemnity provision.

§3.18.3 The Contractor and each Subcontractor, of whatever tier, hereby certifies to the School District that it complies with all employment related laws and regulations governing employment or collective bargaining agreements, if any. Nothing in this agreement shall be construed as divesting any contractor or Subcontractor of its sole and exclusive right to control the means, manner or method of performance of the Work of any contractor or their employees. Nothing in this Agreement shall be construed in a manner that would be violative of the legal or contractual rights of any employee. The Contractor, and each Subcontractor, regardless of tier, shall defend, hold harmless and indemnify the Owner against and from any and all claims, demands, suits, actions, costs and expenses including reasonable attorneys' fees, arising out of or resulting from any claims by an employee or independent contractor of any Contractor or Subcontractor of any tier alleging the violation of any of the individuals' employment rights, whether legal, constitutional or contractual in nature even if caused in whole or in part by the acts or omissions of the Owner. This provision shall be accorded the broadest meaning permitted by law.

§3.18.4 The Contractor agrees to indemnify, defend and hold harmless the Owner from and against any and all administrative and judicial actions (including reasonable attorneys' fees related to any such actions) and judgments incurred by the Owner in connection with any labor-related activity arising from the Contractor's performance of the Work. As used in these Contract Documents, "labor-related activity" includes, but is not limited to, strikes, walk-outs, informational or organizations picketing, use of placards, distribution of hand-outs, leaflets or other similar acts at or in the vicinity of the Project or in the vicinity of any other facility where the Owner conducts business. The Owner shall advise the Contractor if any labor-related activity occurs and the contractor shall arrange for the legal representation necessary to protect the Owner's interest, provided such representation is approved by the Owner in advance.

§3.18.7 Compliance with insurance requirements shall not relieve Contractor of any responsibility to indemnify

Owner, Architect, Construction Manager or their respective consultants, agents and employees pursuant to this paragraph 3.18. Indemnity obligations shall not be reduced or negated by virtue of any insurance carrier's denial of insurance coverage for the occurrence or event that is the subject matter of the claim or refusal to defend Owner, Architect and Construction Manager as additional insureds.

ARTICLE 4 ARCHITECT AND CONSTRUCTION MANAGER

§ 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 The Construction Manager is the person or entity retained by the Owner pursuant to Section 2.3.3 and identified as such in the Agreement.

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

§ 4.2 Administration of the Contract

§ 4.2.1 The Construction Manager and Architect will provide administration of the Contract as described in the Contract Documents and will be the Owner's representatives during construction until the date the Architect issues the final Certificate for Payment. The Construction Manager and 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. On the basis of the site visits, the Architect will keep the Owner and the Construction Manager reasonably informed about the progress and quality of the portion of the Work completed, and promptly report to the Owner and Construction Manager known deviations from the Contract Documents and defects and deficiencies observed in the Work.

§ 4.2.3 The Construction Manager shall provide one or more representatives who shall be in attendance at the Project site whenever the Work is being performed. The Construction Manager will determine in general if the Work observed is being performed in accordance with the Contract Documents, will keep the Owner and Architect reasonably informed of the progress of the Work, and will promptly report to the Owner and Architect known deviations from the Contract Documents and the most recent Project schedule, and defects and deficiencies observed in the Work.

§ 4.2.4 The Construction Manager will schedule and coordinate the activities of the Contractor and other Contractors in accordance with the latest approved Project schedule.

§ 4.2.5 The Construction Manager, except to the extent required by Section 4.2.4, and 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, and neither will be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. Neither the Construction Manager nor the Architect will have control over or charge of, or be responsible for acts or omissions of, the Contractor, Subcontractors, or their agents or employees, or of any other persons or entities performing portions of the Work.

§ 4.2.6 Communications. The Owner shall communicate with the Contractor and the Construction Manager's consultants through the Construction Manager about matters arising out of or relating to the Contract Documents. The Owner and Construction Manager 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 Construction Manager 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 other Contractors shall be

through the Construction Manager. Communications by and with the Owner's own forces and Separate Contractors shall be through the Owner. The Contract Documents may specify other communication protocols.

§ 4.2.7 The Construction Manager and Architect will review and certify all Applications for Payment by the Contractor, in accordance with the provisions of Article 9.

§ 4.2.8 The Architect and Construction Manager have authority to reject Work that does not conform to the Contract Documents, and will notify each other about the rejection. Whenever the Construction Manager considers it necessary or advisable, the Construction Manager will have authority to require inspection or testing of the Work in accordance with Sections 13.4.2 and 13.4.3, upon written authorization of the Owner, whether or not the Work is fabricated, installed or completed. The foregoing authority of the Construction Manager will be subject to the provisions of Sections 4.2.18 through 4.2.20 inclusive, with respect to interpretations and decisions of the Architect. However, neither the Architect's nor the Construction Manager's authority to act under this Section 4.2.8 nor a decision made by either of them in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect or the Construction Manager to the Contractor, Subcontractors, suppliers, their agents or employees, or other persons performing any of the Work.

§ 4.2.9 Utilizing the submittal schedule provided by the Contractor, the Construction Manager shall prepare, and revise as necessary, a Project submittal schedule incorporating information from other Contractors, the Owner, Owner's consultants, Owner's Separate Contractors and vendors, governmental agencies, and participants in the Project under the management of the Construction Manager. The Project submittal schedule and any revisions shall be submitted to the Architect for approval.

§ 4.2.10 The Construction Manager will receive and promptly review for conformance with the submittal requirements of the Contract Documents, all submittals from the Contractor such as Shop Drawings, Product Data, and Samples. Where there are other Contractors, the Construction Manager will also check and coordinate the information contained within each submittal received from the Contractor and other Contractors, and transmit to the Architect those recommended for approval. By submitting Shop Drawings, Product Data, Samples, and similar submittals, the Construction Manager represents to the Owner and Architect that the Construction Manager has reviewed and recommended them for approval. The Construction Manager's actions will be taken in accordance with the Project submittal schedule approved by the Architect or, in the absence of an approved Project submittal schedule, with reasonable promptness while allowing sufficient time to permit adequate review by the Architect.

§ 4.2.11 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. Upon the Architect's completed review, the Architect shall transmit its submittal review to the Construction Manager.

§ 4.2.12 Review of the Contractor's submittals by the Construction Manager and Architect 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 Construction Manager and 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 Construction Manager and 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.

§ 4.2.13 The Construction Manager will prepare Change Orders and Construction Change Directives.

§ 4.2.14 The Construction Manager and the Architect will take appropriate action on Change Orders or Construction Change Directives in accordance with Article 7, and the Architect will have authority to order minor changes in the Work as provided in Section 7.4. The Architect, in consultation with the Construction Manager, will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.

§ 4.2.15 Utilizing the documents provided by the Contractor, the Construction Manager will maintain at the site for the Owner one copy of all Contract Documents, approved Shop Drawings, Product Data, Samples, and similar required submittals, in good order and marked currently to record all changes and selections made during construction. These will be available to the Architect and the Contractor, and will be delivered to the Owner upon completion of the Project.

§ 4.2.16 The Construction Manager will assist the Architect in conducting inspections to determine the date or dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion in conjunction with the Architect pursuant to Section 9.8; and receive and forward to the Owner written warranties and related documents required by the Contract and assembled by the Contractor pursuant to Section 9.10. The Construction Manager will forward to the Architect a final Application and Certificate for Payment or final Project Application and Project Certificate for Payment upon the Contractor's compliance with the requirements of the Contract Documents.

§ 4.2.17 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 Construction Manager of any change in the duties, responsibilities and limitations of authority of the Project representatives.

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

§ 4.2.19 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 so rendered in good faith.

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

§ 4.2.21 The Construction Manager will receive and review requests for information from the Contractor, and forward each request for information to the Architect, with the Construction Manager's recommendation. The Architect will review and respond in writing, through the Construction Manager, to requests for information about the Contract Documents. The Construction Manager's recommendation and the Architect's response to each request 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 other Contractors or Separate Contractors or the subcontractors of other Contractors or Separate Contractors.

§ 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 or the bidding requirements, the Contractor, as soon as practicable after award of the Contract, shall notify the Construction Manager in writing, for review by the Owner, Construction Manager 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. In all cases, this notification shall be received in writing no less than Five (5) Days prior to a Subcontractor starting Work. In the event that the Owner provides insurance in accordance with Article 11 of this Contract, Contractors are responsible for notifying the Program Administrator, Willis of Pennsylvania, Inc., as instructed in the OCIP Project Insurance manual, of all

Subcontractor Awards at least Five (5) Days prior to a Subcontractor starting Work. Within 14 days of receipt of the information, the Construction Manager may notify the Contractor whether the Owner, the Construction Manager or the Architect (1) has reasonable objection to any such proposed person or entity or, (2) requires additional time for review. Failure of the Owner, Architect or Construction Manager to provide notice within the 14-day period shall constitute notice of no reasonable objection..

§5.2.1.1 Not later than ten days after date of commencement, the contractor must furnish in writing to the Owner and Architect, through the Construction Manager, the names of persons or entities proposed as manufacturers for each of the products specified in the Project Manual and, where applicable, the name of the installing Subcontractor.

§ 5.2.2 The Contractor shall not contract with a proposed person or entity to whom the Owner, Construction Manager 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, Construction Manager or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner, Construction Manager 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, Construction Manager 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, Construction Manager and Architect. Each subcontract agreement shall preserve and protect the rights of the Owner, Construction Manager 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.

§5.3.2 The Contractor agrees to include the requirements of §3.6 (including all of its subsections), in full, in all contracts with 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 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.

(Paragraph deleted)

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

§ 6.1 Owner's Right to Perform Construction with Own Forces and to Award Other Contracts

§ 6.1.1 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 the Owner performs construction or operations with the Owner's own forces or Separate Contractors, the Owner shall provide for coordination of such forces and Separate Contractors with the Work of the Contractor, who shall cooperate with them.

(Paragraph deleted)

§ 6.2 Mutual Responsibility

§ 6.2.1 The Contractor shall afford the Owner's own forces, Separate Contractors, Construction Manager and other 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's own forces, Separate Contractors or other Contractors, the Contractor shall, prior to proceeding with that portion of the Work, promptly notify the Construction Manager and Architect of apparent discrepancies or defects in the construction or operations by the Owner or Separate Contractor or other Contractors that would render it unsuitable for proper execution and results of the Contractor's Work. Failure of the Contractor to notify the Construction Manager and the Architect of apparent discrepancies or defects prior to proceeding with the Work shall constitute an acknowledgment that the Owner's own forces or Separate Contractor's or other Contractors' completed or partially completed construction is fit, free of defect, 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's own forces or Separate Contractors or other Contractors that are not apparent.

§ 6.2.3 The Contractor shall reimburse the Owner for costs the Owner incurs, including costs that are payable to a Separate Contractors or to other Contractors, 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 delays, improperly timed activities, damage to the Work or defective construction by the Owner's own forces or Separate Contractors.

§ 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, Separate Contractors, or other Contractors as provided in Section 10.2.5.

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

§6.2.6 Costs caused by delays or by improperly timed activities or defective construction shall be borne by the Contractor responsible therefor.

§6.2.6.1 Should the Contractor, either itself or by its Subcontractor or Subcontractors or their respective agents, servants, or employees, cause damage or injury to the property or Work of any other Prime Contractor or Contractors, or by failing to perform its Work (including the Work of its Subcontractor or Subcontractors) with due diligence, delay any Prime Contractor or Contractors, which suffer additional expense or damage as a result the parties involved shall resolve any disputes by agreement or by litigation between said parties. The Owner will not be a party to disputes or actions between Prime Contractors or Subcontractors concerning such additional expense or damage. It is agreed by all parties that disputes or actions between Contractors concerning the additional expense or damage will not delay

completion of the Work, which shall be continued by the parties, subject to the rights hereinbefore provided. It is agreed by the parties to this Contract (the Owner as promise and the Contractor as promisor) that the intent of this clause is to benefit the other Prime Contractors on the Project or related Projects and to serve as an indication of the mutual intent to the Owner and the Contractor that this clause raise such other Prime Contractors to the status of third party beneficiaries only as to the terms and conditions of Section 6.2.3. The Contractor agrees that Section 6.2.3 is provided as a benefit to the Contractor and that they specifically exclude claim against the Owner for delay or other damages.

§ 6.3 Owner's Right to Clean Up

If a dispute arises among the Contractor, Separate Contractors, other 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 Construction Manager, with notice to 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, Construction Manager, Architect and Contractor. A Construction Change Directive requires agreement by the Owner, Construction Manager 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 Construction Manager and signed by the Owner, Construction Manager, Architect, and Contractor, 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.

§ 7.2.2 A Change Order shall include all costs associated with the additional work described in the Change Order, including any costs of associated delay, interference, acceleration, inefficiency, supervision and overhead. To the extent that any request for Change Order or correspondence prior to the signed Change Order is contrary to this Paragraph 7.2, such requests or correspondence shall have no effect. Any reservations of cost must be expressly reflected on the Change Order form itself at the time that the Change Order is signed by the parties. Payment of a Change Order shall constitute accord and satisfaction of all claims made or capable of being made by or on behalf of the Contractor in connection with the change or changes to the Contract by the Change Order. A Change Order shall be the complete and fully integrated agreement for all related costs and it is agreed that there are no oral or written understandings, representations or agreements, directly or indirectly, connected with the Change Order that are not affirmatively stated within the Change Order.

§ 7.2.3 Each Change Order shall reflect the proper credit of the Owner providing insurance as set forth in Article 11 of this Contract.

§ 7.3 Construction Change Directives

§ 7.3.1 A Construction Change Directive is a written order prepared by the Construction Manager and signed by the Owner, Construction Manager 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 Construction Manager 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 Construction Manager 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 Construction Manager and 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 Construction Manager 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 Construction Manager and 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 Construction Manager and Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Construction Manager and Architect determine to be reasonably justified. The 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 Construction Manager and 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 Construction Manager shall prepare a Change Order. Change Orders may be issued for all or any part of a Construction Change Directive.

§ 7.3.11 Each Change Order shall reflect the proper credit of the Owner providing insurance as set forth in Article 11 of this Contract.

§ 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 Construction Manager 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 Construction Manager 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 Time is of the essence in completion of Work under this Agreement. 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, prematurely commence operations on the site or elsewhere prior to the effective date of insurance required by Article 11 of these General Conditions. The date of commencement of the Work shall not be changed by the effective date of such insurance. Unless the date of commencement is established by the Contract Documents or a Notice to Proceed given by the Owner, the Contractor shall notify the Owner in writing not less than Five (5) Days or other agreed period before commencing the Work to permit the timely filing of mortgages, mechanic's liens and other security interests.

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

§ 8.2.4 The Contractor acknowledges and agrees that the Owner will suffer a inefficiencies, disruptions, diversion of resources and financial loss if the Project is not completed within the Contract Time that will be difficult to quantify. Upon Contractor's failure to achieve substantial completion of the Work within the Contract Time, the Owner shall be entitled to retain or recover from the Contractor or Contractor's Surety as liquidated damages, the applicable amount set forth below in Section 8.2.5 from the first day of delay, not caused by Owner, and for each and every day thereafter, until the designated work is completed. The Owner's right to recover liquidated damages shall not substitute for any right of recovery for additional costs, should the Contractor fail to complete the Contract according to the Contract Documents.

§ 8.2.5 Liquidated damages are hereby established in the following amounts:

For each and every day's delay within the first thirty (30) days from the date of substantial completion, not caused in whole by the Owner, the sum of five hundred dollars (\$500.00) per calendar day.

For each and every day's delay thereafter, not caused in whole by the Owner, the sum of two hundred fifty dollars (\$250.00) per calendar day.

§8.2.6 The Contractor hereby agrees that said sums shall be deducted from monies due the Contractor under the Contract or if no money is due the Contractor, the Contractor hereby agrees to pay to the Owner as liquidated damages, and not by way of Payment or Performance Bond, such total sum as shall be due for such delay.

§ 8.2.7 The remedies provided herein are not exclusive and are in addition to any other rights and remedies provided by law or under the Contract and the Contractor remains liable for damages caused.

§ 8.2.8 To the extent that the Owner permits the Contractor to work after the date scheduled for either substantial or full and final completion, the Owner does not waive its rights to pursue liquidated damages from the Contractor. The assessment of liquidated damages shall result by operation of this paragraph 8.2 and shall not require any prior notice to the Contractor. The Owner may withhold liquidated damages due from any progress payment and/or any final payment. An election by the Owner not to withhold liquidated damages from any progress payment shall not waive the right of the Owner to withhold such liquidated damages from any subsequent progress payment and/or the final payment.

§ 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 an act or neglect of the Owner, Architect, Construction Manager, or an employee of any of them, or of the Owner's Separate Contractors, by changes ordered in the Work, by labor disputes, fire, unusual delay in deliveries, unavoidable casualties, or other causes beyond the Contractor's control; by delay authorized by the Owner pending mediation, arbitration, and binding dispute resolution; or by other causes that the Contractor asserts and the Architect, based on the recommendation of the Construction Manager, determines justify delay, then the Contract Time shall be extended for such reasonable time as the Architect may determine, after consultation with the Owner and Construction Manager.

§8.3.1.1 No such Change Order extending the Contract time shall result in any increased payments to the Contractor for overhead, extended overhead, delay damages, "impact" damages, loss of efficiency, loss of productivity or any other similar form of loss, damage or compensation of any nature. The Contractor's sole remedy for delays shall be an EXTENSION OF TIME ONLY, pursuant to and only in accordance with this Paragraph 8.3. Such extension to be a period equivalent to the time lost by reason of any and all of the aforesaid causes, as determined by the Architect in consultation with Construction Manager and Owner. In consideration for this grant of a time extension, the Owner shall not be held responsible for any loss or damage or increased costs sustained by the Contractor through any delays caused by the Owner, Construction Manager, Architect or any other Contractor, or on account of the aforesaid causes of any other cause of delay. In the event the Contractor shall choose to contest in any fashion this paragraph 8.3.1 and loses said contest, the Contractor shall indemnify, hold harmless and reimburse the Owner for its reasonable costs and expenses, including attorneys' and expert witness fees, and all other costs and expenses incurred by the Owner in the defense of the claim.

§8.3.1.2 Temporary delays in the work due to seasonal inclement weather shall not be considered as sufficient cause for extension of time. Where the delay arises from acts, omissions, or defaults of another Prime Contractor or the other Prime's subcontractors and suppliers, then the Contractor will be entitled to no extension of time and their sole remedy will be a proceeding pursuant to Article 15 of these General Conditions.

§ 8.3.2 Claims relating to time shall be made in accordance with applicable provisions of Article 15. Requests for extension of Contract Completion Date shall be submitted in writing to the Construction Manager and the Architect not more than seven (7) days after the commencement of the delay; otherwise, it shall be waived. This request shall contain at a minimum the following information: (1) date of start of delay; (2) specific cause of delay; (3) effect of delay on construction progress; (4) date of termination of delay; (5) statement of bonded surety concurring in request for extension of Contract Completion Date and the Agreement to extend coverages for the requested extension; (6) evidence of notification of this request having been given to the Owner, the Construction Manager, and the Architect; (7) evidence of notification of this request having been given to all Contractors engaged on the project and their concurrence to such extension of time.

§ 8.3.3 The Architect and Owner will not be liable to any Contractor or any Subcontractors engaged on this project in any manner for any expenses, damages, loss of profits, anticipated or otherwise, or any other charges whatsoever arising out of an extension in the Completion Date for the work of either the Contractor or of any Subcontractor

engaged on this project, or arising out of any hindrance or delay from any cause whatsoever in the progress of the work, whether such hindrance or delay be avoidable or unavoidable.

§ 8.3.4 The Contractors are required to submit at any construction conference considering any claim and at any proceeding considering an extension of time and in all subsequent administrative proceedings, all files, records, and the documents of whatever kind pertaining to the Contractor's performance of the Project Work, the job budget, the summary of all supporting data worksheets and other materials related to the estimate, material and labor scheduling details, and other documents prepared in connection with the submittal of the Contractor's successful bid.

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. In the event and to the extent that the Owner provides insurance in accordance with Article 11 of this Contract, the Contract Sum shall exclude the Contractors' and Subcontractors' related costs for the insurance being provided in accordance with Article 11.

§ 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

The Contractor shall submit a schedule of values to the Construction Manager, 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 Construction Manager and the Architect. This schedule, unless objected to by the Construction Manager or Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment. The Construction Manager shall forward to the Architect the Contractor's schedule of values. Any changes to the schedule of values shall be submitted to the Construction Manager and supported by such data to substantiate its accuracy as the Construction Manager and the Architect may require, and unless objected to by the Construction Manager or 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 fifteen days before the date established for each progress payment, the Contractor shall submit to the Construction Manager 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, Construction Manager or Architect require, such as copies of requisitions, and releases of waivers of lien from Subcontractors and suppliers, and shall reflect retainage if provided for in the Contract Documents. If the manner of completion of the Work and its progress do not remain satisfactory to the Architect, or if any other good and sufficient reason arises, the amount retained by the Owner may be increased up to 1-1/2 times the amount of any possible withholding. If a dispute arises between Owner and Contractor based upon increased costs claimed by Contractor occasioned by delays or other actions of any Contractor, additional retainage in the sum of one and one-half times the amount of any possible liability may be withheld until such time as a final resolution is agreed to by all parties directly or indirectly involved, unless the Contractor causing the additional claim furnishes a bond satisfactory to owner to indemnify Owner against the claim.

§ 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 Construction Manager and 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.

§ 9.3.4 The Contractor for itself and for its Subcontractors, laborers and material suppliers and all other directly or indirectly acting for, through or under it or any of them covenants and agrees that no mechanic's liens or claims will be filed or maintained against the Project, the Premises, or any part thereof, or any interest therein or any improvements thereon, or the Owner or against any monies due or to become due from the Owner to the Contractor, for or on account of any work, labor, services, materials, equipment and other items provided under any Change Order or supplemental agreement for extra or additional work in connection with the Project as to the original work covered by the Contract Documents. This Project is purely for a public purpose and as such, mechanics' lien are expressly prohibited under the PA Mechanics' Lien Law, 49 Pa. C.S.A. §1303, *et. seq.* If any Subcontractor, laborer or material supplier of the Contractor or any other person directly or indirectly acting for, through or under it or any of them files or maintains a mechanic's lien or claim as aforesaid, the Contractor agrees to cause such liens and claims be satisfied, removed or discharged at its own expense by bond, payment or otherwise within ten (10) days from the date of the filing thereof, and upon its failure to do so, the Owner shall have the right, in addition to all other rights and remedies provided under the Contract Documents or by law, to cause such liens or claims to be satisfied, removed or discharged by whatever means the Owner chooses, at the entire cost and expense of the Contractor (such cost and expense to include reasonable attorney's fees and disbursements). The Contractor agrees to indemnify, defend, save and hold harmless the Owner from and against any and all such liens and claims and actions brought or judgments rendered thereon, and from and against any and all loss, damages, liability, costs and expenses, including reasonable attorney's fees and disbursements, which the Owner may sustain or incur in connection therewith.

§ 9.3.5 If a dispute arises between the Owner and any Prime Contractor, which dispute is based upon increased costs claimed by one Prime Contractor occasioned by delays or other actions of another Prime Contractor, additional retainage in the sum of one and one-half times the amount of possible liability may be withheld until such time as a final resolution is agreed to by all parties directly or indirectly involved unless the Contractor causing the additional claim furnished a bond satisfactory to the Owner to indemnify the Owner against the claim.

§ 9.4 Certificates for Payment

(Paragraph deleted)

§ 9.4.1 Not used.

§ 9.4.2 The Construction Manager will, within seven days after the Construction Manager receives all of the Contractors' Applications for Payment: (1) review the Applications and certify the amount the Construction Manager determines is due each of the Contractors; (2) prepare a Summary of Contractors' Applications for Payment by combining information from each Contractor's application with information from similar applications for progress payments from the other Contractors; (3) prepare a Project Application and Certificate for Payment; (4) certify the amount the Construction Manager determines is due all Contractors; and (5) forward the Summary of Contractors' Applications for Payment and Project Application and Certificate for Payment to the Architect.

§ 9.4.2.1 Within seven days after the Architect receives the Project Application and Project Certificate for Payment and the Summary of Contractors' Applications for Payment from the Construction Manager, the Architect will either (1) issue to the Owner a Project Certificate for Payment, with a copy to the Construction Manager; or (2) issue to the Owner a Project Certificate for Payment for such amount as the Architect determines is properly due, and notify the Construction Manager 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 Project Application for Payment, and notify the Construction

Manager and Owner of the Architect's reason for withholding certification in whole as provided in Section 9.5.1. The Construction Manager will promptly forward the Architect's notice of withholding certification to the Contractors.

§ 9.4.3 The Construction Manager's certification of an Application for Payment shall be based upon the Construction Manager's evaluation of the Work and the data in the Application or Applications for Payment. The Construction Manager's certification will constitute a representation that, to the best of the Construction Manager'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, or Contractors are, entitled to payment in the amount certified.

§ 9.4.4 The Architect's issuance of a Certificate for Payment shall be based upon the Architect's evaluation of the Work, the recommendation of the Construction Manager, and data in the Application for Payment or Project Application for Payment. The Architect's certification will constitute a representation 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, or Contractors are, entitled to payment in the amount certified.

§ 9.4.5 The representations made pursuant to Sections 9.4.3 and 9.4.4 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 Construction Manager or Architect.

§ 9.4.6 The issuance of a Certificate for Payment or a Project Certificate for Payment will not be a representation that the Construction Manager or 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 Construction Manager or Architect may withhold a Certificate for Payment or Project Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Construction Manager's or Architect's opinion the representations to the Owner required by Section 9.4.3 and 9.4.4 cannot be made. If the Construction Manager or Architect is unable to certify payment in the amount of the Application, the Construction Manager will notify the Contractor and Owner as provided in Section 9.4.1 and 9.4.2. If the Contractor, Construction Manager and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment or a Project Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Construction Manager or 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 or Project Certificate for Payment previously issued, to such extent as may be necessary in the Construction Manager's or Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from the 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 or other 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;
- .7 repeated failure to carry out the Work in accordance with the Contract Documents;
- .8 failure to meet scheduled benchmarks throughout the Project period;
- .9 in the event that the Owner provides insurance in accordance with Article 11 of this Contract, failure to comply with the Project Insurance Manual procedural requirements including, but not limited to, enrollment, payroll reporting and audit, and claim administration; or.
- 10 failure to comply with Project Safety Requirements as set forth in the Project Safety and Health Management Plan.

§ 9.5.2 When the Contractor disputes the Architect's decision regarding a Certificate for Payment under Section 9.5.1, in whole or in part, the Contractor 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 or Construction Manager withholds certification for payment under Section 9.5.1, 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 Construction Manager, and both will reflect such payment on the next Certificate for Payment. The Owner's decision to issue joint checks shall not be construed in any way to form, or cause to form a contract between the Owner and Subcontractor.

§ 9.6 Progress Payments

§ 9.6.1 After the Architect has issued a Certificate for Payment or Project 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 Construction Manager and Architect.

- 1 Such payment by the Owner shall not constitute approval or acceptance of any item or cost in the Application for payment. No partial payment made hereunder shall be or be construed to be final acceptance or approval of that portion of the work to which such partial payment relates or relieves the Contractor of any of its obligations hereunder with respect thereto.

§ 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 Construction Manager 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 Owner, Construction Manager and Architect 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, Construction Manager 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 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.

(Paragraphs deleted)

§ 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 the Owner can occupy or utilize the Work for its intended use.

§ 9.8.1.1 The Contractor shall achieve Substantial Completion of the entire Work pursuant to AIA Document A132 as submitted and accepted for this Project.

§ 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 notify the Construction Manager, and the Contractor and Construction Manager shall jointly 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 list, the Architect, assisted by the Construction Manager, 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 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, assisted by the Construction Manager, to determine Substantial Completion. The Owner may withhold from the Contract Sum any additional fees paid by Owner to the Construction Manager and/or the Architect due to the necessity of re-inspections.

§ 9.8.4 When the Architect, assisted by the Construction Manager, determines that the Work of all of the Contractors, or designated portion thereof, is substantially complete, the Construction Manager will prepare, and the Construction Manager and Architect shall execute, 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. The payment will be sufficient to increase the total payments to 95 percent of the Contract Sum, less such amounts as the Construction Manager and/or the Architect determines for incomplete Work and unsettled claims pursuant to . § 9.3.1 and/or as provided in § 9.3.5..

§ 9.8.6 In the event that the Owner provides insurance in accordance with Article 11 of this Contract, workers compensation and liability coverages under the OCIP for Contractors and enrolled Subcontractors, regardless of tier, shall continue until sixty (60) days after the date of Substantial Completion by the Contractor or any Subcontractor as certified by the Architect in accordance with the terms of this Agreement; provided, however, that if the Contract Documents require a longer period of coverage for Completed Operations, Owner shall take action necessary to ensure that the longer period of coverage is in place for the Completed Operations. The OCIP does not extend to Work under any implied or expressed warranty. Unless otherwise extended by the Owner, the Contractor or any Subcontractor performing Work after sixty (60) days after the date of their Substantial Completion shall be responsible for providing and maintaining workers compensation and liability insurances required by this Agreement.

§ 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 and Construction Manager shall jointly 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 after consultation with the Construction Manager.

§ 9.9.2 Immediately prior to such partial occupancy or use, the Owner, Construction Manager, 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.

§ 9.9.4 As portions of the Project are completed, and occupied, Contractor shall ensure the continuing construction activity will not unreasonably interfere with the use, occupancy and quiet enjoyment of the completed portions thereof.

§ 9.9.5 The Contractor agrees to coordinate the Work with the Construction Manager, the Architect and the Owner in order to minimize disturbance to occupied portions of the structure. In the event performances or tests are conducted in close proximity to the work in progress, the Contractor agrees to cease all work which may disturb the Owner's occupants at the site.

§ 9.10 Final Completion and Final Payment

§ 9.10.1 Upon completion of the Work, the Contractor shall forward to the Construction Manager a notice that the Work is ready for final inspection and acceptance, and shall also forward to the Construction Manager a final Contractor's Application for Payment. Upon receipt, the Construction Manager shall perform an inspection to confirm the completion of Work of the Contractor. The Construction Manager shall make recommendations to the Architect when the Work of all of the Contractors is ready for final inspection, and shall then forward the Contractors' notices and Application for Payment or Project Application for Payment, to the Architect, who will promptly make such inspection. When the Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Construction Manager and Architect will promptly issue a final Certificate for Payment or Project Certificate for Payment stating that to the best of their knowledge, information and belief, and on the basis of their 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 Construction Manager's and Architect's final Certificate for Payment or Project 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 through the Construction Manager (i) 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, (ii) consent of surety, if any, to final payment, and (iii) 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 Contractor 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. 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 Construction Manager and Architect so confirm, the Owner shall, upon application by the Contractor and certification by the Construction Manager and 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 through the Construction Manager 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

(Paragraphs deleted)

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.

(Paragraph deleted)

§9.10.5 Owner shall not release/make final payment to the Contractor, nor shall the Contractor release/make final payment to any Subcontractor unless required payroll audits have been successfully completed as required by Section 11.1.9 of this Contract and the Contractor/Subcontractor is in compliance with the payroll reporting requirements included in the Project Insurance Manual.

§ 9.11 LIQUIDATED DAMAGES

§ 9.11.1 In the event that the Contractor fails to achieve substantial completion of the work as set forth in the contract Documents, the Owner and the public which it serves will be damaged and inconvenienced, the exact amount of these damages being difficult to quantify. This being established, the Owner and the Contractor agree to the following:

§ 9.11.2 If Substantial Completion is not achieved as set forth in the Contract Documents, the Owner shall be entitled to retain as liquidated damages, and not as penalty, the amounts set forth in **§§ 8.2.4 – 8.2.8**.

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, including special safety precautions and programs for the protection of staff, students, visitors and others who use the premises. The Contractor shall submit the Contractor's safety program to the Construction Manager for review and coordination with the safety programs of other Contractors. The Construction Manager's responsibilities for review and coordination of safety programs shall not extend to direct control over or charge of the acts or omissions of the Contractors, Subcontractors, agents or employees of the Contractors or Subcontractors, or any other persons performing portions of the Work and not directly employed by the Construction Manager.

§ 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, the public, the Owner and its officers, directors and employees, students, visitors, 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;
- .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; and
- .4 construction or operations by the Owner, Separate Contractors, or other Contractors.

§ 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 give the Owner reasonable advance notice and the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel and in strict compliance with all applicable requirements of applicable laws, codes, regulations, ordinances, and orders.

§ 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, 10.2.1.3 and 10.2.1.4 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, 10.2.1.3 and 10.2.1.4. 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, Construction Manager or Architect or anyone directly or indirectly employed by any of them, or by anyone for whose acts any 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, Construction Manager 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.

§10.2.9 Contractor shall comply with and ensure all subcontractors comply with the PROJECT SAFETY PLAN which is added to this agreement.

§ 10.3 Hazardous Materials

§ 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, Construction Manager 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. 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, but subject and without waiver of any statutory or common law immunities from or limitations of liability, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, Construction Manager, Architect, their 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 Insurance Provided by Owner

§11.1.1 Except as otherwise provided in this Contract, prior to issuance of the Notice to Proceed under this Contract, Owner shall, at its sole cost and expense, secure and hereafter maintain insurance of the type and in the limits set forth below. To the extent that the Contractor, Subcontractor, or the property of such persons or entities, are covered by such insurance, (i) the Contractor shall comply and shall require its Subcontractors to comply with the terms set forth in this Section 11.1 and with the most current version of the Project Insurance Manual issued and maintained by the Owner and (ii) the Contractor shall exclude, and shall require its Subcontractors to exclude, the cost and expense of maintaining duplicative insurance coverage in the Cost of Work.

§11.1.2 Except as otherwise specified in this Contract, Owner shall purchase and continuously maintain until Substantial Completion or termination of this Contract, whichever occurs first, Builder's Risk. Such insurance shall cover all equipment, machinery, supplies and other property intended to be permanently incorporated in the Project, for which title or risk of loss shall have passed at the time of loss to an Insured. Coverage shall apply to such property while it is located at the Project Site or located at temporary off-site storage or staging areas approved by the Owner and its representatives, or while in land-based transit to the Project Site and within the continental United States. Coverage shall be written on a Builders Risk form, including but not limited to, fire, lightning, windstorm, hail, riot, riot attending a strike, civil commotion, aircraft, vehicle, smoke, explosion, vandalism, malicious mischief, damage to glass, theft, flood and earthquake (including sinkhole) coverages, subject to policy provisions, limitations, deductibles and exclusions. Limits under this insurance shall not be less than One Hundred Per Cent (100%) of the Replacement Value of the Project for physical damage to property and related expenses, provided that sub-limits shall be established for losses due to earthquake (including sinkhole) and for losses due to flood, which earthquake and flood sub-limits shall be no less than the minimum sub-limits for such losses established pursuant to Owner's agreements with lenders. The following sublimits will also apply:

Coverage	Sublimit
Transit	\$1,000,000
Offsite Storage	\$1,000,000

Equipment Breakdown	Included
Protection of Property	Included (Direct and Imminent Loss)
Ordinance or Law/Demolition & Increased Cost of Construction	Blanket Limit
Soft Costs/Delay in Completion	\$1,000,000
Terrorism (TRIA)	Included – as provided by the Terrorism Risk Insurance Program Reauthorization Act of 2007 with expiration date of 12/31/14
Earthquake	\$1,000,000
Flood	\$1,000,000

§11.1.2.1 Owner and contractor waive all rights against (i) Each other and the subcontractors, agents and employees of each other and (ii) Subcontractors, agents and employees, for damages caused by fire or other peril to the extent covered by the Builders Risk insurance obtained.

§11.1.2.2 Builders Risk Insurance shall include as Additional Insured, the Owner, Contractor and Subcontractor of all tiers performing Work at the Project Site.

§11.1.3 Each Contractor and Subcontractor shall be responsible to pay the Builder's Risk policy deductible. If the claim, however, is caused by the School District or another Contractor/Subcontractor, the negligent party will be held responsible for the deductible payment. If the negligent party is not the School District or another Contractor/Subcontractor, each Contractor and Subcontractor shall be responsible to pay the Builder's Risk policy deductible. Payment towards the Builder's Risk deductible will not exceed \$5,000 per occurrence and will be shared in proportion to direct loss.

§11.1.4 (Left blank on purpose)

§11.1.5 Loss, if any, under this Builder's Risk insurance shall be adjusted with Owner, Lenders, and/or Trustees, with the cooperation of Contractor and Subcontractors. Insurance proceed checks shall be made payable to the Owner or its Lenders or Trustees. Amounts shall be disbursed, when and if appropriate, to the Contractor or Subcontractors through the Change Order procedures described in this Contract.

§11.1.6 Except as otherwise specified in this Contract, the Owner shall maintain an Owner Controlled Insurance Program, referred to herein as OCIP, with Owner, Contractor and Subcontractors of all tiers, and such other persons or interests as the Owner may designate, as Insured parties, with limits not less than those specified below for each coverage. The OCIP coverage shall not apply to vendors, suppliers, truckers and material dealers; to other subcontractors who are solely engaged in the stocking, testing, transporting, picking up, delivering or carrying materials, parts, equipment or any other items or persons to or from the Project Site; to Contractors and Subcontractors who furnish material worked to a special design in accordance with the Drawings and Specifications but who perform no operations at the Project Site, unless required by Owner in writing; to surveyors, consultants, testing agencies, office/trailer suppliers, water and sewage removal suppliers, janitorial services and temporary fencing firms; or to employees who are temporarily at the Project Site for meetings, deliveries or similar activities. Asbestos Abatement and Hazardous Remediation Contractors are not covered by the OCIP (Workers' Compensation coverage, however, may be extended to roofing contractors who self-perform incidental asbestos removal work upon request and approval of the insurance carrier). Contractors and Subcontractors performing work with explosives are not covered by the OCIP for that portion of their work. Contractors and Subcontractors performing traffic work not directly connected to the Owner's site are not covered by the OCIP for that portion of their work. OCIP coverage for any Contractor or Subcontractor requires the written determination of enrollment of the applicable Contractor or Subcontractor by Owner. Owner may, in its sole discretion, and at any time prior to or during the performance of Work by a Contractor or Subcontractor, elect not to enroll or to cease an enrollment of the Contractor or Subcontractor of any tier.

§11.1.6.1 Workers' Compensation insurance for statutory benefit limits under Pennsylvania Workers' Compensation

law, and Coverage B – Employer’s Liability with minimum limits of One Million Dollars (\$1,000,000) Each Accident for Bodily Injury by Accident, One Million Dollars (\$1,000,000) Each Employee for Bodily Injury by Disease, and One Million Dollars (\$1,000,000) Policy Limit for Bodily Injury by Disease for U.S. employees. Such insurance shall be endorsed to include Longshore and Harbor Workers Compensation Act Coverage and Jones Act Coverage, if applicable. The policy shall be endorsed to include "Other States Coverage." Coverage will apply only to Work performed at the Project Site and to incidental off-site activities directly related to Work performed at the Project Site. Coverage is not provided for off-site Work. Refer to 11.1.6 for specific exclusions of coverage for workers compensation.

§11.1.6.2 Commercial General Liability insurance, written on an Occurrence form shall be no less comprehensive and no more restrictive than the coverage provided by the standard Insurance Services Office (ISO) form CG 00 01 (12/07). Such insurance shall include by its terms or appropriate endorsements Bodily Injury, Property Damage, Personal Injury, Blanket Contractual, Independent Contractors, and Products and Completed Operations. This coverage shall have a minimum limit of Two Million Dollars (\$2,000,000) Each Occurrence, Four Million Dollars (\$4,000,000) General Aggregate per School District per Year, and Ten Million Dollars (\$10,000,000) Products/Completed Operations Aggregate per year shared by all program enrollments. The Products/Completed Operations will provide a 12 Year Completed Operations Extension. During this extension period, the Product/Completed Operations will have one limit, will be shared with the latest annual policy period and will be shared by all program enrollments. Coverage will apply only to Work performed at the Project Site. Such insurance will not include coverage for products liability to any insured party, subcontractor, vendor, supplier, material dealer or others for any product(s) manufactured, assembled or otherwise worked upon away from the Project Site. The OCIP does not provide Professional Liability, Employment Related Practices Liability or Pollution Liability coverages. The OCIP policy excludes coverage for nuclear energy liability, blasting, mold, silica, asbestos, lead, EIFS and violation of communication statutes.

§11.1.6.2.1 If a Contractor and/or Subcontractor is responsible, in full or in part, for a General Liability claim that includes property damage, then the Contractor and/or Subcontractor will be responsible to pay towards the General Liability policy deductible. Payment towards the General Liability (property damage only) deductible will not exceed \$5,000 per occurrence per Contractor/Subcontractor.

§11.1.6.3 Umbrella Liability insurance. The Umbrella Liability program is Fifty Million Dollars (\$50,000,000) Per Occurrence and Fifty Million Dollars (\$50,000,000) Aggregate, per School District per year. The Products/Completed Operations Aggregate is Fifty Million Dollars (\$50,000,000), includes a 12 Year Completed Operations Extension and is shared by all program enrollments. Standard liability coverages are provided with similar exclusions as noted in Section 11.1.6.2.

§11.1.6.4 The coverage described in Sections 11.1.6.1, 11.1.6.2 and 11.1.6.3 are set forth in full in their respective policy forms, and the foregoing descriptions of such policies are not intended to be complete, or to alter or amend any provisions of the actual policies. In matters, if any, in which this description may conflict with such policies, the provisions of the policies shall govern.

§11.1.7 Prior to doing any of their work, each Contractor and Subcontractor must complete an Enrollment Application in accordance with the most current version of the Project Insurance Manual. Contractors and Subcontractors that fail to provide the completed Enrollment Application to the Program Administrator, Willis of Pennsylvania, Inc., prior to doing work at the site will be responsible for payment of associated Workers’ Compensation premiums to their incumbent carriers.

§11.1.8 Change Orders. Provided that the Owner is providing the coverages described in Sections 11.1.6.1, 11.1.6.2 and 11.1.6.3, the adjustment of the Contract Sum as contemplated in Section 7.3 and its sub-Sections shall be calculated and determined net of the insurance cost.

§11.1.9 The Contractor and Subcontractors shall provide and/or make available for audit any and all records reasonably needed by the Owner and/or its insurer(s) to calculate the premium properly that is to be paid by the Owner, as applicable. The Contractor and Subcontractors shall keep and maintain, in a professional manner, sufficient records as may be needed to properly calculate insurance premiums for all insurance that the Owner will provide under the terms of this Contract. The insurance carrier will perform physical audits at contractor’s office location or require a self-audit mail for audit on an annual basis based on policy term.

§11.1.10 Notwithstanding anything herein to the contrary, the workers compensation and liability insurance policies and/or coverages provided by the Owner for/on behalf of the Contractor or any Subcontractors under this Agreement shall apply to any act or omission within the coverage of the policies and that occurs on or after the date of

commencement of the Work as defined in the Agreement but prior to Sixty (60) days after the date of Substantial Completion by the Contractor or Subcontractors as certified by the Architect in accordance with the terms of this Agreement. Notwithstanding anything herein to the contrary, the workers compensation and liability insurance policies provided by the Owner under this Agreement for/on behalf of the Contractor or Subcontractors shall not apply to any act or omission occurring after 60 days after the date of Substantial Completion by the Contractor or any Subcontractor unless otherwise extended by Owner. The Contractor or any Subcontractor performing Work after 60 days after the date of their Substantial Completion shall be responsible for providing and maintaining in connection with said work all insurances required by Section 11.2 and the subsections of Section 11.2 of this Agreement. The OCIP does not extend to Work under any implied or expressed warranty.

§11.2 Contractor and Subcontractor Provided Insurance:

The Contractor shall provide the following insurances and, upon request, supply proof of the following insurances to the Owner or its designee.

§11.2.1 Automobile Liability insurance covering all owned, non-owned, and hired vehicles used by Contractor and Subcontractors for all operations both on and off the Project Site, with a minimum limit of One Million Dollars (\$1,000,000) Combined Single Limit Per Accident for Bodily Injury and Property Damage.

§11.2.2 Professional Liability insurance if Contractor (or applicable Subcontractors) will perform or retain others to perform professional services in connection with the Work, including engineering, architectural, medical, testing, environmental assessment or remediation, or design-build services, with a minimum limit of One Million Dollars (\$1,000,000) Per Wrongful Act, Error, or Omission, and a minimum Two Million Dollars (\$2,000,000) Annual Aggregate Limit.

§11.2.3 Owned and Non-Owned Aircraft. If an aircraft, whether owned or non-owned by the Contractor or any Subcontractor, is used in connection with the Work by the Contractor or any Subcontractor of any tier, the Contractor or Subcontractor, as applicable, shall advise the Owner or its representatives, shall provide a written explanation of the planned use of the aircraft, and shall provide Aircraft Liability Insurance at its sole cost and expense, the conditions and limits to be established by the Owner. The Owner reserves the right to prohibit the use of any aircraft in connection with the Work under this Contract. The minimum limit will be Five Million Dollars (\$5,000,000). This insurance shall be primary to all other insurance.

§11.2.4 Asbestos and/or Lead Abatement. Asbestos and/or Lead Abatement Liability Insurance with limits of Ten Million Dollars (\$10,000,000) Each Occurrence and Ten Million Dollars (\$10,000,000) Aggregate when Work includes asbestos and/or lead abatement activities.

§11.2.5 Contractor shall provide Commercial General Liability insurance with minimum limits of Five Million Dollars (\$5,000,000) Each Occurrence; Five Million Dollars (\$5,000,000) General Aggregate and Five Million Dollars (\$5,000,000) Products/Completed Operations. This coverage is primarily for off-site activities and for any other coverage the Contractor deems necessary and/or appropriate.

§11.2.5.1 Contractor shall provide Worker's Compensation insurance providing statutory benefit limits under applicable state law and minimum limits under Coverage Part B (Employer's Liability) of Five Hundred Thousand Dollars (\$500,000) for Each Accident for Bodily Injury by Accident, Five Hundred Thousand Dollars (\$500,000) Each Employee for Bodily Injury by Disease, and Five Hundred Thousand Dollars (\$500,000) Policy Limit for Bodily Injury by Disease. This coverage is for off-site activities and employees not covered by the OCIP.

§11.2.6 Contractor Provided Insurance Resulting from Owners' Cancellation of OCIP or Exclusion of Contractor.

Within seven (7) days of being notified that the Owner has elected to cancel the OCIP in accordance with paragraph 11.3.11 or has excluded a Contractor or Subcontractor of any tier in accordance with paragraph 11.1.6, Contractor shall submit a quote or proposal in writing to provide Workers' Compensation and General Liability insurance that meets the terms and conditions of the Contract Documents. The Contractor shall not bind or place such insurance unless instructed by the Owner through a Change Order. In the event that the Owner does not provide such a Change Order to the Contractor, the Owner will continue to provide insurance through the OCIP in accordance with the Contract Documents. Any quote or proposal by the Contractor in accordance with this paragraph 11.2.6 shall be at the Contractor's actual cost of the additional insurance.

§11.2.6.1 In the event that the Owner exercises its right to cancel the OCIP or exclude a Contractor, the Contractor shall then supply insurance for both on-site and off-site Work prior to the continuation of Work, the following provisions shall apply:

§11.2.6.1.1 Contractor shall provide, pay for and maintain (and shall require Subcontractors of all tiers to

provide, pay for and maintain) insurance of the type and limits set forth below. Such insurance shall be maintained in full force and effect from the commencement of the Work by Contractor until final acceptance of the entire Project or the completion of all post-acceptance warranty or related Work by Contractor, whichever is later, and shall be for both on-site and off-site Work.

(Paragraph deleted)

§11.2.6.1.2 Automobile Liability insurance covering all owned, non-owned, and hired vehicles used by Contractor and Subcontractors for all operations both on and off the Project Site, with a minimum limit of One Million Dollars (\$1,000,000) Combined Single Limit Per Accident for Bodily Injury and Property Damage.

(Paragraph deleted)

§11.2.6.1.3 Professional Liability insurance if Contractor (or applicable Subcontractors) will perform or retain others to perform professional services in connection with the Work, including engineering, architectural, medical, testing, environmental assessment or remediation, or design-build services, with a minimum limit of One Million Dollars (\$1,000,000) Per Wrongful Act, Error, or Omission, and a minimum Two Million Dollars (\$2,000,000) Annual Aggregate Limit.

§11.2.6.1.4 Owned and Non-Owned Aircraft. If an aircraft, whether owned or non-owned by the Contractor or any Subcontractor, is used in connection with the Work by the Contractor or any Subcontractor of any tier, the Contractor or Subcontractor, as applicable, shall advise the Owner or its representatives, shall provide a written explanation of the planned use of the aircraft, and shall provide Aircraft Liability Insurance at its sole cost and expense, the conditions and limits to be established by the Owner. The Owner reserves the right to prohibit the use of any aircraft in connection with the Work under this Contract. The minimum limit will be Five Million Dollars (\$5,000,000). This insurance shall be primary to all other insurance.

(Paragraph deleted)

§11.2.6.1.5 Asbestos and/or Lead Abatement. Asbestos and/or Lead Abatement Liability Insurance with limits of Ten Million Dollars (\$10,000,000) Each Occurrence and Ten Million Dollars (\$10,000,000) Aggregate when Work includes asbestos and/or lead abatement activities.

(Paragraph deleted)

§11.2.6.1.6 Workers' Compensation insurance providing statutory benefit limits under Pennsylvania's Workers' Compensation law and minimum limits under Coverage Part B (Employer's Liability) of One Million Dollars (\$1,000,000) for Each Accident for Bodily Injury by Accident, One Million Dollars (\$1,000,000) Each Employee for Bodily Injury by Disease, and One Million Dollars (\$1,000,000) Policy Limit for Bodily Injury by Disease. The insurance shall cover all operations of Contractor (or the applicable Subcontractor). Such insurance shall be endorsed to include "Other States Coverage".

§11.2.6.1.7 Commercial General Liability insurance covering all Operations/ Work of Contractor (or the applicable Subcontractor). Such insurance shall be written on an Occurrence form. Coverage shall not be provided under a "Claims-Made" or "Modified Occurrence" policy without the prior, expressed written consent of Owner. Such insurance: (i) Shall be no less comprehensive and no more restrictive than the coverage provided by the standard Insurance Services Office (ISO) form CG 00 01 (12/04); (ii) shall include by its terms or appropriate endorsements Bodily Injury, Property Damage, Personal Injury, Blanket Contractual, Independent Contractors, Products and Completed Operations coverages for 5 years; (iii) shall include Products Liability coverage for any products manufactured, assembled, or otherwise worked upon away from the Project Site; and (iv) shall include coverage for "x" (explosion), "c" (collapse), and "u" (underground) exposures. Such insurance shall have the following minimum limits:

For the Contractor:

- \$10,000,000 Each Occurrence;
- \$10,000,000 General Aggregate per Project; and
- \$10,000,000 Products/Completed Operations Aggregate (5 Years)

For all Subcontractors:

- \$1,000,000 Each Occurrence;
- \$2,000,000 General Aggregate per Project; and
- \$1,000,000 Products/Completed Operations Aggregate (5 Years)

(Paragraph deleted)

§11.2.6.1.8 The Owner, the Architect and its Consultants, the Construction Manager, and the Clerk of the Works shall

be named as Additional Insureds on the insurance policies described in Sections 11.2.6.1.2, 11.2.6.1.4, 11.2.6.1.5 and 11.2.6.1.7. Coverage afforded to the Owner, the Architect and its Consultants, the Construction Manager, and the Clerk of the Works as Additional Insureds under said policies shall be primary and non-contributory to any insurance carried by Owner, the Architect and its Consultants, the Construction Manager, and/or the Clerk of the Works.

(Paragraph deleted)

§11.3 General Provisions Relating to Insurance

(Paragraph deleted)

§11.3.1 All insurance required by this Contract shall be from insurance companies authorized to transact that class of insurance in the Commonwealth of Pennsylvania and having a minimum rating of (or equivalent to) A- VIII by A.M. Best & Company. When required, certificates must be personally and manually signed by the authorized representative of the insurance company shown on the certificate with proof that he/she is an authorized representative thereof and provided to the Owner's representative as evidence of insurance required in accordance with Section 11.2 herein. In addition, certified, true and exact copies of all insurance policies required by this Contract shall be provided by Contractors and Subcontractors within a reasonable period of time upon written request.

(Paragraph deleted)

§11.3.2 All of the insurance provided by the Contractor, Subcontractors and Owner under the terms of this Contract shall provide primary coverage with respect to the Work, unless noted otherwise herein. Any other insurance maintained by Owner, Contractor, or Subcontractor shall be in excess of this insurance and shall not contribute to it.

(Paragraph deleted)

§11.3.3 The issuing insurers will endeavor to provide thirty (30) Days written notice to the Owner and Contractor of any cancellation, intent not to renew, or reduction in the policies' coverage except in the application of the Aggregate Limit Provisions.

(Paragraphs deleted)

§11.3.4 The insurance coverages and limits required under this Contract are designed to meet the minimum requirements of the Owner. They are not designed as a recommended insurance program for the Contractor or its Subcontractor; and meeting these minimum requirements does not relieve such persons or entities of their obligations under any other Section of this Contract. The Contractor shall not be prevented from acquiring, at its own expense, any other additional insurance coverages it deems necessary for the protection of its Work under the Contract.

§11.3.5 The amounts and types of insurance required by the Contract shall conform to the minimum requirements set forth in this Article 11, utilizing Insurance Services Office (ISO) policies and endorsements where applicable.

§11.3.6 All of the insurance required by this Article 11 shall be issued as required by law and shall be endorsed, where necessary, to comply with the minimum requirements contained herein.

§11.3.7 Owner may elect at any time during the term of this Contract to require Contractor to procure and maintain other or additional insurance. Notice of such election shall be given at least Sixty (60) Days prior to the effective date of the required modifications. Any additional costs incurred by the Contractor or Subcontractors in securing said other or additional insurance shall be reimbursed by the Owner as part of the Cost of the Work, and the Contract Price shall be revised by Change Order to be increased by the amount of such additional cost.

§11.3.8 Owner and Contractor waive all rights against (i) each other and the Subcontractors, agents and employees of each other and (ii) Subcontractors, agents and employees, for damages caused by fire or other peril to the extent covered by the Builder's Risk insurance obtained pursuant to Section 11.1.2 hereof, Commercial General Liability insurance obtained pursuant to Section 11.1.6.2 hereof, or Umbrella Liability insurance obtained pursuant to Section 11.1.6.3 hereof; except such rights as each may have to proceeds of such insurance held by any party to this Agreement or by any Subcontractor. The insurance policies obtained by Owner pursuant to this Article 11 shall include a waiver of subrogation in favor of the Contractor and Subcontractors and the insurance policies obtained by Contractor or Subcontractors pursuant to this Article 11 shall include a waiver of subrogation in favor of the Owner. Without limiting the generality of the foregoing, it is specifically agreed that there is and shall be no waiver of subrogation by Owner or Owner's other Property and Casualty insurer(s) for claims, damages, or losses of whatever nature or type that are insured by any insurance obtained either by Owner, the Contractor, or any Subcontractor of any tier pursuant to any of the provisions of this Agreement. In all events, any insurance obtained by the Owner, Contractor or any Subcontractor of any tier pursuant to this Agreement shall be primary and the policies possessed by Owner, Contractor or any Subcontractor of any tier for purposes of fulfilling the insurance obligations under this Agreement shall be written as primary.

§11.3.9 The Owner, the Architect and its Consultants, the Construction Manager, the Clerk of the Works, and CM Regent shall be named as Additional Insureds on the insurance policies described in Sections 11.3.1, 11.3.3, 11.3.4, and 11.3.5. Coverage afforded to the Owner, the Architect and its Consultants, the Construction Manager, the Clerk of the Works, and CM Regent Insurance as Additional Insureds under said policies shall be primary and non-contributory to any insurance carried by Owner, the Architect and its Consultants, the Construction Manager, the Clerk of the Works, and/or CM Regent Insurance.

§11.3.10 Any and all returns of premiums, dividends, discounts or other adjustments to any OCIP policy is assigned, transferred and set over absolutely to Sponsor. This assignment is valid for insurance policies whose premiums have been paid by the Owner on behalf of Contractors and Subcontractors.

§11.3.11 Owner reserves the right to terminate or modify the coverages identified in Sections 11.1.6.1, 11.1.6.2 and 11.1.6.3 on Sixty (60) Calendar Days written notice to Contractor and Subcontractors of all tiers. To the extent that any coverage identified in Sections 11.1.6.1, 11.1.6.2 and 11.1.6.3 is so terminated or modified, or if and when Owner determines not to enroll or cease enrollment of a Contractor or Subcontractor of any tier in any of such coverages, then Contractor shall maintain or amend, and shall require its affected Subcontractors to maintain, its own policies of insurance as required in Section 11.3 of this Contract and its sub-Sections to include coverage for all operations not included or no longer included in the coverage to be furnished by the Owner pursuant to Section 11.1 and its sub-Sections. The actual cost of such alternative insurance which was originally identified as the quote for Insurance coverages of the applicable Contractor or Subcontractor will be reimbursed by Owner as a Change Order with the Contract Price or the pro-rata portion thereof, amended accordingly. Alternate Bids and Unit Prices will be adjusted in a similar fashion. Upon request, written evidence of such alternative insurance shall be provided to the Owner prior to the actual date of the termination or modification of the Owner-furnished insurance coverage, or promptly after Owner's determination of non-enrollment of a Contractor or Subcontractor in any such coverage.

§11.3.12 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.

§11.3.13 In the event that the Owner provides insurance in accordance with Article 11 of this Contract, any Claim involving third parties or Workers' Compensation shall be reported in accordance with the Project Insurance Manual procedures as set forth in Article 11 and the applicable Insuring Agreement.

§ 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, Architect, and Construction Manager for loss of use of the Owner's property, due to fire or other hazards however caused to the extent such loss is covered by such insurance.

§ 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 Construction Manager, Architect and Contractor their just shares of insurance proceeds received by the Owner, and by appropriate agreements the Construction Manager, 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.

§ 11.6 Performance Bond, Payment Bond and Maintenance Bond

§ 11.6.1 Contractors shall furnish to the Construction Manager for the benefit of the Owner, a Performance Bond as security for the faithful performance of the Contract. Contractors shall furnish to the Construction Manager, for the benefit of the Owner, a separate Labor and Materials Payment Bond as security for the payment of all persons performing labor and furnishing materials in connection with this Contract. Contractors shall furnish to the Owner a Maintenance Bond, as required by the Township having jurisdiction over this Project. The Performance and Payment Bonds shall be in an amount at least equal to 100 percent of the Contract Sum. The Maintenance Bond shall be in an amount equal to 10% of the Contract Sum. The Bonds shall be written by a surety company approved by the Owner, Construction Manager and Architect and licensed to do business in the Commonwealth of Pennsylvania and otherwise comply with the requirements of applicable laws. All Bonds signed by an agent must be accompanied by a certified copy of the authority for the agent to act. The Performance and Payment Bonds shall remain fully in effect for a period commencing prior to the commencement of Contractor's Work and ending 1 year after Final Completion.

§ 11.6.2 The Contractor must deliver the required Bonds to the Owner before the Agreement is executed.

§ 11.6.3 The Contractor requires the attorney-in-fact who executes the required Bonds on behalf of the surety to affix thereto a certified and correct copy of the Power of Attorney.

§ 11.6.4 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.

§ 11.6.5 If the surety on any Bond furnished by Contractor is declared bankrupt or becomes insolvent or if its right to do business in the Commonwealth is terminated or if it ceases to meet the requirements set forth in Section 11.4.1 Contractor shall promptly (without additional cost to the Owner), but in all events within five (5) days after the occurrence of any such event, substitute another Bond and Surety in compliance with the requirements of this Paragraph.

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 Construction Manager's or Architect's request or to requirements specifically expressed in the Contract Documents, it must, if requested in writing by either, be uncovered for their 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 Construction Manager or Architect has not specifically requested to examine prior to its being covered, the Construction Manager or 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 Construction Manager or 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 Construction Manager's and 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, Construction Manager or Architect, the Owner may correct it in accordance with Section 2.5.

§ 12.2.2.1.1 In the event the Contractor corrects any deficiency or furnishes any new equipment or material as a consequence of a breach of any special warranty or if any of the Work is found to be defective, a new 1-year period of warranty commences with the completion of the correction of the defective Work or the replacement of the defective equipment or material.

§ 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.

(Paragraph deleted)

§ 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, Separate Contractors, or other 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.

§ 12.2.6 The obligations under this Section 12.2 shall cover any repairs and replacement to any part of the Work or other property caused by the defective 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. 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 laws of the Commonwealth of Pennsylvania, Allegheny County, Pennsylvania.

§ 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 or in equity.

§ 13.3.2 No action or failure to act by the Owner, Construction Manager, 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.

§ 13.3.3 In the event Contractor shall breach any obligation imposed by the Contract Documents, in addition to all other damages, losses, costs and relief, whether in law or equity, which Owner may recover, Owner also shall be entitled to an award for any reasonable attorneys' fees and costs incurred in attempting to enforce or recover upon the Contract Documents by reason of the Contractor's breach.

§ 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 Construction Manager and Architect timely notice of when and where tests and inspections are to be made so that the Construction Manager and 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 Construction Manager, 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 Construction Manager and 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 Construction Manager and Architect of when and where tests and inspections are to be made so that the Construction Manager and 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 Construction Manager's and 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 Construction Manager for transmittal to the Architect.

§ 13.4.5 If the Construction Manager or Architect is to observe tests, inspections, or approvals required by the Contract Documents, the Construction Manager or 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

The final payment due the Contractor from the Owner bears interest at a rate of 6 percent per annum for all contracts with provisions for retainage, such interest to begin after the date that such payment becomes due and payable to the Contractor, provided, however, that where the contracting body has issued bonds to finance the project, interest is

payable to the Contractor at the rate of interest of the bond issue or at the rate of interest of the bond issue, or 6% whichever is less.

§ 13.6 Time Limits on Claims

The Contractor shall commence all claims and causes of action, whether in contract, tort, breach of warranty or otherwise, against the other arising out of or related to the contract in accordance with the requirements of the final dispute resolution method selected in the Agreement within the time period specified by applicable law. The Contractor waives all Claims and causes of action not commenced in accordance with this Section 15.1.2.

§ 13.6.1 As to claims of the Contractor, except where an earlier commencement of statutory limitation period is specified in the Contract Documents, the commencement of statutory limitation period shall be:

.1 Before Substantial Completion.

As to acts or failures to act occurring prior to the relevant date of Substantial Completion, any applicable statute of limitations shall commence to run and any alleged cause of action shall be deemed to have accrued in any and all events not later than such date of Substantial Completion;

.2 Between Substantial Completion and Final Certificate for Payment.

As to acts or failures to act occurring subsequent to the relevant date of Substantial Completion and prior to issuance of the final Certificate for Payment, any applicable statute of limitations shall commence to run and any alleged cause of action shall be deemed to have accrued in any and all events not later than the date of issuance of the final Certificate for Payment.

§ 13.6.2 Nothing in this Agreement shall be construed to impose any statute of limitation upon any claims of the Owner. The Owner fully reserves the rights and privileges applicable to it under the legal doctrine of *nullum tempus occurrit regi*.

§ 13.7 CLEARANCES

§ 13.7.1 All Contractors and subcontractors on this Project must have clearances related to Child Abuse History Act 33/151; Pennsylvania State Police Act 34; Fingerprinting; a Clearance Affidavit; and Federal Criminal History Record Act 114 Clearance and must present them to the Owner's representative on or prior to the time directed by the Owner. A badge attesting to those Clearances should be carried by each individual workman when on the premises or in the buildings. The cost of obtaining these "clearances" and required badges shall be the responsibility of the Contractor.

§ 13.7.2 **Public Works Employment Verification Act:** All Contractors and Subcontractors of whatever tier are required to comply with the Public Works Employment Verification Act, 43 P.C. §§167.1-167.11 and its Chapter 66 implementing guidelines. All Contractors and Subcontractors performing work on this project are required to comply with Federal Employment Eligibility Requirements through the United States Department of Homeland Security's E-Verify Program. For each employee hired on or after January 1, 2013, Contractors and subcontractors must submit a Public Works Employment Verification Form to the School District prior to being awarded a Public Works Contract and throughout the duration of the Project, regardless of whether such employees will work onsite or offsite. Contractors and subcontractors shall update the Verification Forms throughout the duration of the Project. Contractors shall include the requirement to comply with this Act in each and every subcontract into which they enter on this Project. The School District will maintain the Form for the duration of the Project. The Form may be accessed at: www.dgs.state.pa.us. The Chapter 66 implementing guidelines are located at <http://www.pabulletin.com/secure/data/vol42/42-52/index.html>.

§ 13.8 PREVAILING WAGE RATES

If the total estimated project sum is greater than \$25,000.00, this regulation and the general Pennsylvania prevailing minimum wage rates, (Act 442 of 1961, P.L., 987, amended) as determined by the Secretary of Labor and Industry, which shall be paid for each craft or classification of all workers needed to perform the contract during the anticipated term therefore in the locality in which public work is performed, are made part of this Contract.

§ 13.8.1 No workmen shall be employed on this work except in accord with the classifications set forth in the decision of the Secretary of Labor and Industry. If additional or different classifications are necessary, the procedure set forth in Section 7 of the Regulations for Pennsylvania Prevailing Wage Act shall be followed.

§ 13.8.2 All workmen employed or working on this work shall be paid unconditionally, regardless of whether any contractual relationship exists or the nature of any contractual relationship which may be alleged indirectly, except authorized deductions, the full amounts due at the time worked in the appropriate classification. This Contract does not prohibit payment of more than the general prevailing minimum wage rates as determined by the Secretary of Labor and Industry.

§ 13.8.3 Each Contractor and Subcontractor shall post for the entire period of construction the wage determination decisions of the Secretary of Labor and Industry, including the effective date of any changes thereof, in a prominent and easily accessible place or places at the site of the work and at such place or places used by them to pay workmen their wages. Subcontractors need not post such decisions in the same places where they are posted by Contractors. The posted notice of wage rates shall contain the following information:

- .1 Name of the Project.
- .2 Name of the Public Body for which it is being constructed.
- .3 The crafts and classifications of workmen listed in the Secretary's general prevailing minimum wage rate determination for the particular project.
- .4 The general prevailing minimum wage rates determined for each craft and classification and the effective date of any changes.
- .5 A statement advising workmen that if they have been paid less than the general prevailing minimum wage for their job classification, or if the Contractor or Subcontractor or both are not complying with the Act or the Regulations in any manner whatsoever, they may file a protest, in writing, with the Secretary of Labor and Industry within three months of the date of the occurrence, objecting to the payment of any Contractor or Subcontractor to the extent of the amount or amounts due or to become due to them as wages for work performed on the public work project. Any workmen paid less than the rate specified in the Contract shall have a civil right of action for the difference between the wage paid and the wages stipulated in the Contract, which right of action shall be exercised within six months from the occurrence of the event creating such right.

§ 13.8.4 The Contractor and each Subcontractor shall keep accurate records showing the name, craft, classification, number of hours worked per day and actual hourly rate of wage paid (including employee benefits) to each workman employed by him in connection with work. Such records shall include any deduction from each workman. The records shall be preserved for three years from the date of payment and shall be open at all reasonable hours to the inspection of the public body awarding the Contract and to the Secretary of Labor and Industry or his duly authorized representative.

§ 13.8.5 Apprentices shall be limited to such numbers as shall be in accord with a bonfide apprenticeship program registered with and approved by the Pennsylvania Apprenticeship and Training Council and only apprentices whose training and employment are in full compliance with the provisions of the Apprenticeship and Training Act approved July 14, 1961 (Act No. 304) and the Rules and Regulations issued pursuant thereto shall be employed on the public work project. Any workman using the tools of a craft who does not qualify as an apprentice within the provisions of this Section shall be paid the rate predetermined for journeymen in that particular craft and classification.

- .1 Wages shall be paid without any deductions except authorized deductions. Employers not parties to a contract requiring contributions for employee benefits which the Secretary has determined to be included in the general prevailing minimum wage rate shall pay the monetary equivalent thereof directly to the workmen.
- .2 Payment of compensation to workmen for work performed on public work on a lump sum basis, or a piece work system, or a price certain for the completion of a certain amount of work, or the production of a certain result shall be deemed a violation of the act and these Regulations, regardless of the average hourly earning resulting therefrom.

- .3 Each Contractor and each Subcontractor shall file a statement each week and a final statement at the conclusion of the work on the contract with the contracting agency, under oath, and in form satisfactory to the Secretary, certifying that all workmen have been paid wages in strict conformity with the provisions of the contract as prescribed by this section 3 of these Regulations, or if any wages remain unpaid to set forth the amount of wages due and owing to each workman respectively.

§ 13.9 DISCRIMINATION PROHIBITED

According to 62 Pa. C.S.A. §3701, the Contractor agrees:

- (1) In the hiring of employees for the performance of Work under the contract or any subcontract, no contractor, subcontractor, or any person acting on behalf of the contractor or subcontractor shall by reason of gender, race, creed, or color, discriminate against any citizen of this Commonwealth who is qualified and available to perform the Work to which the employment relates;
- (2) no Contractor, Subcontractor, Sub-Subcontractor or any person on their behalf shall in any manner discriminate against or intimidate any employee hired for the performance of Work under the contract on account of gender, race, creed, or color;
- (3) The contract may be canceled or terminated by the government agency, and all money due or to become due under the contract may be forfeited for a violation of the terms or conditions of that portion of the contract.
- (4) Contractors are bound by Appendix F to Exhibit a to the parties' Agreement, in its entirety as it relates to the Contractor's work on the Project.

§ 13.11 HUMAN RELATIONS ACT

The provisions of the Pennsylvania Human Relations Act, Act 222, of October 27, 1955 (P.L. 744)(43 P.S. Section 951, et. seq.) of the Commonwealth of Pennsylvania prohibit discrimination because of race, color, religious creed, ancestry, age, sex, national origin, handicap or disability, by employers, employment agencies, labor organizations, contractors and others. The Contractor shall agree to comply with the provisions of this Act as amended that is made part of this specification. Your attention is directed to the language of the Commonwealth's non-discrimination clause in 16 PA. Code 49.101.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 Termination by the Contractor

§ 14.1.1 The Contractor may suspend 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; or
- .2 An act of government, such as a declaration of national emergency, that requires all Work to be

(Paragraphs deleted)
stopped.

(Paragraphs deleted)

§ 14.1.4 If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor or a Subcontractor or their agents or employees or any other person performing portions of the Work under contract with the Contractor 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' written notice to the Owner, the Construction Manager, and the Architect, suspend performance under the Contract and, when work resumes, recover from the Owner costs of the Work completed, actually earned and incurred, through the date of the termination. Contractor shall not be entitled to any fee, overhead, profit or any other losses or damages for any work not performed.

§ 14.2 Termination by the Owner for Cause

§ 14.2.1 The Owner may terminate the Contract if the Contractor

- .1 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;

- .3 disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or
- .4 otherwise is in breach of a provision of the Contract Documents.
- .5 fails to abide by the Project Construction Schedule, and/or fails, within seven days after receipt of written notice to correct or recover the schedule, to provide required scheduling information;
- .6 institutes proceedings or consents to proceedings requesting relief under the Federal Bankruptcy Code or if a Petition under the Federal Bankruptcy code is filed against the contractor and such Petition is not dismissed within sixty (60) days from the date of said filing; or
- .7 abandons the work.

§ 14.2.2 When any of the reasons described in Section 14.2.1 exist, and upon certification by the Initial Decision Maker 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, three 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 Construction Manager's and 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, upon application, be certified by the Initial Decision Maker after consultation with the Construction Manager, and this obligation for payment shall survive termination of the Contract.

§ 14.2.5 If the Owner terminates the contract for cause and it is subsequently determined that such termination was without sufficient cause or was improper for any reason whatsoever, such termination shall be deemed for all purposes to have been a termination for convenience and, in such event, Contractor shall be entitled to recover only those sums due pursuant to paragraph 14.4.3.

§ 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 the Contract Time shall be adjusted for increases in the cost and time caused by suspension, delay, or interruption as commencing upon the thirty-first (31st) calendar day of such suspension, delay or interruption. Adjustment of the Contract Sum shall include compensation for actual expenses incurred as a result of the suspension delay or interruption. 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 any and all 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 as accepted and/or approved and expenses actually earned and incurred. Contractor shall not be entitled to any fee, overhead, profit or any other losses or damages for any work not performed.

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 Not Used

§ 15.1.3 Notice of Claims

§ 15.1.3.1 Claims by the 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 Owner and to the Architect, as Initial Decision Maker, with a copy sent to the Construction Manager. Claims by Contractor shall be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the Contractor first recognizes the condition giving rise to the Claim, whichever is later.

§ 15.1.3.2 Claims by the 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 Owner. 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.

§ 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 waives Claims against the Owner for consequential damages arising out of or relating to this Contract. This waiver includes
(Paragraphs deleted)

damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, loss of bonding capacity and for loss of profit.

This 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.

§ 15.1.8 DISPUTES OR ACTIONS BETWEEN CONTRACTORS

§ 15.1.8.1 Should the Contractor either itself or by its subcontractor or subcontractors of its agents, servants, or employees, cause damage or injury to the property or Work of any other Prime Contractor or Contractors, or by performing or failing to perform his Work including the Work of his subcontractor or subcontractors hereunder with due diligence, delay or interfere with any Prime Contractor or contractors who shall suffer additional expense or damage thereby, the parties involved in such dispute shall settle by agreement or litigate said claim dispute or disputes in the Court of Common Pleas of Allegheny County, Pennsylvania.

§ 15.1.8.2 Neither the Construction Manager, Architect, nor Owner shall be a party to disputes or actions between Prime Contractors or subcontractors concerning such additional expense or damage. It is agreed by all parties that disputes or actions between Contractors concerning the additional expense or damage hereinbefore mentioned shall not delay completion of the work which shall be continued by the parties, subject to the rights hereinbefore provided.

§ 15.2 Initial Decision

§ 15.2.1 Claims of the Contractor, excluding those 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 Contractor Claim. If an initial decision has not been rendered within 30 days after the Claim has been referred to the Initial Decision Maker, the Contractor 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 Contractor's 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 Contractor, (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.

§ 15.2.3 In evaluating Contractor's 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 the Contractor to furnish additional supporting data, the Contractor 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, the Construction Manager, and the Architect, if the Architect is not serving as the Initial Decision Maker, of any recommended change in the Contract Sum or Contract Time or both. The initial decision shall be final and binding on the Contractor but subject to the provisions in paragraph 15.4 for dispute resolution provided that the Contractor provides written notice of an intent to submit a Claim to dispute resolution proceedings within forty-five (45) days following the initial decision.

§ 15.2.6 Either party may file for mediation of an initial decision at any time. Mediation is a condition precedent to litigation.

(Paragraph deleted)

§ 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.

(Paragraph deleted)

§ 15.3 Mediation

§ 15.3.1 Claims, disputes, or other matters in controversy arising out of or related to the Contract may be submitted to mediation upon agreement of the parties.

§ 15.3.2 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.

(Paragraphs deleted)

§ 15.4 Dispute Resolution

(Paragraph deleted)

§ 15.4.1 Any controversy, cause of action or claim arising out of or related to the Contract, or the breach thereof, shall, at the Owner's sole and exclusive option, be decided by arbitration in accordance with the Construction Industry Arbitration Rules of the American Arbitration Association then in effect. The Owner's election to arbitrate shall be specifically enforceable under the prevailing arbitration law. The award rendered by the arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof.

(Paragraph deleted)

§ 15.4.2 In the event the Contractor provides timely written notice of an intention to pursue a Claim in accordance with this Article 15, the Owner will, within sixty (60) days following receipt of the Contractor's written notice, notify the Contractor in writing of the Owner's election to have such Claim submitted to either arbitration or litigation. Should the Owner elect to proceed to litigation or fail to exercise its election with sixty (60) days following receipt of the Contractor's written notice, the Contractor shall be limited to an action at law initiated in the Court of Common Pleas of Allegheny County, Pennsylvania. The Contractor must commence arbitration or court proceedings within twenty (20) days following the Owner's election or, if no election is made, following the expiration of Owner's election period. In the event Contractor does not initiate such proceedings within this time period, Contractor's claim shall be deemed waived.

§ 15.4.3 The Owner may initiate an action against the Contractor in arbitration, law, or equity, at its option, and the Contractor agrees that the Court of Common Pleas of Allegheny County, Pennsylvania shall have jurisdiction of both the person and subject matter alleged in any complaint, and any arbitration shall be within the county in which the Project is located, unless the Owner agrees otherwise.

§ 15.4.4 Nothing contained in this paragraph 15.4 or this Article 15 is intended or shall be construed to entitle the Contractor to demand arbitration, it being understood and agreed that such determination shall be at the sole discretion of the Owner.

§ 15.4.5 The parties waive the right to a jury trial in any court proceeding arising from or involving this Agreement.

§ 15.4.6 The Owner, at its sole discretion, may consolidate an arbitration conducted under this Agreement with any other arbitration to which it is a party or join other persons or entities to such arbitration where the claims to be adjudicated involve common questions of law or fact and/or where the presence of the other party or parties is required if complete relief is to be accorded in arbitration.

§ 15.4.7 In the event of any arbitration or litigation between the parties hereto, if the Owner is the prevailing party on any of its own claims or in defense of Contractor's claims, the Contractor shall reimburse the Owner, in full, for any and all attorneys' fees, professional fees, expert witness costs, arbitrator fees or other costs and expenses associated with prosecuting or defending such claims. For purposes of this provision, the Owner shall be considered the prevailing party if it has obtained a verdict or award equal to fifty percent (50%) of more of the amount demanded by

its claim(s) or if the Contractor has obtained a verdict or award that is less than fifty percent (50%) of the amount demanded by its claim(s).

ARTICLE 16 EQUAL EMPLOYMENT OPPORTUNITY

§ 16.1 The Contractor shall maintain policies of employment as follows:

§ 16.1.1 The contractor, Contractor's Subcontractors and Sub-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 be limited to, the following: employment, upgrading, demotion or transfer, recruitment or recruitment advertising; lay-off 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 the policies of non-discrimination.

§ 16.1.2 The Contractor, Contractor's Subcontractors and Sub-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.

PROJECT SAFETY PLAN
March 2024 EDITION

Confirmation of this Project Safety & Health Management Plan Project Requirements

As used in this Safety and Health Management Plan (herein referred to as "Plan"), "Contractor" shall mean the controlling Contractor (who has a contractual agreement with the Owner), who shall comply with these requirements. The Contractor shall also agree to require each of their Subcontractors and Sub-subcontractors to comply with this Plan.

It is the responsibility of the Contractor to maintain total control of Safety to ensure that employees and the general public will be provided with an environment free of recognized hazards during construction and renovation activities. This Plan does not relieve the Contractor of their responsibilities regarding the safety of their employees and the preservation of property.

The Federal Occupational Safety and Health Act as well as other federal, state, and local regulations promulgated in the Interest of Safety are required by law and this Plan.

The Safety Requirements of this Plan is a supplementary document to all Government rules and regulations. It does not negate, abrogate, alter or otherwise change any provisions of those rules and/or regulations, and is intended to supplement and enforce the individual program of each Contractor and the overall safety effort. It is understood that the ultimate responsibility for providing a safe workplace rests with each individual Contractor.

I hereby acknowledge that I have received, read and evaluated the Project Safety and Health Management Plan and I hereby certify that I will ensure that its requirements and conditions are fulfilled.

Company Name

Contractor – Project Manager

Contractor – Field Supervisor

Date

Date

Please submit a signed copy of this Acknowledgement to the OCIP Administrator
c/o Sean Sabol, Fax: 844-774-3400, prior to commencing work.

Project Safety and Health Management Plan

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1.0 Introduction

This Safety and Health Management Plan (herein referred to as “Plan”) is intended to establish uniform policies and procedures for all Contractors, with the goal of reducing the frequency and severity of accidents. This Plan applies to all Work performed on all CM Regent OCIP Construction Projects as defined by the Contract.

1. Contractor shall implement, maintain and adhere to a written Contractor Safety Program as required by the Bid Documents. Contractor, upon request, shall submit the Contractor Safety Program to the Owner or its representatives prior to commencement of the Work. In the event that the Contractor Safety Program does not comply with the requirements of this Agreement or of the Plan incorporated into this Agreement, the Contractor Safety Program shall be redrafted to comply with this Agreement and with the Plan, whichever provides the highest level of Safety. (The Contractor may, however, incorporate this Plan into their Safety Program for this project by reference.) One or more copies of the written Contractor Safety Program must be maintained on-site for employee review. Before the Contractor or any Subcontractor commences Work, the Contractor or Subcontractor, as applicable, shall make available to employees a copy of the Contractor Safety Program and the Contractor or Subcontractor, as applicable, and shall certify that prior to any employee, or any employee of any Subcontractor, beginning Work on the Project, the employees have been oriented with regards to the written Contractor Safety Program and have been directed by the Contractor or Subcontractor or its representatives to comply with Program requirements.
2. The Contractor, all Subcontractors and Sub-subcontractors shall assume all costs related, but not limited to, Personal Protective Equipment, Drug and Alcohol-Free Workplace Substance Abuse Program (costs for Drug & Alcohol tests, as specified in this plan, shall be the responsibility of the Owner), all training requirements, etc.
3. Compliance with the Plan is a requirement of the Contract. Failure to comply will be considered a breach of Contract, subject to the remedies provided in the Contract including, but not limited to, withholding of progress payments or termination for cause.
4. The Contractor, all Subcontractors and Sub-subcontractors shall immediately correct unsafe conditions. When the Contractor, any Subcontractors or Sub-subcontractor is notified of an unsafe condition they shall immediately correct the unsafe condition.
5. If the Contractor, any Subcontractors or Sub-subcontractor refuses to correct an imminent danger condition, the Owner and/or its representatives is authorized to stop that portion of the Work until the Work can continue in accordance with the requirements of this Plan. The cost to bring the Work activity into compliance shall be incurred by the Contractor, Subcontractors and/or Sub-subcontractors and at no time shall the costs be charged to the Owner.
6. Each Contractor, all Subcontractors and Sub-subcontractors shall be responsible for payment of all fines, damages or other costs resulting from failure to comply with the Plan requirements. The Contractor shall reimburse the Owner for any fines, damages or costs incurred (including the costs of attorneys' fees for defense and appeals) arising out of the Contractor's operations.

2.0 General Requirements

Each Contractor, Subcontractor and Sub-subcontractor shall: (a) be solely responsible for the health, safety and security of employees and others under its control and/or supervision; and (b) comply with the terms and conditions of the Project Safety and Health Management Plan (herein referred to as “Plan”) attached hereto and incorporated herein by reference as if fully set forth herein. The Project Manager and Field Supervisor of each Contractor and Subcontractor must execute a copy of the Plan certifying that each will ensure that the requirements of the Plan will be fulfilled. Notwithstanding anything to the contrary that is contained herein or in the Project Safety and Health Management Plan, the Contractor and Subcontractors of all tiers are solely responsible for safety on the job site and with respect to the work and waive all claims against the Owner, the Construction Manager, and/or the Architect based on, arising out of or in any way involving any actual or alleged non-compliance with the Safety and Health Management Plan.

1. Contractor shall conduct its business in a professional manner to prevent the occurrence of incidents that lead to injuries or illnesses and/or equipment and property damage. Safety, health and security requirements for the Work under this Contract shall be administered by the Contractor and all of its Subcontractors and Sub-subcontractors in accordance with the following:
 - a. The importance of Safety with respect to all Work shall be recognized and accident prevention shall be an integral part of all planning and operations by the Contractor and its Subcontractors;
 - b. Contractor, Subcontractors and Sub-subcontractors shall conduct Work in accordance with: (i) the Occupational Safety and Health Act of 1970 (OSHA) and all additions, amendments and revisions thereto; and (ii) the Plan;
 - c. Contractor, Subcontractors and Sub-subcontractors shall follow all applicable federal, state and local laws/regulations pertaining to pollution control, water supply, fire protection, sanitation facilities, waste disposal and other related items;
 - d. Contractor, Subcontractors and Sub-subcontractors shall cooperate fully with the Owner and its representatives and all other Contractors and Subcontractors in providing and managing safety, health and security programs with respect to the Work;
 - e. Housekeeping shall be observed at all times and waste, debris and garbage shall be removed daily and placed in appropriate waste containers. All materials, tools and equipment shall be stored in a safe and orderly fashion.
 - f. Should Owner or its representatives notify Contractor of any safety non-compliance resulting in an unsafe act or improper equipment operation that puts the life and/or safety of Job Site personnel in imminent danger or other persons at risk, the Owner or its representatives shall have the right to immediately stop such Work or acts. Contractor shall correct the hazard or condition within the time specified prior to resuming Work in the area. Nothing in this Contract shall be construed as creating any duty on the part of the Owner to inspect the Work for safety.

2. Safety Program

- a. Any Contractor or Subcontractor having a Contract Value with respect to the Work of Fifty Million (\$50,000,000) or greater (per contract/bid package) shall provide a dedicated full-time site Safety Representative knowledgeable in the areas of construction safety, health and fire prevention. The full-time Safety Representatives

shall have completed the OSHA 500 Construction and Outreach Training Program, as a minimum. This individual shall have no other collateral duties or job responsibilities and shall have the authority to act as liaison with the Owner and/or its representatives, other Contractors and Subcontractors on all matters related to safety. This individual shall have full authority to ensure safe Work practices and to correct unsafe or hazardous conditions. All other Contractors and Subcontractors shall designate a member of supervision, who may have other duties, as its Safety Representative whose duty shall be the prevention of accidents. The Safety Representative shall have a current (within the last Five (5) Years) OSHA 10 Hour Construction Outreach Training Certificate. The OSHA 10-hour training card shall be available for review upon request.

- b. Contractor shall inform the Owner and/or its representatives of any federal or state inspections. Contractor shall provide Owner and/or its representatives with copies of all federal and state inspection reports, citations, penalties, abatement dates, and the like, with respect to the Work or any aspect of the Work under this Contract.
- c. The Contractor shall cooperate with the Owner and/or its representatives, who may periodically observe any aspect of the Work and/or the Project Work Site without prior notice.
- d. All lay down and storage areas shall be coordinated with the designated Project official prior to set-up of these areas. Contractor shall be responsible for the security of said area(s) and for all material, equipment and tools.
- d. Any media contact or responses to media inquiries shall be directed to the Project official designated by the Owner. Contractor and Subcontractor shall not discuss accidents, incidents or other related issues with the media.
- f. All employee vehicles shall be restricted to designated parking areas. All parking areas shall be coordinated with the designated Project official.

3. Employee and Visitor Dress Requirements

- a. All projects shall enforce a One Hundred Percent (100%) hard hat requirement for all construction areas. All supervisors, employees and visitors shall be required to wear hard hats while on the Project Site.
- b. Contractor shall ensure that all workers and visitors wear durable work shoes. At no time are clogs or footwear with large openings, street shoes, tennis shoes or sandals allowed. Under no condition shall employees wear shorts, tank tops and/or sleeveless shirts.

4. Failure to Comply with Safety Regulations

- a. Failure to comply with the Contract Safety Requirements shall be deemed to constitute non-compliance with the Contract and may result in remedial action as provided by the Contract.
- b. If Contractor refuses to correct unsafe or unhealthy conditions or acts, the Owner and/or its representatives may take one or more of the following actions:
 - i. Instruct the Contractor, Subcontractor or Sub-subcontractor, who shall comply with said instructions, to cease the Work, or a portion thereof, until the condition is brought into compliance with Contract and Safety Requirements;
 - ii. Require Contractor, Subcontractor or Sub-subcontractor, who shall comply with said requirement, to replace or supplement its site Safety Representative and/or supervisory personnel, as appropriate;
 - iii. Stop payment for the Work being performed; and/or
 - iv. Correct the situation using another employee or Contractor and charge Contractor who shall pay for the expenses and costs incurred.
 - v. All costs associated with ensuring a safe and healthful Work environment, shall be borne by any non-compliant Contractor or Subcontractor, and costs will be charged to and/or assessed against the non-conforming Contractor or Subcontractor. Contractor, Subcontractor, and Sub-subcontractor shall be responsible for the payment of all fines and/or claims for damages levied against the Owner and/or its representatives for deficiencies relating to the conduct of the Contractor's Work.

3.0 Safety Policy Statement

Objective

The objective of this Plan is to reduce the frequency and severity of accidents on this Project. There are Three (3) sound reasons for this objective:

1. No endeavor is worthy if it should cause human suffering through disabling injury or loss of life.
2. A good safety record reflects the quality of management.
3. Poor accident experience increases cost, and results in a loss of profit.

Policy Statement

The safety of persons and property is of paramount importance to the Owner. This Plan will establish employee safety and health as an integral part of the overall success of this Project.

By Contract, the Contractor, all Subcontractors and Sub-subcontractors on the Project Site shall comply with the requirements of the Federal Occupational Safety and Health Act of 1970 (OSHA) and all additions and revisions thereto, as well as any other applicable federal, state and local requirements and this Plan.

The on-site supervisory personnel are responsible for the actions of those they supervise, for maintaining safe and healthy working conditions in their areas of responsibility, and for strictly enforcing all safety and health policies and regulations. All employees shall comply with these Rules and Regulations.

4.0 Responsibilities

The Contractor, all Subcontractors and Sub-subcontractors shall prevent accidents and are responsible for thorough safety and risk control training and instruction for their employees.

The prevention of accidents and protection of property shall receive management's top priority, support and participation.

General Overview

- Provide a safe environment where employees can perform high quality Work.
- Use Safety Planning as a tool to reduce injury to persons and damage to property.
- Provide inspections to locate and abate unsafe conditions and practices before they result in bodily injury or property loss.
- Protect the public and property adjacent to the Construction Site.
- Educate and Train employees through:
 - ◆ New Hire Safety Orientation
 - ◆ Weekly Safety meetings
 - ◆ Task-Specific Safety Training, (i.e., hazard communications (HAZCOM), fall protection, construction safety practices, trenching safety, confined space entry, etc.)
- Mandatory Personal Protective Equipment (PPE) Programs.
- Injury reporting and record keeping to maintain an up-to-date accident experience and trends analysis.
- Using accident investigation information to abate deficiencies and eliminate any additional losses.
- Return-To-Work (Modified Duty) Programs.
- Site-Wide One Hundred Per Cent (100%) Six (6) Foot Fall Protection Policy including steel erection. (See scaffold section for erection/dismantling fall protection requirements).
- Drug and Alcohol-Free Work Place Program.

Contractor's Project Manager

The Contractor's Project Manager shall be responsible for:

- Promoting Total Job Safety with all employees and visitors;
- Accepting full and complete responsibility for the implementation and execution of the Plan on-site;
- Monitoring Contractor adherence to Plan Requirements; and
- Assisting in accident investigations with the Program's Safety Representative;
- Send in a signed and dated copy of the Confirmation of this Project Safety & Health Management Plan Project Requirements to the OCIP Administrator at the beginning of the Project.

Contractor's Project Foremen

The Contractor's Project Foreman shall be responsible for:

- Setting a good safety example for workers;
- Using Pre-Task Planning, instructing workers on Safe Work Practices and Methods to prevent injury, damage to property and loss of productive time;
- Supplying and enforcing the use of Personal Protective Equipment (PPE);
- Familiarizing workers with the Safety Requirements applicable to their Work;
- Holding weekly Tool-Box Safety Meetings with their Work crews;
- Conducting daily Safety Inspections of their Work areas;
- Assisting in accident investigations with the Program's Safety Representative; and
- Assuring that proper first-aid treatment is administered to injured employees.

Contractors, Subcontractors and Sub-subcontractors

All Contractors, Subcontractors and Sub-subcontractors shall have overall responsibility for accident prevention and implementation of this Plan for their personnel.

Each Contractor, Subcontractor and Sub-subcontractor shall designate a member of supervision, who may have other duties, as their Safety Representative in accordance with the Contract Documents. The Safety Representative shall be knowledgeable and responsible for all applicable Safety Standards and site policies. This individual shall have, at a minimum, completed the OSHA 10 Hour Construction Outreach training course within the last Five (5) Years.

The Safety Representative is responsible for performing Construction Safety Inspections and identifying and resolving any safety related concerns pertaining to their Work.

All employees shall be orientated to their company's Contractor Safety Program as well as to the Plan. Documentation of this training (which includes but is not limited to: Attendance roster, date of training and course content) shall be maintained on file.

Each Contractor shall be responsible for providing their Subcontractor's and Sub-subcontractor's Safety Representative with an emergency communication plan for use in emergency response and other safety related communications.

Although many existing hazards may be corrected through informal communications, all corrective actions must be documented.

Worker's Responsibilities

The Workers shall be responsible for:

- Working according to good safety practices as posted, instructed and discussed;
- Complying with the Plan and the Contractor's Safety Program;
- Using all required and provided safety devices;
- Reporting any unsafe situation or act to their supervisor and/or designated Safety Representative immediately;
- Maintaining a clean and safe Work area;
- Performing assigned duties in an alert manner, free of any impairment that may affect safety;
- Following the Site's Safety Program; and
- Reporting injuries immediately to their supervisor.

5.0 Safety Related Meetings and Training

Safety Meetings and Training shall be conducted by the Contractor, all Subcontractors and Sub-subcontractors. The following meetings and training shall be conducted, documented and maintained on file:

- Indoctrination (Orientation) Safety Training
 - ◆ All new employees and visitors to the Construction Project shall be properly trained and oriented with regards to the OCIP, hazard recognition, Site-Specific Safety Requirements, emergency procedures, first-aid/medical procedures, assigned Panel of Physicians, etc.
- "Toolbox" Safety Meetings
 - ◆ The Contractor, all Subcontractors and Sub-subcontractors shall conduct weekly Safety Training Meetings with all employees working on the Construction Project. This training shall be conducted by a supervisor or foremen.
 - ◆ The meetings shall cover any Hazardous Work Conditions, unsafe Work practices that have been identified, safe working practices, review of accidents and near-misses that have occurred on the Construction Project and safety rules and regulations.

- ◆ This training shall be documented to include names of employees attending the training and an outline of all topics discussed.
- Coordination Meetings
 - ◆ Safety shall have a portion of the agenda in all Coordination Meetings for discussion of previous safety issues and to discuss the current week's activities. Minutes from the Coordination Meetings shall reflect safety items discussed and any proposed resolution to issues.
- Periodic Safety Management Meetings
 - ◆ Upon request by the Owner or its representatives, a Safety Management Meeting will be held periodically on the Construction Project to review on-going safety issues. The Contractor's, all Subcontractor's and Sub-subcontractor's Safety Representatives, Project Managers and Project Safety Representatives shall attend these meetings.
 - ◆ If the Contractor, any Subcontractor or Sub-subcontractor has a lost-time injury, a representative of the respective company shall explain at the next Safety Meeting:
 - Why the accident occurred?
 - What corrective measures have been taken to prevent similar injuries from occurring?
 - What the claim status of the injured employee is?
 - What, if any, alternative (modified duty) work has been provided?
- Pre-Shift Hazard Recognition Training
 - ◆ The Contractor, all Subcontractors and Sub-subcontractors shall hold Pre-Shift Hazard Recognition Training with each work crew working under the following conditions:
 - In and/or around occupied school facilities – Special hazards associated with occupied facilities – Separation and isolation of Construction activities from school activities.
 - One Hundred Percent (100%) Fall Protection
 - Scaffold Erection and Dismantling
 - Crane and all Material Hoisting Operations
 - Excavation and Trenching Operations
 - Non-Routine Work Operations, i.e. Emergency Procedures, Industrial Hygiene, etc.
 - Confined Space Operations
 - Demolition – written engineering survey to be completed and submitted to the Construction Manager or Owner representative prior to demolition activities.

6.0 Project Disciplinary / Corrective Procedures

General Statement: The Project Disciplinary/Corrective Procedures are intended to encourage compliance with the requirements of OSHA, other applicable federal, state and local requirement, and this Plan. Workers performing Work in an unsafe manner shall be subject to counseling, training, discipline, transfer or termination.

Responsibilities of Contractor and Subcontractors: Each Contractor and Subcontractor shall respond to each work injury and known unsafe act as follows:

- 1. Investigation.** The Contractor or Subcontractor, as applicable, shall conduct a proper investigation to determine: (a) the nature of the unsafe act; (b) the reasons the unsafe act occurred; and (c) the identity of the individual(s) who engaged in or was responsible for the unsafe act. With respect to any individual employee or representative who was identified as having engaged in or being responsible for an unsafe act, the following information shall be among the information reviewed and considered:
 - a. The individual's past training and experience as is relevant to the unsafe act committed;
 - b. The individual's prior disciplinary record;
 - c. The individual's prior record with respect to: (i) engaging in or allowing unsafe acts, and (ii) following instructions and directions; and
 - d. The individual's degree of culpability.
- 2. Prevention.** The Contractor or Subcontractor, as applicable, shall take action that is reasonably calculated to ensure that:
 - a. The unsafe act will not be repeated; and
 - b. That the individual(s) responsible for engaging in or allowing the unsafe act to occur will not engage in or allow unsafe acts to occur in the future.
- 3. Disciplinary/Corrective Options.** The options available to Contractors and Subcontractors when taking action that is reasonably calculated to ensure that the unsafe acts will not be repeated and that responsible individuals will not engage in or allow unsafe acts to occur include:
 - a. Additional training for workers in general and/or to the responsible individual in particular;
 - b. Job performance counseling of the responsible individual(s);
 - c. Verbal Warning (which shall be documented);
 - d. Written Warning;
 - e. Suspension from Work without pay;
 - f. Transfer off the Project; and
 - g. Discharge from employment.
- 4. Guiding Principles.** Contractors and Subcontractors shall decide which option(s) to exercise in accordance with the following guiding principles:

- a. Nothing in this Plan shall be construed to require any Contractor or Subcontractor to violate the terms or conditions of any applicable law, collective bargaining agreement or employment contract;
 - b. If any individual engages in a repeated unsafe act(s), a repeated violation(s) of the Contract, a repeated violation(s) of OSHA requirements, or a repeated violation(s) of this Plan, the actions taken by the Contractor or Subcontractor, as applicable, shall be progressive in severity and consequence;
 - c. Nothing in this Plan requires progressive discipline as a precondition to any suspension, transfer or discharge from employment and the Contractor or Subcontractor may impose a suspension, transfer or discharge for safety violations if it so chooses without having engaged in prior progressive discipline;
 - d. It is expected that individuals who engage in or who are responsible for any unmitigated life-threatening conduct or for willful disregard to the safety requirements of this Plan shall be subject to immediate discharge or permanent transfer off the Project.
- 5. Follow Up.** Contractors and Subcontractors shall take follow up action to ensure that the actions taken are effective. If it is observed that the actions originally taken have not been effective to prevent a repeat of the particular unsafe act or to prevent the particular individual(s) from engaging in that or other unsafe acts, the Contractor or Subcontractor, as applicable, shall take more aggressive disciplinary and corrective action.
- 6. Documentation.**
- a. Each Contractor and Subcontractor shall fully document the following:
 - i Known unsafe acts;
 - ii Investigation undertaken in accordance with these procedures;
 - iii Disciplinary and/or corrective action taken;
 - iv Rationale for choosing the particular action taken;
 - v Follow up action that is planned;
 - vi Follow up action that is taken; and
 - vii Results of the follow up action.
 - b. The documentation shall be maintained in an organized manner by each Contractor or Subcontractor as applicable and in accordance with the Record-Keeping requirements of this Plan. Records of discipline, job counseling and training shall be placed in the personnel file of the employee. Copies of the documentation shall be provided to the Owner and/or its representatives.

7.0 Recordkeeping and Files

The Contractor, all Subcontractors and Sub-subcontractors shall maintain a master or central file for safety and health related documentation on the Job Site. Files shall be maintained in such a manner that distinguishes each Contractor and their Subcontractors and Sub-subcontractors.

The Owner and/or its representatives shall have the right to review all documentation at any time upon request. The Contractor shall give full cooperation during these reviews.

The following documentation shall be in the Safety Files:

- The Contractor Safety Plan.
- Hazard Communication Program, including current Safety Data Sheets (SDS).
- Site Emergency Plans.
- All required safety & health permits.
- Weekly Toolbox/Tailgate Safety Meeting reports – including meeting topic(s) and employee attendance/sign-up sheets.
- Specific job hazard worker training.
- Job Site Safety Inspection reports – including documentation of corrective measures for closure.
- Equipment inspection reports.
- Crane inspection reports – daily and monthly (annual certification reports required prior to equipment operation).
- Employee orientation training records.
- Accident investigation reports, including near misses.
- Job Hazard Analysis.
- Competent person qualifications.
- Written Safety Violations.
- Written engineering survey for demolition.

8.0 Job Site Inspections

Inspections

Daily Safety and Health Inspections shall be continually conducted by the Contractor, all Subcontractors and Sub-subcontractors for each of their respective work areas on the Job Site. Documentation of all identified and corrected deficiencies shall be maintained on file.

Corrective Measures

Corrective measures to abate all deficiencies shall be completed immediately if life-threatening/serious conditions exist or no later than the end of the working shift for non-life threatening/serious conditions. All work shall be stopped until imminent danger hazards have been abated. Documentation of these corrective measures shall be provided to the Program's Safety Representative.

If a deficiency can not be abated within the same shift, a letter shall be provided to the Owner or its representatives outlining the reason(s) why and the step(s) taken as an interim measure to control the potential hazard.

Non-Abatement

If Contractor, Subcontractor or Sub-subcontractor fails to make corrections to identified deficiencies in a timely manner, the Owner or its representatives will:

- Notify the Contractor in writing to take prompt corrective action to eliminate construction safety and health concerns. Written notification will describe specific contract or code violations;
- Resolve outstanding construction safety issues and maintain documentation of corrective actions;
- Report in writing to the Contractor, the name(s) of the individual(s) and their supervisor(s) who are observed to violate Construction Safety Requirements, with copies to the Project File. If necessary, the Owner or its representatives may require the Contractor to remove these individual(s) and/or their supervisor(s) from the Job Site.

Stoppage of the Work

The Owner and/or its representatives shall be authorized to order, at the Contractor's expense, a stoppage of the Work until unsafe conditions are abated for imminent danger. It shall be communicated that all employees have a responsibility and are authorized to “stop work” on any activity or situation they believe presents a danger to themselves or a coworker, without fear of retribution.

9.0 Drug and Alcohol-Free Workplace Program

General Statement: The Owner is committed to maintaining a drug and alcohol-free workplace. The Owner has a vital interest in maintaining safe, healthful and efficient working conditions. Alcohol and illegal drug use or possession, pose a serious threat to workplace safety and health. Impairment from alcohol and the use and possession of illegal drugs pose a danger. The costs associated with implementing the Drug and Alcohol-Free Workplace Program, (herein referred to as “Program”) shall be the responsibility of the Contractor, Subcontractor or Sub-subcontractor, as applicable. Costs for Drug & Alcohol tests, as specified in this plan, shall be the responsibility of the Owner.

Responsibilities of Contractor and Subcontractors: Contractors and subcontractors shall adopt, implement and enforce drug and alcohol-free workplace programs that comply with the following minimum conditions:

1. Employee Prohibitions

- a. No covered employee shall report for duty or remain on duty (i) while having an alcohol concentration of 0.04 or greater; (ii) while possessing alcohol; (iii) while using alcohol; or (iv) within Four (4) Hours after using alcohol.
- b. No covered employee shall report for duty or remain on duty when the employee uses any controlled substance (except when the use is pursuant to the written instructions or prescription of a physician who has advised the employee that the substance does not adversely affect the employee's ability to work safely) or tests positive for controlled substances.
- c. No covered employee required to take a post-accident alcohol test under this program shall use alcohol for Eight (8) Hours following the accident or until he or she undergoes a post-accident alcohol test, whichever first occurs.
- d. No covered employee shall refuse to submit to a post-accident alcohol or controlled substances test required under this program or a reasonable suspicion alcohol or controlled substances test required by this program, or a follow-up alcohol or controlled substances test required under this program.

2. Employee Duties

- a. Covered employees shall comply with all mandates and prohibitions contained in this Program.
- b. Covered employees shall cooperate fully with all required testing and shall promptly report to all testing as directed.
- c. Covered employees are required to notify the Contractor or Subcontractor as applicable if they are taking any therapeutic drugs and shall supply a written certification on a form provided by the Contractor or Subcontractor from the physician prescribing the drug(s) that the substance(s) will not adversely affect the employee's ability to work safely and to comply with the safety requirements on the job.

3. Consequences of Covered Employees Engaging in Substance Use-Related Conduct.

- a. Consistent with contractual, legal and constitutional requirements, a determination shall be made by the Contractor or Subcontractor, as applicable, as to the appropriate disciplinary action, if any, to be imposed upon any covered employee who violates any of the prohibitions or mandates of this Program. Nothing in this Program shall be construed to limit the authority of any Contractor or Subcontractor to impose discipline, including discharge, as it shall determine so long as the minimums set forth in this Program are satisfied. Unless prohibited by law, contract or collective bargaining agreement, any employee who engages in any of the following conduct shall not be permitted access to the Construction Project and shall not be permitted to engage in any of the Work:
 - i Fails a drug test;
 - ii Possesses illegal drugs;
 - iii Refuses to submit to a drug or alcohol test;

- iv Is in possession of alcohol on the Work Site; or
 - v Is convicted or pleads guilty or *nolo contendere* of illegal drug use, possession or trafficking.
- b. Any covered employee tested under this Program who is found to have an alcohol concentration of 0.02 or greater but less than 0.04 shall be suspended without pay at least until the start of the employee's next regularly scheduled duty period that is at least Twenty-Four (24) Hours following the administration of the test.
- c. Any covered employee: (i) who reports or remains on duty while having an alcohol concentration of 0.04 or greater, possessing alcohol, using alcohol or having used alcohol within Four (4) Hours of reporting to Work; or (ii) who reports or remains on duty when the employee uses or has used any controlled substance (except when the use is pursuant to the written instructions or prescription of a physician who has advised the employee that the substance does not adversely affect the employee's ability to safely Work and the employee has so advised the Contractor or Subcontractor) or tests positive for controlled substances; or (iii) who consumes alcohol in contravention of a post-accident alcohol test requirement or refuses to submit to any drug or alcohol test required under this Program, and who is not to be discharged from employment, shall be suspended without pay and shall not be reinstated until the following requirements have been met:
- i Employee has been advised of the resources available to the employee in evaluating and resolving problems associated with the misuse of alcohol and the use of controlled substances, including the names, addresses and telephone numbers of substance abuse professionals and counseling and treatment programs; and
 - ii Employee has been evaluated by a substance abuse professional who shall determine what assistance, if any, the employee needs in resolving problems associated with alcohol misuse and controlled substances use; and
 - iii Employee has undergone a return-to-work alcohol test with a result indicating an alcohol concentration of less than 0.02 if the conduct involved alcohol, or a controlled substance test with a verified negative result if the conduct involved a controlled substance; and
 - iv If the employee has been identified as needing assistance in resolving problems associated with alcohol misuse or controlled substances use, the employee shall be evaluated by a substance abuse professional to determine that the employee has properly followed a rehabilitation program as prescribed.
4. Mandatory Drug and Alcohol Testing. Contractors and Subcontractors shall, as part of this Program, adhere to the following Post-Accident, Reasonable Suspicion, Return-to-Work and Follow-Up drug and alcohol testing of covered employees (costs for Drug & Alcohol tests, as specified in this plan, shall be the responsibility of the Owner):
- a. Post-Accident Testing. As soon as practical following an accident in connection with the Work involving any personal injury of the employee or of another requiring medical attention or first aid, or any property damage greater than One Thousand Dollars (\$1,000), the employee shall be tested for alcohol and controlled substances.
 - i An employee who is subject to post-accident testing under this policy shall remain readily available for such testing or may be deemed by the Contractor or Subcontractor, as applicable, to have refused to submit to testing;

- ii If a post-accident alcohol test is not administered within Two (2) Hours following the accident, the Contractor or Subcontractor as applicable, shall prepare and maintain a record stating the reasons the test was not promptly administered. If the test is not administered within Eight (8) Hours following the accident, attempt to administer the alcohol test shall cease and the Contractor or Subcontractor, as applicable, shall prepare and maintain a record setting forth why testing was not performed
 - iii If a post-accident controlled substances test is not administered within Thirty-Two (32) Hours following the accident, attempts to administer the test shall cease and the Contractor or Subcontractor, as applicable, shall prepare and maintain a record stating the reasons why the test was not administered within the required time.
 - iv A breath or blood test for the use of alcohol or a urine test for the use of controlled substance conducted by federal, state or local officials or policy having authority to conduct such testing shall be considered to meet the requirements of this Program if the results will be turned over to the Contractor or Subcontractor.
- b. Reasonable Suspicion Testing. A covered employee shall be required to submit to an alcohol and/or controlled substances test when the Contractor or Subcontractor, as applicable, has reasonable suspicion that the employee is using or has used alcohol or controlled substances in violation of the prohibitions or mandates of this Program.
 - i The determination that reasonable suspicion exists to require an employee to undergo testing must be based on specific, contemporaneous, articulable observations concerning the appearance, behavior, speech or body odors of the employee. The observations may include indications of the chronic and withdrawal effects of controlled substances. Reasonable suspicion as to alcohol use may be based only on observations made while the employee is working or just before the employee begins Work or just after the employee stops working.
 - ii The Contractor and Subcontractors shall designate individuals who shall have obtained necessary training that covers the physical, behavioral, speech and performance indicators of probable alcohol misuse and use of controlled substances. Only those so trained are permitted to make the determination that can lead to Reasonable Suspicion Testing.
 - iii Reasonable Suspicion Testing may not be performed by the individual who made the determination that there was reasonable suspicion for testing.
 - iv A written record shall be prepared and maintained setting forth the basis and observations for the reasonable suspicion leading to the testing. With respect to suspicion related to controlled substances, such record shall be made and signed by the individual who made the observation within Twenty-Four (24) Hours of the observed behavior or before the results of the controlled substances test are released, whichever is earlier.
 - v Reasonable Suspicion Alcohol Testing shall be required while the employee is working, just before the employee begins work, or just after the employee stops working. If an alcohol test is not administered within Two (2) Hours following the determination that reasonable suspicion exists, the Contractor or Subcontractor

shall prepare and maintain a record stating the reasons the test was not promptly administered. If the test is not administered within Eight (8) Hours following the determination that reasonable suspicion exists, attempts to administer the alcohol test shall cease and the Contractor or Subcontractor, as applicable, shall prepare and maintain a record setting forth the reasons the test was not administered. Notwithstanding the absence of a reasonable suspicion alcohol test, where there was reasonable suspicion of alcohol use, the employee shall not be permitted to work until:

- (1) An alcohol test is administered and the employee's alcohol concentration measures to less than 0.02; or
- (2) Twenty-Four (24) Hours have elapsed following the determination of reasonable suspicion.

- c. Return-to-Work Testing. No employee may return to work after engaging in conduct prohibited by this Program until after he or she has, as appropriate, undergone an alcohol test with a result indicating an alcohol concentration of less than 0.02 or a controlled substances test with a result indicating a verified negative result for controlled substance use.
- d. Follow-Up Testing. Any employee who is in need of assistance in resolving problems associated with alcohol misuse and/or use of controlled substances shall be subject to unannounced Follow-up Testing as directed by a substance abuse professional. Follow-up Testing shall be conducted only when the employee is working, just before the employee begins work, or just after the employee has stopped working.

5. Miscellaneous

- a. A "covered employee" under this program shall mean any person who is an employee of the Contractor or any Subcontractor and who engages in any Work that is subject to the safety requirements of the Contract or this Plan and any employee of any Contractor or any Subcontractor who operates a commercial vehicle as defined by law in connection with any of the Work.
- b. The means, manner and methods of the testing procedures for alcohol and substances under this Program shall be in accordance with the procedures set forth in Title 49, Part 40 of the Code of Federal Regulations, which, by this reference, are hereby incorporated herein by reference as if fully set forth herein. Without intending to limit the generality of the foregoing requirement, preparation for testing, specimen collection procedures, laboratory personnel requirements, laboratory analysis procedures, quality assurance and quality control procedures, reporting and review of results procedures, protection of employee records procedures, individual access to test and laboratory results, use of certified laboratory requirements, breath alcohol technician requirements, breath alcohol device requirements, quality assurance plans, procedures for confirmation of tests, refusal to test and uncompleted test procedures, inability to provide an adequate amount of breath, invalid test procedures, etc., as governed by 49 CFR, Part 40, shall all be implemented by Contractors and Subcontractors with respect to any drug or alcohol test administered in accordance with this Program.
- c. Work Related Injuries. Contractors and Subcontractors shall require Post-Accident Testing in accordance with the terms and conditions of this Program in the event of any accident that results in a work-related accident. The Post-Accident Testing may be arranged by the Contractor or Subcontractor or may be arranged by the OCIP Workers' Compensation carrier. In either event, the procedures contained in 49 CFR,

Part 40, shall be followed.

- d. Employee Training. Each Contractor and Subcontractor shall require that all employees are trained and periodically retrained in the requirements of the Drug and Alcohol-Free Workplace Program. This training shall be properly documented.

10.0 Accident/Injury Management

Accident Reporting

All accidents resulting in employee injury, property damage, or involving the public shall be reported immediately to the project officials in accordance with the claims reporting instructions provided by the OCIP Insurance Administrator. All accidents resulting in injuries or illnesses shall be thoroughly investigated by the *injured worker's supervisor*.

The Contractor shall complete an Accident Investigation Report for all accidents resulting in employee injury, property damage, public involvement or near miss incidents. All Contractors shall cooperate with the Owner and its representatives in the investigation, analysis and defense of any claim, accident, occurrence or insured loss.

Accident Investigation

A formal written "Accident Investigation Report" and "First Report of Injury" shall be completed by the end of the working day/shift of the accident. Identification and review of accident causes shall be completed, identifying corrective actions, persons responsible for corrective actions and date of completion shall be established. Follow-up documentation verifying corrective action shall be required.

Copies of all accident investigation documents shall be maintained on file.

11.0 Workers Compensation Claims Cooperation

General Statement

In the event of any work related injury of any employee of any Contractor or Subcontractor, the Contractor or Subcontractor, as applicable, shall cooperate with the Workers' Compensation insurer, or its representatives, to reduce the costs of the administration of the claim by the insurer, to ensure that the claim is properly administered, and to return the employee back to work as soon as possible.

Responsibilities of Contractor and Subcontractors

Contractors and Subcontractors shall adopt, implement and enforce a Workers' Compensation Program that complies with the following minimum conditions:

1. **Compliance with Posting and Notice Requirements.** Each Contractor and Subcontractor shall comply with all posting and notice requirements imposed by Pennsylvania's Workers' Compensation Act. Contractors and Subcontractors shall maintain documentation proving that they have complied with these requirements.
2. **Posting and Designation of Physicians.** In the event that the OCIP Workers' Compensation insurer has provided a list of designated physicians to the Contractor and/or Subcontractor, the Contractor and Subcontractor shall properly post and provide notice of the designated physicians to employees in accordance with the requirements of the Workers' Compensation Act. Contractors and Subcontractors shall maintain documentation proving that they have complied with these requirements. Where a designated physician panel is in place, Contractors and Subcontractors shall take action to ensure that injured employees receive treatment from the designated physicians in accordance with the law.
3. **Notice of Workers' Compensation Injuries.** Contractors and Subcontractors shall receive reports of occupational injuries and diseases in accordance with the terms and conditions of the Workers' Compensation Act and shall promptly complete and file the necessary forms and reports with the Commonwealth and the OCIP insurer or its representative.
4. **Participation in Claims Meetings.** Contractors and Subcontractors shall participate in claims review meetings when and if scheduled by the OCIP Workers' Compensation insurer or its representative.
5. **Return-to-Work Programs.** Contractors and Subcontractors shall cooperate with the OCIP Workers' Compensation insurer or its representative to return injured employees to Work as soon as possible consistent with their medical capabilities. Contractors and Subcontractors shall consider and offer modified Work to employees when such Work is available or can reasonably be made available.
6. **Litigation Cooperation.** In the event that there is any litigation growing out of a Work-related injury, each Contractor or Subcontractor, as applicable, shall cooperate with the OCIP insurer, its representatives and attorneys, in the defense of the claim and shall make necessary evidence and witnesses available for hearing preparation and testimony.
7. **Nothing in this Plan shall be construed as a requirement that any Contractor or Subcontractor take any action that is in violation of law, any applicable collective bargaining agreement or contract.**

12.0 General Safety and Health Policies

Policies outlined are for the health and safety of all contractors, representatives and owners during the construction activity. It is the responsibility of all contractors to adhere to all federal, state and local laws regarding health and safety of employees. Any contractor/employee who willfully refuses to follow policies may be subject to disciplinary action which may include immediate removal from the Job Site.

Competent Person Requirements

The Contractor, all Subcontractors and Sub-subcontractors shall develop and maintain documentation identifying employee(s) designated as a competent person(s). The qualifications for Competent Persons are identified in the Subpart of OSHA 29 CFR 1926. NOTE: Various subparts of OSHA have interpretations as to the qualifications and training required to be designated as a Competent Person (i.e., Subpart P – Excavations; Subpart L – Scaffolding; etc.)

Personal Protective Equipment

All employees shall use protective equipment prescribed by federal, state, and local laws and by this Plan to control hazards or other exposure to illness or injury. **Any employee who willfully refuses to use prescribed protective equipment designed to protect them or willfully damages such equipment shall be subject to disciplinary action which may include immediate removal from the Job Site.**

Eye and Face Protection:

Contractors, Subcontractors and Sub-subcontractors shall provide, maintain and manage eye and face protection for their employees in accordance with OSHA Construction Standards 29 CFR 1926.102.

All Construction workers and visitors are required to wear 100% eye protection which meet ANSI Z 87.1 2015 at all times while on the Construction Site.

Only clear safety glasses shall be worn inside any building(s).

Head Protection:

All Construction workers and visitors shall wear hard hats which meet ANSI Z 89.1-1986, One Hundred Percent (100%) of the time while on the Construction Site. Hard hats should display the company decal where the employee works.

All delivery personnel, vendors and visitors shall wear approved hard hats while on the Construction Site.

Hearing Protection:

All Work areas identified as high noise exposure shall be properly posted to warn employees of the exposure.

Appropriate hearing protection shall be worn in Work areas where noise levels are 85 dBA or greater.

Respiratory Protection:

Contractors, whose Work activities warrant that employees wear respiratory protection, shall establish and implement a Respiratory Protection Program. The Program shall meet the requirements set forth in 29 CFR 1926.134.

Foot Protection:

All personnel on the Construction Site shall wear leather hard-soled work boots. No one is permitted to wear sneakers (including ANSI approved), tennis shoes or athletic shoes of any type, sandals, high

heels or open toed shoes on the Construction Site.

Clothing:

Suitable clothing for Construction Work shall be worn on the Construction Site. Shirts with sleeves at least t-shirt (4 inches in length) and full-length pants shall be required. Polyester or similar material is not allowed. Shorts, sweatpants or tank-tops are not allowed. High visibility clothing and/or vests shall be worn at all times including indoor and outdoor activities. Any work involving equipment operations, employees must wear high visibility ANSI Class 2 vest.

Fall Prevention

The Fall Prevention Policy is based on the following observations:

- All fall hazards can be eliminated, prevented and/or controlled.
- To control fall hazards is morally responsible, good business and cost effective.
- The establishment and implementation of a Fall Prevention Program is the most effective way to provide a continuous process to identify, evaluate and control fall hazards.

No person/employee shall be exposed to a fall hazard from any elevation greater than Six (6) Feet. In addition, all other construction activities that involve fall protection/prevention shall be performed in accordance with 29 CFR 1926, Subpart M:

- Employees exposed to a fall distance of Six (6) Feet or more (no exceptions), or less where the distance has a likelihood of a serious or fatal injury, shall be protected by the means of a Fall Protection System.
- Fall prevention controls shall be based on the principle that engineering and design techniques for the elimination and prevention of fall hazards shall be utilized above and beyond the use of Personal Fall Protection Equipment. When it is not feasible to provide fall prevention controls, workers exposed to falls shall be equipped with:
 - ◆ Only full-body harnesses and Lanyards with shock absorbers with locking snap-hooks. Body Belts are not permitted on the Project. All Personal Fall Protection Equipment shall be compatible, and all manufacturers equipment guidelines shall be understood and followed.
 - ◆ Appropriate anchorage points, capable of supporting Five Thousand (5,000) Pounds per worker attached shall be properly installed.
- Guardrails systems shall comply with the following; top rail 42" (+/- 3") above the walking/working surface. It shall be able to withstand, without failure, a force of 200 pounds applied in any outward or downward direction. Mid-rails, when used, shall be installed midway between the upper surface of the top rail and the walking/working surface. It shall be able to withstand, without failure, a force of 150 pounds applied in any outward or downward direction.
- Contractors performing structural erection activities (such as precast concrete and **steel erection**) shall provide upon request a "Task Specific Fall Protection Plan" which complies with the **Six (6) Foot Fall Protection Requirement**.
 - Contractors performing roofing work/activity shall provide upon request a "Site Specific Fall Protection Plan" which complies with 29 CFR 1926, subpart M. All

fall protection means must be evaluated prior to use of safety monitoring systems. **Safety monitoring systems shall be utilized as a last resort.** All Safety monitors must be distinguishable and have appropriate training according to OSHA.

- Ladders (straight, extension & step) shall be used only for employee access and short duration miscellaneous light Work where 3-point contact with the ladder can be maintained. If ladders are to be used for performing long duration heavy Work at heights Six (6) Feet and greater (or any height where the likelihood of a serious or fatal injury exists), the fall hazards shall be controlled through the use of fall protection.

Excavations and Trenches

Excavations shall be performed in accordance with 29 CFR 1926, Subpart P:

- A safe means of access and egress shall be provided for employees from excavations and trenches regardless of their depth at intervals that provide no more than Twenty-Five (25) Feet of lateral travel.
- A Competent Person shall be present anytime excavation Work is performed. The Competent Person shall inspect each excavation before the start of each shift and as conditions change (rain run-off, seeping water, freezing/thawing conditions, vibration, atmospheric conditions, etc.). All inspections shall be documented and maintained on file.
- All soils shall be classified as type "C" until the Competent Person can demonstrate the soil can be reclassified as another type, using acceptable soil analysis practices.
- All employees shall be protected from cave-ins by means of benching, sloping and/or shoring systems, in accordance with 29 CFR 1926, Subpart P.
- All open excavations and trenches shall be barricaded or adequately guarded at all times with highly visible material.
- Equipment, material and spoil piles shall not be placed closer than Two (2) Feet from the excavation or trench edge.
- Atmospheric testing shall be conducted and completed in excavations and trenches where possible hazardous condition exists prior to employees entering.

Electrical

Electrical Work shall be performed in accordance with 29 CFR 1926, Subpart K:

- Only qualified electricians familiar with code requirements shall be allowed to perform electrical Work.
- Extension cords used with portable electrical tools and appliances shall be heavy duty and of the three-wire type. Extension cords shall be at least 12 gauge designed for hard or extra-hard usage types S, ST, SO and STO. Cords shall be covered, elevated or otherwise protected from damage which would create a hazard to

Construction Site Personnel.

- Extension cords shall be hung overhead and/or positioned as to minimize slip, trip and fall hazards.
- Electrical cords and equipment shall be visually inspected before each shift for external defects. All damaged and defective cords shall be removed from service immediately (this includes cords with the ground prong missing). Cords shall be repaired with approved heat-shrink methods, electrical tape is not permitted.
- All temporary electrical tools, cords and equipment shall be properly protected by Ground Fault Circuit Interrupters (GFCI). All portable generators shall have properly functioning GFCI outlets. GFCI receptacles shall be tested monthly with a multi-range GFCI tester (the tests shall be documented) to insure the GFCI is properly functioning and protecting the worker.
- Electrical equipment or machinery shall be de-energized and rendered inoperative by the electrician performing Work on the system. Any company performing Work on electrical equipment shall develop a "task-specific" lockout/tagout safety plan. Lockout/Tagout shall be performed in accordance with 29 CFR 1910.147. The failure to follow lockout/tagout procedures will result in immediate removal from the Project.

Scaffolds

Scaffold Work shall be performed in accordance with 29 CFR 1926, Subpart L:

- The contractor shall have a competent person determine the feasibility and safety of providing fall protection for employees erecting or dismantling supported scaffolds. Employers are required to provide fall protection for employees erecting or dismantling supported scaffolds where the installation and use of such protection is feasible and does not create a greater hazard.
 - Lean-to scaffolds and makeshift platforms shall be prohibited.
 - Scaffolds shall not be used for storage of materials except material currently being used.
 - All scaffolds shall be adequately designed to carry, without failure, Four (4) Times the maximum intended load. At no time shall any scaffold be overloaded.
 - All scaffolds shall be maintained in safe condition. Scaffolds damaged or weakened, from any cause, shall be immediately removed from service.
 - Scaffolding more than Six (6) Feet above the working surface shall have standard guardrails and toe boards properly installed.
 - Each Contractor working with scaffolds shall designate, in writing, the name of their designated Competent Person for erection, dismantling, altering and moving of scaffolds.
 - Scaffolds shall be inspected prior to each shift by the designated Competent Person.
 - Proper access shall be provided for all employees to working areas. Employees shall not climb on cross-bracing to access scaffold.
 - Scaffolds shall be erected on sound, rigid surfaces. Base-plates and mud-sills shall be used with all scaffolds. Unstable objects such as brick, block, etc. shall not be used to support scaffolds.

Welding and Cutting

Welding and Cutting Work shall be performed in accordance with 29 CFR 1926, Subpart J:

- Welding leads and cutting hoses shall be kept clear of walkways and stairways.
- Flash arrestors shall be installed on both oxygen and acetylene hoses at the regulator connection.
- All welders shall wear approved eye and head protection when welding. All personnel assisting the welder shall also wear approved protective eye protection.
- Prior to welding or cutting a "20-ABC" rated fire extinguisher shall be within easy reach of the worker. A fire watch shall be stationed at all locations where sparks and/or flames may fall to a lower floor/work area or to another side of a wall.
- A suitable cylinder truck, with chain, shall be used to keep cylinders from being knocked over while in use.
- Flash arrestors shall be installed on both oxygen and acetylene hoses at regulator connection.
- Spent welding rods shall be picked up and disposed of daily.
- When practical, all welding and cutting operations shall be shielded by non-combustible or flame-proof screens.
- Oxygen and acetylene cylinders shall not be stored inside buildings.
- Rubber boot protectors shall be provided on all welding leads where they make connections at the welding machine.

Cranes

Crane Operations shall be in accordance with 29 CFR 1926, Subpart CC:

The following requirements shall be followed by the Contractor and all tiered Subcontractors for all cranes entering the Construction Area:

- All hydraulic and lattice boom cranes operating on the Construction Site shall be equipped with a functioning "anti-two blocking" device.
- The operator shall know the weight of every suspended load, regardless of size.
- All cranes shall have an annual inspection (completed and certified by a nationally recognized crane inspection organization) and available upon request.

All crane operators shall be qualified prior to operating any crane on the Job Site:

- Operators shall meet the requirements of 29 CFR 1926, Subpart CC.
- An up-to-date résumé detailing the operator's qualifications (i.e., years of experience, previous jobs worked on, etc.) Shall be maintained in the Contractor's and/or any Subcontractors and Sub-subcontractor's files at the Job Site.

- Before any operator is allowed to operate a crane on the Construction Site, the Contractor and/or Subcontractors and Sub-subcontractors shall have the operator perform a functional operation appraisal to ensure the operator is qualified. Employer must ensure all operators are qualified on the make, model and configuration of the crane. This shall be documented and maintained on file in accordance with 29 CFR 1926, Subpart CC.
- Operators shall hold a current CCO (Certified Crane Operator) card with the appropriate designation for the type of crane being used, a current Pennsylvania Crane Operators license and current medical certificate.

Cranes shall be inspected for safety-related deficiencies and defective/damaged parts that effect the safe operation of a crane. Cranes shall be immediately removed from service until repairs can be made. All inspections shall be documented. The following inspection criteria shall be followed:

- After set-up and prior to initial lift;
- Before each shift;
- Monthly;
- After every malfunction;
- Manufacturer's inspection guidelines.

Motor Vehicles and Heavy Equipment

Heavy Equipment Work shall be performed in accordance with 29 CFR 1926, Subpart O:

- All employees who operate equipment and vehicles shall have sufficient experience with that particular piece of equipment and shall be trained in the safe operation of that equipment.
- All heavy equipment including: cranes, forklifts, dozers, endloaders, etc. shall have a reverse signal/back-up alarm audible above surrounding background noise.
- High visibility clothing ANSI Class 2 shall be worn at all times.
- No one shall ride in a vehicle or mobile equipment unless they are in a seat (exceptions, if the equipment is designed to be operated while standing up). Riding in the back of pick-up trucks shall not be allowed.
- All motor vehicles and equipment brought on-site shall be thoroughly inspected and shall be in safe operating condition.
- Forklift operators shall have a current training card that should be available for review upon request.

Coronavirus Disease (COVID-19)

All contractors and visitors should follow all CDC, federal, state and local requirements, recommendations and mandates in regard to protocols and practices to minimize the spread and potential infection of COVID-19. Contractors should also follow their own company's COVID-19 Safety Plan as well.

Protocols and practices implemented may include but not limited to:

- Frequently wash your hands with soap and water for at least 20 seconds. When soap and running water are unavailable, use an alcohol-based hand rub with at least 60% alcohol.
- Avoid touching your eyes, nose or mouth with unwashed hands.
- Follow appropriate respiratory etiquette, which includes covering for coughs and sneezes
- Don appropriate face coverings
- Maintain social distancing

In addition, employees must familiarize themselves with the symptoms of COVID-19, which may include but not limited to:

- Coughing
- Fever
- Shortness of breath, difficulty breathing and,
- Early symptoms such as chills, body aches, sore throat, headache, diarrhea, nausea/vomiting and runny nose.

****All employees who exhibit symptoms and/or have been in close contact with someone showing symptoms should notify their employer immediately.**

DOCUMENT 00 7346 - WAGE DETERMINATION SCHEDULE

PART 1 - GENERAL

1.1 DOCUMENTS

- A. The Prevailing Minimum Wage Predetermination, included herein below, as determined by the Secretary of Labor and Industry of the Commonwealth of Pennsylvania, is a part of the Contract documents for this Project.
 - 1. Serial Number: 25-08962.
 - 2. Determination Date: 9/29/2025
- B. Submit a Certified Payroll Certificate each week directly to the Owner.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 ELECTRONIC DOCUMENTS

- A. See www.dli.pa.gov to search and view Prevailing Wage Project Rates or view the **Project Rates attached**.
 - 1. Wage rate determination search:
www.pa.gov/en/agencies/dli/resources/forms-and-documents/labor-law/prevailing-wage.html
 - 2. Weekly Payroll Certification Form:
www.pa.gov/content/dam/copapwp-pagov/en/dli/documents/documents/mandatory-postings/lhc-25.pdf

DOCUMENT CONTINUES ON NEXT PAGE

BUREAU OF LABOR LAW COMPLIANCE PREVAILING WAGES PROJECT RATES

Project Name:	NEW DISTRICT MAINTENANCE & BUS DEPOT FACILITY
General Description:	New 13,000 sf fleet vehicle maintenance and office facility. Two-story masonry bearing with steel and concrete floor and wood truss roof construction. Extensive grading and site improvements. Comprehensive MEP.
Project Locality	South Fayette Township
Awarding Agency:	South Fayette Township School District
Contract Award Date:	11/27/2025
Serial Number:	25-08962
Project Classification:	Building/Heavy/Highway
Determination Date:	9/29/2025
Assigned Field Office:	Pittsburgh
Field Office Phone Number:	(412)565-5300
Toll Free Phone Number:	(877)504-8354
Project County:	Allegheny County

BUREAU OF LABOR LAW COMPLIANCE PREVAILING WAGES PROJECT RATES

Project: 25-08962 - Building	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Asbestos & Insulation Workers	8/1/2024		\$43.40	\$29.51	\$72.91
Asbestos & Insulation Workers	8/1/2025		\$45.10	\$30.31	\$75.41
Boilermakers	6/1/2016		\$40.90	\$27.61	\$68.51
Bricklayer	12/1/2024		\$41.00	\$25.59	\$66.59
Bricklayer	6/1/2025		\$41.50	\$26.09	\$67.59
Carpenters - Piledriver/Welder	1/1/2025		\$43.38	\$22.72	\$66.10
Carpenters - Piledriver/Welder	1/1/2026		\$44.63	\$23.47	\$68.10
Carpenters, Drywall Hangers, Framers, Instrument Men, Lathers, Soft Floor Layers	6/1/2024		\$41.49	\$19.93	\$61.42
Carpenters, Drywall Hangers, Framers, Instrument Men, Lathers, Soft Floor Layers	6/1/2025		\$43.34	\$19.93	\$63.27
Cement Masons	7/1/2024		\$34.57	\$25.09	\$59.66
Cement Masons	6/1/2025		\$35.52	\$25.64	\$61.16
Drywall Finisher	6/1/2024		\$34.01	\$24.63	\$58.64
Drywall Finisher	6/1/2025		\$35.16	\$25.98	\$61.14
Electricians & Telecommunications Installation Technician	12/27/2024		\$50.86	\$32.69	\$83.55
Electricians & Telecommunications Installation Technician	12/26/2025		\$54.16	\$32.69	\$86.85
Elevator Constructor	1/1/2024		\$58.55	\$43.87	\$102.42
Elevator Constructor	1/1/2025		\$61.07	\$40.05	\$101.12
Glazier	9/1/2024		\$37.06	\$31.89	\$68.95
Glazier	9/1/2025		\$38.70	\$33.75	\$72.45
Iron Workers	6/1/2024		\$39.89	\$36.47	\$76.36
Iron Workers	6/1/2025		\$41.50	\$37.36	\$78.86
Laborers (Class 01 - See notes)	1/1/2025		\$27.32	\$19.96	\$47.28
Laborers (Class 01 - See notes)	1/1/2026		\$27.82	\$20.46	\$48.28
Laborers (Class 02 - See notes)	1/1/2025		\$27.47	\$19.96	\$47.43
Laborers (Class 02 - See notes)	1/1/2026		\$27.97	\$20.46	\$48.43
Laborers (Class 03 - See notes)	1/1/2025		\$30.47	\$19.96	\$50.43
Laborers (Class 03 - See notes)	1/1/2026		\$30.97	\$20.46	\$51.43
Landscape Laborer (Skilled)	1/1/2025		\$25.79	\$18.78	\$44.57
Landscape Laborer (Skilled)	1/1/2026		\$26.79	\$19.03	\$45.82
Landscape Laborer (Tractor Operator)	1/1/2025		\$26.09	\$18.78	\$44.87
Landscape Laborer (Tractor Operator)	1/1/2026		\$27.09	\$19.03	\$46.12
Landscape Laborer	1/1/2025		\$25.37	\$18.78	\$44.15
Landscape Laborer	1/1/2026		\$26.37	\$19.03	\$45.40
Millwright	6/1/2020		\$41.68	\$20.32	\$62.00
Operators (Class 01 - see notes)	6/1/2024		\$41.69	\$24.39	\$66.08
Operators (Class 01 - see notes)	6/1/2025		\$42.72	\$24.79	\$67.51
Operators (Class 01 - see notes)	6/1/2026		\$43.74	\$25.29	\$69.03
Operators (Class 02 -see notes)	6/1/2024		\$35.62	\$24.39	\$60.01
Operators (Class 02 -see notes)	6/1/2025		\$36.67	\$24.79	\$61.46
Operators (Class 02 -see notes)	6/1/2026		\$37.67	\$25.29	\$62.96
Operators (Class 03 - See notes)	6/1/2024		\$32.83	\$24.39	\$57.22
Operators (Class 03 - See notes)	6/1/2025		\$33.88	\$24.79	\$58.67

BUREAU OF LABOR LAW COMPLIANCE PREVAILING WAGES PROJECT RATES

Project: 25-08962 - Building	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Operators (Class 03 - See notes)	6/1/2026		\$34.88	\$25.29	\$60.17
Painters Class 6 (see notes)	6/1/2024		\$32.14	\$24.93	\$57.07
Painters Class 6 (see notes)	6/1/2025		\$34.16	\$25.81	\$59.97
Piledrivers	1/1/2025		\$41.88	\$22.72	\$64.60
Piledrivers	1/1/2026		\$43.13	\$23.47	\$66.60
Plasterers	6/1/2024		\$33.14	\$21.04	\$54.18
plumber	6/1/2024		\$51.75	\$25.87	\$77.62
plumber	6/1/2025		\$54.95	\$25.87	\$80.82
plumber	6/1/2026		\$58.05	\$25.87	\$83.92
plumber	6/1/2027		\$61.15	\$25.87	\$87.02
Pointers, Caulkers, Cleaners	12/1/2024		\$39.69	\$21.61	\$61.30
Pointers, Caulkers, Cleaners	6/1/2025		\$40.66	\$21.99	\$62.65
Roofers	6/2/2024		\$38.00	\$20.67	\$58.67
Roofers	6/1/2025		\$39.91	\$20.76	\$60.67
Sheet Metal Workers	7/1/2024		\$43.00	\$33.96	\$76.96
Sheet Metal Workers	7/1/2025		\$45.00	\$35.16	\$80.16
Sign Makers and Hangars	7/15/2024		\$32.32	\$25.82	\$58.14
Sign Makers and Hangars	7/15/2025		\$33.48	\$26.41	\$59.89
Sprinklerfitters	7/1/2024		\$45.38	\$26.46	\$71.84
Sprinklerfitters	1/1/2025		\$44.79	\$27.05	\$71.84
Steamfitters	6/1/2024		\$48.15	\$29.57	\$77.72
Steamfitters	6/1/2025		\$50.20	\$31.02	\$81.22
Stone Masons	12/1/2024		\$43.10	\$24.22	\$67.32
Stone Masons	6/1/2025		\$43.60	\$24.72	\$68.32
Terrazzo Finisher	12/1/2024		\$41.04	\$18.72	\$59.76
Terrazzo Finisher	6/1/2025		\$41.73	\$19.03	\$60.76
Terrazzo Mechanics	12/1/2024		\$40.39	\$21.02	\$61.41
Terrazzo Mechanics	6/1/2025		\$41.13	\$21.28	\$62.41
Tile Finisher	12/1/2024		\$32.51	\$17.99	\$50.50
Tile Finisher	6/1/2025		\$33.24	\$18.36	\$51.60
Tile Setter	12/1/2024		\$39.41	\$22.44	\$61.85
Tile Setter	6/1/2025		\$40.15	\$22.80	\$62.95
Truckdriver class 1(see notes)	1/1/2025		\$36.43	\$23.21	\$59.64
Truckdriver class 1(see notes)	1/1/2026		\$37.93	\$23.71	\$61.64
Truckdriver class 2 (see notes)	1/1/2025		\$36.89	\$23.52	\$60.41
Truckdriver class 2 (see notes)	1/1/2026		\$38.39	\$24.02	\$62.41
Window Film / Tint Installer	10/1/2019		\$25.00	\$2.63	\$27.63

BUREAU OF LABOR LAW COMPLIANCE PREVAILING WAGES PROJECT RATES

Project: 25-08962 - Heavy/Highway	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Carpenter	1/1/2025		\$41.35	\$22.09	\$63.44
Carpenter	1/1/2026		\$42.60	\$22.84	\$65.44
Carpenter Welder	1/1/2025		\$42.85	\$22.09	\$64.94
Carpenter Welder	1/1/2026		\$44.10	\$22.84	\$66.94
Carpenters - Piledriver/Welder	1/1/2025		\$43.38	\$22.72	\$66.10
Carpenters - Piledriver/Welder	1/1/2026		\$44.63	\$23.47	\$68.10
Cement Finishers	1/1/2024		\$35.14	\$26.30	\$61.44
Cement Finishers	1/1/2025		\$35.94	\$27.50	\$63.44
Cement Masons	1/1/2020		\$32.84	\$21.10	\$53.94
Electric Lineman	6/3/2024		\$53.97	\$31.05	\$85.02
Electricians & Telecommunications Installation Technician	12/27/2024		\$51.76	\$31.80	\$83.56
Electricians & Telecommunications Installation Technician	12/26/2025		\$54.16	\$32.69	\$86.85
Iron Workers (Bridge, Structural Steel, Ornamental, Precast, Reinforcing)	6/1/2024		\$39.89	\$36.47	\$76.36
Iron Workers (Bridge, Structural Steel, Ornamental, Precast, Reinforcing)	6/1/2025		\$41.50	\$37.36	\$78.86
Laborers (Class 01 - See notes)	1/1/2024		\$32.20	\$25.50	\$57.70
Laborers (Class 01 - See notes)	1/1/2025		\$33.70	\$26.00	\$59.70
Laborers (Class 01 - See notes)	1/1/2026		\$34.70	\$27.00	\$61.70
Laborers (Class 02 - See notes)	1/1/2024		\$32.36	\$25.50	\$57.86
Laborers (Class 02 - See notes)	1/1/2025		\$33.86	\$26.00	\$59.86
Laborers (Class 02 - See notes)	1/1/2026		\$34.86	\$27.00	\$61.86
Laborers (Class 03 - See notes)	1/1/2024		\$32.75	\$25.50	\$58.25
Laborers (Class 03 - See notes)	1/1/2025		\$34.25	\$26.00	\$60.25
Laborers (Class 03 - See notes)	1/1/2026		\$35.25	\$27.00	\$62.25
Laborers (Class 04 - See notes)	1/1/2024		\$33.20	\$25.50	\$58.70
Laborers (Class 04 - See notes)	1/1/2025		\$34.70	\$26.00	\$60.70
Laborers (Class 04 - See notes)	1/1/2026		\$35.70	\$27.00	\$62.70
Laborers (Class 05 - See notes)	1/1/2024		\$33.61	\$25.50	\$59.11
Laborers (Class 05 - See notes)	1/1/2025		\$35.11	\$26.00	\$61.11
Laborers (Class 05 - See notes)	1/1/2026		\$36.11	\$27.00	\$63.11
Laborers (Class 06 - See notes)	1/1/2024		\$30.45	\$25.50	\$55.95
Laborers (Class 06 - See notes)	1/1/2025		\$31.95	\$26.00	\$57.95
Laborers (Class 06 - See notes)	1/1/2026		\$32.95	\$27.00	\$59.95
Laborers (Class 07 - See notes)	1/1/2024		\$33.20	\$25.50	\$58.70
Laborers (Class 07 - See notes)	1/1/2025		\$34.70	\$26.00	\$60.70
Laborers (Class 07 - See notes)	1/1/2026		\$35.70	\$27.00	\$62.70
Laborers (Class 08 - See notes)	1/1/2024		\$34.70	\$25.50	\$60.20
Laborers (Class 08 - See notes)	1/1/2025		\$36.20	\$26.00	\$62.20
Laborers (Class 08 - See notes)	1/1/2026		\$37.20	\$27.00	\$64.20
Millwright	6/1/2024		\$47.59	\$23.72	\$71.31
Millwright	6/1/2025		\$49.72	\$23.72	\$73.44
Operators (Class 01 - see notes)	1/1/2024		\$38.59	\$24.03	\$62.62
Operators (Class 01 - see notes)	1/1/2025		\$40.39	\$24.23	\$64.62

BUREAU OF LABOR LAW COMPLIANCE PREVAILING WAGES PROJECT RATES

Project: 25-08962 - Heavy/Highway	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Operators (Class 01 - see notes)	1/1/2026		\$41.96	\$24.66	\$66.62
Operators (Class 02 -see notes)	1/1/2024		\$38.33	\$24.03	\$62.36
Operators (Class 02 -see notes)	1/1/2025		\$40.13	\$24.23	\$64.36
Operators (Class 02 -see notes)	1/1/2026		\$41.70	\$24.66	\$66.36
Operators (Class 03 - See notes)	1/1/2024		\$34.68	\$24.03	\$58.71
Operators (Class 03 - See notes)	1/1/2025		\$36.48	\$24.23	\$60.71
Operators (Class 03 - See notes)	1/1/2026		\$38.05	\$24.66	\$62.71
Operators (Class 04 - See notes)	1/1/2024		\$34.22	\$24.03	\$58.25
Operators (Class 04 - See notes)	1/1/2025		\$36.02	\$24.23	\$60.25
Operators (Class 04 - See notes)	1/1/2026		\$37.59	\$24.66	\$62.25
Operators (Class 05 - See notes)	1/1/2024		\$33.97	\$24.03	\$58.00
Operators (Class 05 - See notes)	1/1/2025		\$35.77	\$24.23	\$60.00
Operators (Class 05 - See notes)	1/1/2026		\$37.34	\$24.66	\$62.00
Operators Class 1-A	1/1/2024		\$41.59	\$24.03	\$65.62
Operators Class 1-A	1/1/2025		\$43.39	\$24.23	\$67.62
Operators Class 1-A	1/1/2026		\$44.96	\$24.66	\$69.62
Operators Class 1-B	1/1/2024		\$40.59	\$24.03	\$64.62
Operators Class 1-B	1/1/2025		\$42.39	\$24.23	\$66.62
Operators Class 1-B	1/1/2026		\$43.96	\$24.66	\$68.62
Painters Class 1 (see notes)	6/1/2022		\$34.45	\$22.82	\$57.27
Painters Class 2 (see notes)	6/1/2024		\$38.09	\$24.93	\$63.02
Painters Class 2 (see notes)	6/1/2025		\$40.36	\$25.81	\$66.17
Painters Class 3 (see notes)	6/1/2024		\$40.66	\$24.93	\$65.59
Painters Class 3 (see notes)	6/1/2025		\$43.68	\$25.81	\$69.49
Painters Class 4 (see notes)	6/1/2019		\$28.20	\$20.06	\$48.26
Painters Class 5 (see notes)	6/1/2019		\$22.91	\$20.06	\$42.97
Pile Driver Divers (Building, Heavy, Highway)	1/1/2025		\$62.82	\$22.72	\$85.54
Pile Driver Divers (Building, Heavy, Highway)	1/1/2026		\$64.70	\$23.47	\$88.17
Piledrivers	1/1/2025		\$41.88	\$22.72	\$64.60
Piledrivers	1/1/2026		\$43.13	\$23.47	\$66.60
Steamfitters (Heavy and Highway - Gas Distribution)	5/1/2022		\$48.43	\$40.28	\$88.71
Truckdriver class 1(see notes)	1/1/2025		\$36.43	\$23.21	\$59.64
Truckdriver class 1(see notes)	1/1/2026		\$37.93	\$23.71	\$61.64
Truckdriver class 2 (see notes)	1/1/2025		\$36.89	\$23.52	\$60.41
Truckdriver class 2 (see notes)	1/1/2026		\$38.39	\$24.02	\$62.41

DOCUMENT 00 7393 - COVENANT TO INDEMNIFY

1.1 STATEMENT

- A. In addition and supplemental to all other agreements of the undersigned Contractor, relating to **Project No. 24-S49-01B NEW DISTRICT MAINTENANCE & BUS DEPOT FACILITY** (hereinafter referred to as the "Work") by the undersigned for South Fayette Township School District (hereinafter referred to as the "Owner"), the undersigned Contractor, intending to be legally bound hereby does hereby agree as follows:
- B. To the fullest extent permitted by law, the Contractor shall indemnify, defend, and hold harmless the Owner, Construction Manager, Architect and consultants, agents, and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to, attorneys' fees and defense costs, arising out of or resulting from performance of the Work, to the extent caused in whole or in part by the acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts or omissions 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 which would otherwise exist as to a party or person described in this Paragraph. The Contractor agrees to and does hereby assume on behalf of the Owner and Architect the defense of any action at law or in equity which may be brought against such indemnities by reason of claims for which indemnity is owed hereunder, and will pay on behalf of such indemnities, upon their demand, the amount of any judgment that may be entered against such indemnities in any such action. In the event that any such claim, loss, cost, expense, liability, damage, or injury arises or is made, asserted, threatened against the Owner for which the Contractor or its insurer does not admit coverage, or if the Owner reasonably determines such coverage to be inadequate, the Owner shall have the right to withhold from any payments due to or become due to the Contractor an amount sufficient to protect the Owner from such claim, loss, cost, expense, liability, damage, or injury, including attorneys' fees and expenses reasonably necessary for the defense thereof.
- C. IN WITNESS WHEREOF, the undersigned has duly executed this Covenant of Indemnity this _____ day of _____, 2025.

(SEAL)

President

Contractor's company name

END OF DOCUMENT 00 7393

SECTION 01 1000 - SUMMARY

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Project information.
 2. Work covered by Contract Documents.
 3. Work under other contracts.
 4. Project Timeline.
 5. Access to site.
 6. Coordination with occupants.
 7. Work restrictions.
 8. Specification and drawing conventions.
- B. Related Sections include the following:
1. Section 01 1200 "Summary of Multiple Contracts" for indication of responsibilities among Prime Construction Contracts for the Work.

1.2 PROJECT INFORMATION

- A. Project Identification:
DRAW Collective Project No. 24-S49-01B
New District Maintenance & Bus Depot Facility
3600 Old Oakdale Road, South Fayette Township, Allegheny County, Pennsylvania.
- B. Owner: South Fayette Township School District, 3680 Old Oakdale Road, McDonald, PA 15057.
1. Owner's Representative: Dr. Michelle Miller, District Superintendent
412-221-4542, ext. 413
mmmiller@southfayette.org
- C. Architect: DRAW Collective, 470 Washington Road, Pittsburgh PA 15228-2811; 412-561-7117.
- D. Construction Manager: PJ Dick Incorporated, 225 North Shore Drive, Pittsburgh PA 15212; 412-807-2225
1. Construction Manager has been engaged for this Project to serve as an advisor to Owner and to provide assistance in administering the Contract for construction between Owner and each Prime Contractor, according to a separate contract between Owner and Construction Manager.
- E. Consulting Engineers: The Architect has retained the following design professionals who have prepared designated portions of the Contract Documents:
1. Structural Engineering:
Keystone Structural Services, 8150 Perry Highway Suite 302, Pittsburgh PA 15237; 412-369-9020
 2. Mechanical, Engineer, Plumbing Engineering:
Tower Engineering, 115 Evergreen Heights Drive, Suite 400, Pittsburgh PA 15229; 412-931-8888
 3. Site/Civil Engineering and Survey:
Civil & Environmental Consultants, Inc, 4530 Northern Pike, Suite 141, Monroeville PA 15146; 724-337-5200

4. Landscape Architect:
Herbert, Rowland & Grubic, Inc., 220 West Kensinger Drive, Suite 100, Cranberry Township PA 16066,
24-779-4777

F. Owner's Geotechnical Engineering/ Construction Testing Consultant:

1. Civil & Environmental Consultants, Inc, 4530 Northern Pike, Suite 141, Monroeville PA 15146; 724-337-5200

1.3 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of the Project is defined by the Contract Documents and consists of new construction on undeveloped greenfield site as follows:

New bus fleet maintenance and office facility, totaling about 12,830 square feet on two floors.

- Conventional masonry-bearing on shallow footings with ground-level slabs-on-grade and concrete on composite metal elevated floor decks on upper level.
- Retaining wall along three sides of ground-floor walls.
- Wood truss and deck roof systems with metal roofing assemblies.
- Masonry cavity wall perimeter matching appearance of existing nearby school buildings.
- Interior construction and finishes.

Comprehensive site improvements including clearing, regrading, excavation and building pad prep, site utilities, stormwater management, lawn improvements and plantings, segmental retaining wall, parking and drives, walkways, fencing, site lighting.

New comprehensive mechanical, plumbing, fire suppression, power and lighting, security and access control, electronic communications, data and technology systems.

B. The work will be constructed under four coordinated, concurrent multiple prime contracts.

1. See Section 01 1200 "Multiple Contract Summary" for a list of multiple contracts, a description of work included under each of the multiple contracts, and the responsibilities of Lead Contractor.

1.4 WORK UNDER OTHER CONTRACTS

A. Concurrent Work: Owner reserves the right to award separate contract(s) for other construction operations at Project site. Those operations may be conducted simultaneously with work under this Contract. Completion of that work may depend on successful completion of preparatory work under this Contract.

B. Future Work: Owner may elect to award separate contracts, including but not limited to, the following additional work to be performed at site prior to Substantial Completion. Completion of that work will depend on successful completion of preparatory work under this Contract.

1. Moveable Furniture and Furnishings Contracts
2. Special Inspections and Quality Assurance Testing Contracts
3. Building Commissioning Contract (if used)

C. Cooperate fully with separate contractors so work may be carried out smoothly, without interfering with or delaying work under this Contract. Coordinate the Work of these Contracts with work performed under separate contracts if applicable.

1.5 PROJECT TIMELINE

- A. Project will be phased to allow for Owner use and occupancy for the duration of the Project. Benchmark Completion Dates indicated in the Construction Manager's Phasing Narrative represent minimum Owner requirements for proper operation of the School
1. Owner reserves the right to assess Liquidated Damages to the Contractor not meeting the dates specified, as set forth in Division 00 Document "*Conditions of the Contract*." In the event Owner's use and occupancy of the facility is affected, or Owner suffers any other harm due Contractor's failure to adhere to the schedule, Owner reserves the right to other remedies under law or equity.
- B. The following timeline is based upon the first regularly scheduled Board of School Director's meeting following the advertised bid opening date. As the advertised bid opening date is subject to revision by addendum, the Contract Award date listed below may change accordingly. The dates listed below do not alter the Owner's right to award a contract within 60 days of the bid opening. Should the date of Contract Award not occur prior to 21 days of the date that on-site work may begin, the Contract Time will be adjusted by mutual agreement.
- C. The following dates are subject to completion of the bidding period, the Owner's evaluation of bid results, and award of contracts at the regularly scheduled **November 2025** board meeting.
1. Contract Award.....**November 2025**
 2. Notice to Proceed (NTP).....**December 5, 2025**
 3. Mobilization**February 16, 2026**
 4. Substantial Completion**August 6, 2026**
- D. The Contractor's bid is to include the cost of executing the work between the "start-on-site" date and the "Date of Substantial Completion". No adjustment to the contract sum will be made for work required beyond the "normal work day" (Monday through Friday, 7:00AM to 4:00PM) in order to meet the timeline stated.
1. Fabrication and delivery of key equipment and materials to the site to support the required completion dates is essential. Prime Contractor is to include in its bid the cost to expedite submittals and delivery of key materials and equipment by the dates required to meet the Schedule. No additional costs will be considered for expediting materials or equipment to meet the required schedule.
 2. Each Prime Contractor shall include in the bid the cost of preparing for and attending specified periodic coordination meetings, minimum weekly, starting immediately following award of the contract. Key subcontractors are also to include this cost in their bids for their participation in these coordination meetings. The purpose of these early coordination meetings will be to assure that submittals, reviews, and materials/equipment are delivered by the required dates and also to coordinate work.
 3. Contractors must anticipate that Contractors must cooperate with the Owner's staff to allow simultaneous use of space.
 4. To the degree permissible by North Fayette Township ordinance and other applicable law, the Owner will cooperate with the Contractor to allow access to the Work during evening and weekend hours. The Contractor is to include the cost of premium/overtime/second shift work required to execute the work in the time line indicated.
 - a. If contractors need to work weekends during the project to meet their schedule, the Contractor shall responsible to pay for the additional costs of the Construction Manager and Architect at rates agreed to with the Owner. Rates of compensation are subject to adjustment from year to year.
- E. In the event that work is not able to "start on-site" by the date listed or modified by addendum, a mutually agreed upon revision to the Date of Substantial Completion will be considered, at no additional cost to the contract sum.

1.6 ACCESS TO SITE

- A. General: Contractor has limited use of Project site for construction operations as indicated on Drawings and as indicated by requirements of this Section.

- B. Use of Site: Limit use of Project site to areas within the Contract limits indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.
 - 1. Confine storage of materials and support facilities to Owner-designated areas. Use of other areas of site for construction storage and support facilities, or for access of personnel through undisturbed areas, or for delivery or staging of materials, tools or equipment not used for construction in the affected area, or for use of existing toilet facilities, or for break areas, is prohibited.
 - 2. Driveways, Walkways and Entrances: Keep driveways, loading areas, and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.
 - a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
 - b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
 - c. On-site parking is available in Owner-designated area of parking lots.
- 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. Superimposed Loads: Before proceeding with Work, obtain loading limitations for existing structure. Keep superimposed loads within these limits. Do not endanger structure in any way.
 - 2. Protect existing windows adjacent to addition.
- D. Comply with other reasonable restrictions as may be imposed by Owner, Construction Manager, or Architect.

1.7 COORDINATION WITH OCCUPANTS

- A. Student services have priority over the Work. While Owner makes every reasonable effort to accommodate the Work in an orderly manner, it reserves the right to adjust or change any work schedule if necessary to maintain proper student services.
- B. Full Owner Occupancy: Owner will occupy site and existing building during entire construction period. 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 or approved by Owner, and acceptable to authorities having jurisdiction.
 - 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.
- C. Owner Occupancy of Completed Areas of Construction: Owner reserves the right to occupy and to place and install equipment in completed areas of building, before Substantial Completion, provided such occupancy does not interfere with completion of the Work. Such placement of equipment and partial occupancy shall not constitute acceptance of the total Work.
 - 1. If required by schedule, Architect will prepare a Certificate of Substantial Completion for each specific portion of the Work to be occupied before Owner occupancy.
 - 2. Obtain a Certificate of Occupancy from authorities having jurisdiction before Owner occupancy.
 - 3. Before partial Owner occupancy, mechanical and electrical systems shall be fully operational, and required tests and inspections shall be successfully completed. On occupancy, Owner will operate and maintain mechanical and electrical systems serving occupied portions of Project.
 - 4. On occupancy, Owner will assume responsibility for maintenance and custodial service for occupied portions of building.

1.8 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. On-Site Work Hours: Limit work to normal business working hours of 7:00 a.m. to 4:00 p.m., Monday through Friday, unless otherwise indicated, or agreed upon with local authorities.
 - 1. Weekend Hours: Coordinate and agree upon with the Owner, through Construction Manager, in advance.
 - 2. Early Morning Hours: Coordinate and agree upon with the Owner, through Construction Manager, in advance.
 - 3. Hours for Utility Shutdowns: Coordinate and agree upon with the Owner, through Construction Manager, in advance.
 - 4. Hours for Core Drilling, pneumatic hammering, or similar activity: Coordinate and agree upon with the Owner, through Construction Manager, in advance.
 - 5. Deliveries shall be scheduled in accordance with the Owner's morning and afternoon traffic patterns for staff and student traffic.
- C. Existing 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 Owner, through Construction Manager, not less than two days in advance of proposed utility interruptions.
 - 2. Obtain Construction Manager's and Owner's written permission before proceeding with utility interruptions.
- D. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner.
 - 1. Notify Owner, through Construction Manager, not less than four business days in advance of proposed disruptive operations.
 - 2. Obtain Construction Manager's and Owner's written permission before proceeding with disruptive operations.
- E. Nonsmoking Building: Use of tobacco products of any kind is prohibited on School District property.
- F. Controlled Substances: Use of illegal controlled substances on Project site is not permitted.
- G. Employee Screening: Comply with Owner's requirements for drug and background screening of Contractor personnel working on Project site.
 - 1. Each Prime Contractor shall provide copies of both approved and submitted applications to the Construction Manager.
 - 2. Maintain list of approved screened personnel with Construction Manager.
 - 3. Do not allow any worker not in compliance with screening requirements to receive or hold an ID tag or to have access to work site.
- H. Employee Identification: Identification tags will be required for Contractor personnel working on the Project site. Personnel shall utilize identification tags at all times. Each Contractor is responsible for providing their employees and Subcontractor personnel with laminated badges containing a photograph of the employee, the employee's name and the company name. No personnel shall be permitted to work on school district property without an approved ID tag.
 - 1. Each Contractor represents that issuing an identification tag to a worker represents compliance with requirements in of the Document 00 2113 "Instruction to Bidders" (Article 10 Employee Background Checks,) Document 00 7213 "Conditions of the Contract" (Section 13.7 Clearances,) and of Section 01 4100 "Regulatory Requirements."
- I. Employee Ingress and Egress: Have personnel enter and exit building through Owner-designated entrance(s).

- J. Food and Beverages: Food and beverages are prohibited in Work areas.
- K. Food Service Facilities: Personnel may not use building's food service facilities.

1.9 SPECIFICATION AND DRAWING CONVENTIONS

- A. Use of standardized formats and conventions is employed in these Contract Documents for purposes of presenting information in a reasonably predictable and consistent manner. Some deviation from standard formats and conventions will occur, but such deviation will by no means release Contractor from performance of the Work depicted.
- B. Specifications Format: Except as noted otherwise, the Specifications are generally organized into Divisions and Sections using the 50-Division format of CSI/CSC's "MasterFormat" numbering system, 2014 Edition.
 - 1. Some Sections may deviate from CSI/CSC's SectionFormat standard for organizing specification text within a Section.
 - 2. Section Identification: Consult the table of contents at the beginning of the Project Manual to determine numbers and names of Sections in the Contract Documents.
 - 3. Documents in Division 00 that are not specifically excluded from the set of Contract Documents, and Sections in Division 01 generally, govern the performance of the Work specified anywhere in the Contract Documents.
- C. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
 - 1. Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be inferred as the sense requires. Singular words shall be interpreted as plural, and plural words shall be interpreted as singular where applicable as the context of the Contract Documents indicates.
 - 2. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
 - a. Occasionally, the indicative or subjunctive mood may be used in the Section Text for clarity to describe responsibilities that must be fulfilled indirectly by Contractor or by others when so noted.
 - 3. Specification requirements are to be performed by Contractor unless specifically stated otherwise.
- D. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.
- E. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:
 - 1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
 - 2. Abbreviations: Materials and products are identified by abbreviations published as part of the U.S. National CAD Standard and scheduled on Drawings.
- F. Measurement Units: Values stated in inch-pounds are the Contract requirement. Values given in parentheses are for information only.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 1000

SECTION 01 1200 - MULTIPLE CONTRACT SUMMARY

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes a summary of Prime Contracts, with scope descriptions and respective responsibilities for coordination and temporary facilities and controls.
1. Specific requirements of each Prime Contract are also indicated in individual Specification Sections and on Drawings.
 2. Where requirements for Work of each Contract indicated in individual Specification Sections or on Drawings are or may be interpreted to be at variance with requirements in this Section, request clarification from Architect, or perform the Work.
- B. Related Sections:
1. Section 01 1000 "Summary of Work" for general description and summary of Work covered by Contract Documents.

1.2 CONTRACTS INCLUDED

- A. Project Identification:
- DRAW Collective Project No. 24-S49-01B
- New District Maintenance & Bus Depot Facility,**
3600 Old Oakdale Road, South Fayette Township, Allegheny County, Pennsylvania.
- for the
- South Fayette Township School District, 3680 Old Oakdale Road, McDonald PA 15057
- B. Prime Contracts are separate individual agreements with the Owner for significant specific construction activities, performed concurrently with and closely coordinated with one another and administered by the Architect and Construction Manager. Prime Contracts for this Project:
1. Contract No 24-S49-01B-01 General Construction (GC)
 2. Contract No 24-S49-01B-02 HVAC Construction (HC)
 3. Contract No 24-S49-01B-03 Plumbing and Fire Protection Construction (PC)
 4. Contract No. 24-S49-01B-04 Electrical Construction (EC)

1.3 PERMITS AND INSPECTIONS

- A. Unless otherwise provided in the Contract Documents, the Owner, through the Architect, will secure and pay for the initial building permit and the municipality's initial construction code review and plan examination fees, if any.
1. Lead Contractor shall coordinate final issuance of permit prior to starting on-site operations, shall properly post necessary permits at the project site prior to the start of construction activity, and shall maintain posting on-site through the completion of the Project.
 2. Contractor shall secure and pay 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. Singular purpose permits shall be the sole responsibility of the Prime Contract to which they apply and shall be secured prior to the initial project meeting.

- B. Each Prime Contractor will be responsible for scheduling all inspections as required for its work, with the appropriate inspection agency. Notification of scheduled inspections shall be made to the Architect and the Construction Manager, no less than three business days prior to its scheduled date. No Work which requires inspection shall be concealed from view until approved by the inspection agency and the Architect.
 - 1. Lead Contractor shall maintain an inspection log available to the Inspector, the Architect, the Construction Manager, and all Prime Contractors at all times during construction and until final approvals are obtained for the project.
- C. Verify costs of permit and inspection fees prior to submitting bids. The benefit of waived or discounted fees shall be passed to Owner.

1.4 LEAD CONTRACTOR

- A. Definition: The Prime Contractor selected by the Owner to perform duties described generally as multiple-prime coordination.
- B. The General Contractor is designated as Lead Contractor for this Project, except as otherwise indicated.
 - 1. The HVAC Contractor is designated as Lead Contractor solely for preparation of interdisciplinary coordination drawings.
- C. Lead Contractor shall be responsible for overall coordination of the Work, including among operations of the Work performed by each of the separate Prime Contractors.
 - 1. Lead Contractor shall assign full-time personnel experienced in administration and supervision of multiple-prime contract building construction on projects.
- D. Support, administrative, and control activities of Lead Contractor:
 - 1. Provide Construction Manager's field office, complete, including equipment and services, for use as a common meeting area for all personnel engaged in construction activities per Section 01 3100 "Project Management and Coordination."
 - 2. Provide quality-assurance and quality-control services specified in Section 01 4000 "Quality Requirements."
 - 3. Provide those Field Engineering Services not provided by Owner, in compliance with Section 01 7300 "Execution"
 - 4. Project Record Documents: Coordinate preparation, printing, and submitting of Project Record Documents if information from more than one Contractor is to be integrated with information from other Prime Contractors to form one combined record. Collect record Specification Sections from Contractors, collate Sections into numeric order, and submit complete set.
 - 5. Provide progress cleaning of common areas and coordinate progress cleaning of areas or pieces of equipment where more than one Prime Contractor or their sub-contractors has worked.
 - 6. Providing and maintaining all dust and sound partitions.
- E. Coordination activities of Lead Contractor:
 - 1. Coordinate overall safety and security procedures for project.
 - 2. Provide overall coordination of temporary facilities and controls.
 - 3. Coordinate Pre-Installation meetings as required in individual Specifications Sections that affect the work of more than one Prime Contract.
 - 4. Coordinate, schedule, and approve interruptions of permanent and temporary utilities, including those necessary to make connections for temporary services. Provide information necessary to adjust, move, or relocate existing utility structures affected by construction.
 - 5. Coordinate sequence of activities to accommodate tests and inspections, and coordinate schedule of tests and inspections.
 - 6. Coordinate cutting and patching by the various Prime Contractors.
 - 7. Coordinate protection of the Work.
 - 8. Coordinate compliance with requirements of penetration fireproofing by the various Prime Contractors.
 - 9. Coordinate completion of interrelated punch list items.

10. Coordinate shared access to work spaces.
 11. Coordinate product selections for compatibility.
 12. Coordinate preparation of Operation and Maintenance manuals if information from more than one Contractor is to be integrated to form one combined record.
 13. Coordinate all required pre-installation meetings on site as required in individual Specifications Sections.
- F. Sequencing and scheduling activities of the Lead Contractor: Coordinate sequencing and scheduling of the Work. Observe requirements of Section 01 3200 "Construction Progress Documentation" Include the following:
1. Initial Coordination Meeting: At earliest possible date, arrange and conduct a meeting with Prime Contractors for sequencing and coordinating the Work; negotiate reasonable adjustments to schedules.
 2. Prepare, maintain, distribute, and submit Contractors' Combined Construction Schedule for entire Project. Secure time commitments for performing critical construction activities from separate Prime Contractors. Show activities of each Contract on a separate sheet.
 - a. It shall be the responsibility of each Prime Contract to fully participate in preparing and updating the Construction Schedule to fully understand the sequencing and durations.
 3. Work closely with the Construction Manager and other Prime Contracts to coordinate all Prime Contractors' Submittals Schedules with the Combined Construction Schedule, for entire Project.
 - a. Secure and coordinate submittal requirements from individual Prime Contractors, allowing reasonable review time in compliance with Section 01 3300.
 - b. Show schedule of submittals for each Contract on a separate sheet, properly keyed to Combined Construction Schedule.
 - c. Coordinate Schedule with Construction Manager to accommodate Owner's pre-occupancy activities to be performed under other contracts or with Owner's own forces.
 4. Schedule and coordinate in-wall and above-ceiling utility rough-in inspections and Prime Contractor signoffs prior to wall/ceiling closures.
 - a. Coordinate sequencing of Prime Contractor Work to avoid cutting and patching of new construction.
- G. HC Responsibility as Lead Contractor:
1. Initiate and manage Coordination Drawings in collaboration with each Contractor. Observe requirements of Section 01 3100 "Project Management and Coordination".

1.5 ALL PRIME CONTRACTS: GENERAL REQUIREMENTS OF CONTRACTS

- A. Extent of Contract: Unless the Contract Documents contain a more specific description of the Work of each Contract, names and terminology on Drawings and in Specification Sections determine which contract includes a specific element of Project.
1. Local custom and trade-union jurisdictional settlements do not control the scope of the Work of each contract. When a potential jurisdictional dispute or similar interruption of work is first identified or threatened, affected Contractors shall negotiate a reasonable settlement to avoid or minimize interruption and delays.
 2. Perform Work specifically depicted and described by, or reasonably inferable from, the Contract Documents as work necessary to produce the intended results of the respective Construction Contract. Commonly recognized names and terminology on Drawings and in Specifications may reasonably be used to infer which contract includes a specific element of the Project.
 3. Requirements and Specifications of the Project Manual applicable to all Contracts:
 - a. Contract Documents of Division 00 – Introductory Information, Bidding Requirements and Contracting Requirements,
 - b. Sections of Division 01 – General Requirements

- B. Each Prime Contractor shall be responsible for the following as it relates to its own scope of Work, including work of its Subcontractors.
1. General coordination and cooperation with all other Prime Contractors so as not to delay timely progress of the Project.
 2. Compliance with ANSI A117.1: Required of each Contract as relates its scope of Work.
 3. Photographic documentation prior to demolition or cutting and patching, with each payment application, and at closeout.
 4. All equipment, tools and material needed by the Contractor to perform and complete its Work.
 5. All safety equipment, tools and material required in performance of its work in compliance with OSHA and local requirements.
 6. Local licenses, permits, inspections, approvals, tests and fees.
 7. Submission of compliant prevailing wage documents, including for its subcontracts.
 8. Costs for document reproduction.
 9. Hoisting and rigging equipment; shoring, scaffolding, special equipment, etc.
 10. Selective Demolition: Performed by each Contract for its own Work, and as delineated throughout the Contract Documents, properly coordinated with the Work of other Contracts, through the Lead Contractor.
 11. Interior and exterior equipment pads and housekeeping pads.
 - a. Coordinate sizes and locations of pads with other Prime Contractors and CM
 12. Trenching/excavation, dewatering, bedding and backfill material, and proper removal and disposal/placement of spoils.
 13. Hangers, supports, identification and painting required for all systems in its scope of work.
 14. Through-penetration fire stopping, fire sealing, tagging and/or labeling for rated walls and floors.
 15. Blocking, backing panels, sleeves, and metal fabrication supports: provided by each Contract for its own Work, coordinated with the Work of other Contracts.
 16. Removal, storing, and re-installing of existing ceiling tiles as required to expose existing work and install new work, including replacement of any tiles damaged during removal, storage, and/or reinstallation.
 17. Field-applied caulk and joint sealant, and acoustic sealants: provided by each Contract for its own Work, coordinated with the Work of other Contracts.
 - a. Sealing of joints between installed work of different Prime Contracts shall be the responsibility of the installer of the work last in sequence, unless otherwise indicated.
 18. Floor, wall, and roof penetrations, cutting and patching: provided by each Contract for its own Work, coordinated with the Work of other Contracts.
 - a. Patching shall match adjacent installed finishes.
 - b. All locations of installed roof where a penetration is part of cutting and patching operations shall be immediately made weathertight by the Prime Contractor causing the breach, with permanent cap or patching materials and methods acceptable to the manufacturer.
 19. Each Prime Contractor shall be responsible to furnish and install access doors and frames required for its own Work.
 - a. Where an access door is required for the work of more than one prime, coordinate with Lead Contractor and Construction Manager.
 - b. Where hidden Work requires future or ongoing access for service, maintenance, operation, observation, or inspection, submit to Lead Contractor (GC) detailed requirements for size, location, type and clearance needed for access doors and frames. Cooperate with Lead Contractor in verifying proper sequencing and installation.
 20. Roof-mounted equipment curbs with associated wood blocking for the work of each contract shall be the work of each contract for its own work.
 - a. Coordinate size, location, and sequencing with RC and Lead Contractor.
 21. Daily cleanup and debris removal
 22. As-built drawings for all systems related to its scope of work.
 23. Project closeout requirements by each contract for its own Work.

24. Providing and maintaining temporary barricades, coverings, signage and protection related to openings and penetrations in floors, walls, or roof per current OSHA standards and local code requirements.
 25. All necessary traffic control measures.
- C. Unless otherwise indicated, the Work described in this Section for each contract shall be complete systems and assemblies, including products, components, accessories, and installation required by the Contract Documents.
1. All Contractors shall be responsible for verification of existing conditions.
 2. Each Contract includes complete cooperation, coordination and communication with other Prime Contractors whose work interfaces with its Work, and whose sequencing is affected by its Work, in support of the most current Combined Construction Schedule.
 3. Except as otherwise indicated, each Contract includes permits and inspections specified or required by authorities having jurisdiction, including timely notifications, applications and payment of fees.
 4. Each Contract includes demonstration, training, and support of Owner personnel in products, systems, assemblies, and equipment included in its scope.
- D. Coordination and Scheduling:
1. Contractors' Startup Construction Schedule: Within five working days after startup horizontal bar-chart-type construction schedule and preliminary network diagram submittal has been received from the Lead Contractor, submit a matching startup horizontal bar-chart schedule and startup network diagram showing construction operations sequenced and coordinated with overall construction.
 2. Submit preliminary and progress project schedules, matching and coordinated with Lead Contractor's Project master schedule, showing construction operations sequenced and coordinated with overall construction.
 3. Participate in and cooperate with coordination activities of Lead (General) Contractor as specified in Section 01 3100 and 01 3200. Perform Work in support of the most recent updated and approved Project Schedule, Submittals Schedule and Coordination Drawings to maintain the required sequence and overall progress of the Project.
 - a. Provide information requested by Lead Contractor in preparation of Combined Construction Schedule, including time commitments for critical activities.
 - b. Prepare and schedule necessary personnel for scheduled project update, coordination and reinstallation meetings, and other project meetings.
 4. Participate in preparing, amending, and circulating Coordination Drawings.
 5. Coordinate Work with that of other Prime Contractors and work by the Owner, including access and performance of personnel and equipment, staging and storing of tools and materials, sequencing of operations, use and maintenance of temporary facilities including shoring and scaffolding.
 - a. No Contractor may embark upon work that impacts another Prime Contract without detailed coordination with that Prime Contractor and the Lead Contractor.
 - b. Modifications to the Work made necessary by a Contractor's failure to properly coordinate the Work, shall be made by that Contractor, at no additional cost to the Owner.
 6. Participate in and cooperate with requirements and procedures for site safety and security measures, daily and periodic cleaning, personnel behavior, worker and delivery access, daily materials delivery, and Owner's continued occupancy and use of sites adjacent to Project areas.
 7. Participate in and cooperate with quality assurance, testing and inspection activities of Lead Contractor, Owner, Architect, Owner's Commissioning Authority, and Construction Manager.
 8. Participate in and cooperate with all Special Inspections being done by Owner's Special Inspections Testing Agency, and with consulting testing or inspection agencies or municipal inspectors requiring access to and throughout the Project site.
 9. Participate in and cooperate with closeout activities and procedures of Lead Contractor, Construction Manager, and Architect.
- E. Logistics:
1. Requirements for use of building and site for specific activities will be clarified at the initial Pre-Construction Conference, and are intended to allow for Owner's continued use of the building and site during the Contract Time, and to allow the Work to proceed uninterrupted during the Contract Time.

2. It is the responsibility of each Prime Bidder to anticipate logistics requirements prior to bid to fully understand the proposed sequencing, restrictions and durations. There will be no extensions of time on the Project.
 3. Deviations from specific logistics requirements will be acceptable only with prior written approval from Owner, Construction Manager, and Architect, and properly coordinated with all Prime Contracts, and only if there is no adverse impact on Owner's intended continued use of the building and site and no additional cost to the Owner from any Prime Contractor.
 4. Each Prime Contractor shall be responsible to protect, maintain, extend, repair, restore, or otherwise keep functional all building systems in occupied spaces that may be interrupted or disturbed by construction activities or by phasing relocations and/or restrictions.
- F. Recovery Schedule: The Combined Construction Schedule shall indicate work activity duration and sequence, including critical benchmarks. It shall be the responsibility of each Prime Contract to fully participate in preparing and updating the Construction Schedule to fully understand the sequencing and durations.
1. There will be no extensions of time on the project. If it becomes apparent that a Prime Contractor will not meet any one of the agreed-upon critical benchmarks, that Contractor shall institute a Recovery Plan as outlined in Section 01 3200. Some or all of the following shall be employed at no additional cost to the Owner:
 - a. Increase manpower.
 - b. Increase man-hours per shift, shifts per workday, days per work week, or any combination thereof. Additional cost for Architect, Construction Manager or Owner for overtime or shift work is the responsibility of the Contractor.
 - c. Increase construction equipment or expedite material deliveries.
 - d. Revise the scheduled sequencing of tasks to put project back on schedule.
 2. If the contractor fails to institute a recovery plan within 24 hrs. from written notice, which will return the project to the original schedule, appropriate action may be taken involving contractual commitments and performance bonds.
 3. The costs for any recovery plan shall be anticipated by the Contractor and included in the Contractor's Base Bid plus approved Alternate Bid amounts.
- G. Substitutions and Options: Each Contractor shall cooperate with other Prime Contractors involved to coordinate approved substitutions and Contractor's options with remainder of the Work.
1. Lead Contractor shall coordinate substitutions.
 2. Any Contractor providing materials that meet the standard established by a Basis-of-Design specification but is not actually the Basis-of-Design material itself, shall be responsible for coordinating such material's installation requirements with all other affected Prime Contractors.
 3. Use by any Prime Contractor of products, systems or assemblies other than those identified as Basis-of-Design, shall not result in additional cost to the Owner or any other Prime Contract. Except as otherwise indicated, Prime Contractor employing such substitution shall be subject to a reduction in Contract Sum to compensate for charges so incurred by Owner or other Prime Contract.
- H. Benchmarks and Building Control Lines:
1. The Lead Contractor shall procure the services of a registered land surveyor to perform the field layout work for establishing primary site lines and levels. If any of the control points initially are moved or lost, control points shall be re-established by the General Contractor at no additional cost to the Owner. Contract work shall properly relate to lines and levels and detail dimensions shown or established by supplemental drawings.
 2. All engineering or field layout for points necessary to perform work is the responsibility of each Prime Contractor and all such information must be copied to the Construction Manager.
 3. All other layout is the responsibility of each Prime contractor. Contractors shall exercise proper precaution to verify the dimensions shown on drawings prior to laying out work and report any inaccuracies or errors to Construction Manager prior to beginning work. The contractor shall be held responsible for any error resulting from failure to exercise such precautions. Coordinate and check all other dimensions and levels as necessary for detailed layout work. All discrepancies which are found, must be coordinated with Construction Manager prior to proceeding with the work.
 4. Contractors are cautioned that temperature corrections during all surveying and layout must be used. Contractors will be responsible for any and all extensions of lines and grades necessary for their work.

5. At the request of the Construction Manager provide certification, signed by the Contractor's retained field engineer, certifying that elevations and locations of improvements are in conformance or non-conformance with requirements of the Contract Documents.
- I. Cleaning: Each Contractor is responsible for progress cleaning of work areas affected by its operations on a daily and periodic basis. Remove construction debris to general waste facility as provided by Lead Contractor.
- J. Cutting and Patching: Except as otherwise indicated, each Contractor is responsible for cutting and patching for its own Work, coordinated with the Work of other Contracts.
 1. Patching shall match new and existing-to-remain finishes.
 2. Work causing penetrations of existing roofing, or removals of rooftop equipment, or other Work involving cutting and patching operations at existing roofing, shall immediately be made weathertight by the Prime Contractor causing the breach, with permanent cap or patching materials and methods acceptable to the manufacturer, without compromising existing warranties.
- K. Temporary Facilities and Controls: In addition to specific responsibilities for temporary facilities and controls indicated in Sections 21 0500 "Common Work Results for Fire Suppression," 22 0500 "General Provisions and Common Work Results for Plumbing," 23 0500 "Common Work Results for HVAC," 26 0100 "Basic Electrical Requirements," 27 0100 "Basic Communications Systems Requirements," 28 0100 "Basic Electronic Safety and Security Requirements," and in 01 5000 "Temporary Facilities and Controls," each Contractor is responsible for the following:
 1. Installation, operation, maintenance, and removal of each temporary facility usually considered as its own normal construction activity, and costs and use charges associated with each facility, except as otherwise provided for in this Section.
 2. Plug-in electric power cords and extension cords, supplementary plug-in task lighting, and special lighting necessary exclusively for its own activities.
 3. Its own field office, complete with necessary furniture, utilities, and telephone service, in compliance with Construction Manager's Site Logistics Diagram and Additional Site Logistics Requirements, and as otherwise directed or approved by Construction Manager.
 4. Its own storage and fabrication sheds.
 5. Temporary enclosures for its own construction activities.
 6. Staging for its own construction activities.
 7. General hoisting facilities for its own construction activities.
 8. Shoring as required for its own work.
 9. Scaffolding as required for its own work, except as specifically indicated.
 10. Waste disposal facilities, including collection and legal disposal of its own hazardous, dangerous, unsanitary, or other harmful waste materials.
 11. Secure lockup of its own tools, materials, and equipment.
 12. Construction aids and miscellaneous services and facilities necessary exclusively for its own construction activities.
- L. Temporary Heating, Cooling, and Ventilation: Requirements, restrictions and responsibilities as described in Section 01 5000 "Temporary Facilities and Controls".
- M. Use Charges: Requirements, restrictions and responsibilities as described in Section 01 5000 "Temporary Facilities and Controls".
- N. Site Utilities: Site Utility systems are generally defined as that part of systems beyond five feet from building line. Responsibility for site utilities and structures, including selective demolition of existing systems, trenching and backfilling, and cutting and patching existing paving and other site surfaces (or sleeves under road where acceptable), shall be as follows.
 1. GC:
 - a. Storm Sewage and Drainage: Complete system, including but not limited to piping, structures and connections. Selective demolition or abandonment in place of existing systems.
 - b. Storm retention systems.

- c. Complete foundation drainage: Include necessary testing and inspection coordination of storm drain systems.
 - d. Complete Erosion and Sedimentation Controls.
- 2. HC: None
- 3. PC:
 - a. Fuel Gas Service: Complete system, including but not limited to piping, structures and connections to public utility system.
 - b. Domestic and Fire Suppression Water Service: Complete system, including but not limited to piping, structures and connections to public utility system.
 - c. Sanitary Sewer System: Complete system, including but not limited to piping, structures and connections to public sanitary system
- 4. EC:
 - a. Complete power and communication service including coordination with public utility.
 - b. Work associated with Site Lighting.

1.6 GENERAL CONSTRUCTION CONTRACT NO. 24-S49-01B--01

- A. The abbreviation GC, as used in reference to contract work scope on the Drawings or elsewhere in the Contract Documents, refers to the Contract, or the Prime Contractor, for General Construction.
- B. General Summary of GC Work, in addition to applicable GC Requirements of Articles 1.4 "Lead Contractor" and 1.5 "**All Prime Contracts: General Requirements of Contracts**" above.
 - 1. All work as described in the following Specification Divisions:
 - a. Division 01 – General Requirements.....All Sections
 - b. Division 02 – Existing Conditions02 4113
 - c. Division 03 – ConcreteAll Sections
 - d. Division 04 – MasonryAll Sections
 - e. Division 05 – MetalsAll Sections
 - f. Division 06 – Wood, Plastic and Composites.....All Sections
 - g. Division 07 – Thermal and Moisture ProtectionAll Sections
 - h. Division 08 – OpeningsAll Sections
 - i. Division 09 – FinishesAll Sections
 - j. Division 10 – SpecialtiesAll Sections
 - k. Division 11 – Equipment.....All Sections
 - l. Division 12 – FurnishingsAll Sections
 - m. Division 14 – Conveying Equipment.....All Sections
 - n. Divisions 21 through 28as applicable to GC scope of Work
 - o. Division 31 – EarthworkAll Sections
 - p. Division 32 – Exterior Improvements.....All Sections
 - q. Division 33 – Utilities33 4100, 33 4913
 - 2. All work as identified on the following Drawings:
 - a. General.....All Drawings
 - b. CivilAll Drawings
 - c. StructuralAll Drawings
 - d. ArchitecturalAll Drawings
 - e. Coordination with all other Drawings
 - 3. All Work indicated on the Contract Documents not assigned to another Contract.

C. General Outline of GC Responsibility:

1. All Work indicated as GC Work, plus other construction operations traditionally recognized as General Construction, and Work not specifically identified or reasonably inferred to be in the scope of another Prime Contract.
2. Site preparation, except as otherwise indicated, including clearing and grubbing, earth moving, erosion and sedimentation controls, building pad grading and preparation, disturbed site restoration, and maintenance of mown areas, and other site activities as indicated.
3. Site utilities and structures to the extent described in Article "General Requirements of Contracts" above.
4. Site improvements not assigned to another Prime Contract, including, roadways, parking lots, pedestrian paving, stairs, ramps, railings, utility structures, segmental retaining wall, site development furnishings and equipment, plantings and landscaping.
5. Exterior identification, wayfinding, and traffic control signage
6. Site structures, enclosures and equipment, including digital site entrance sign.
7. Guard rail, fencing and gates
8. Superstructure, including floor and roof framing and decking.
9. Miscellaneous metal fabrications and secondary framing not assigned to another Prime Contract.
10. Include the work necessary for structural framing assemblies at floor and roof openings.
11. Exterior closure not assigned to another Prime Contract
12. Complete and continuous Air Barrier System, including transitions between various air barrier assemblies and between new and existing construction.
13. Complete roofing systems and continuity with existing roofing assembly, roof accessories and specialties not assigned to another Prime Contract.
14. Interior construction not assigned to another Prime Contract,
 - a. Partitions and ceilings
 - b. Fire rated assemblies
 - c. Expansion devices and covers
 - d. Doors and hardware, interior glazed openings, window treatments
 - 1) EC: Coordinate interface requirements for controls; Provide controls where indicated
 - 2) GC: Provide all labor and parts necessary for door and frame internal low voltage wiring for electrified door openings and control. Coordinate final connections with EC.
 - e. Access doors and frames: Coordinate size, types, and locations with other Prime Contracts, as applicable.
 - f. Miscellaneous rough and finish carpentry, and architectural woodwork
 - g. Miscellaneous appurtenances.
 - h. Fire-protection specialties.
 - i. Interior finishes and specialties.
 - 1) Includes painting of exposed unfinished mechanical and electrical work.
15. Casework: Manufactured and custom institutional cabinet units, countertops, accessories and trim. Include:
 - a. Coordination with and preparation for installation of utilities and services under other Contracts
 - b. Provide holes and cutouts in counter tops, for fixtures and bowls provided under PC. Cooperate with PC for proper size and location of holes and cutouts.
 - 1) PC: Supply GC with full-size templates and location guides for holes and cutouts.
 - c. Provide electrical service fittings as described in Section 12 3553. Provide cutouts and grommets for passage of wiring where indicated.
 - 1) EC: Provide rough-in and final connections.
16. Fixed equipment, fixtures and specialties not assigned to another Prime Contract.
17. Window treatments, furnishings and movable equipment not otherwise assigned to another Prime Contract.

D. Temporary facilities and controls, in addition to requirements of Lead Contractor and not otherwise specifically assigned to another Prime Contract.

E. Related work by other Prime Contractors

1. PC:
 - a. Rough-in and final connections for plumbing devices and appliances.
 - b. Stainless steel sinks and fixtures, including countertop cutouts.
 - c. Full-size templates for holes and cutouts in tops.
2. HC:
 - a. Coordinate penetrations through floor and building enclosure.
3. EC:
 - a. Rough-in and final connections for electrical devices and appliances.
 - b. Rough-in and final connections for electrical service fittings installed in casework.
 - c. Rough-in wiring to and between equipment, and final connections.
 - d. Wall receptacles and devices not otherwise provided
 - e. Disconnects and devices as indicated

F. Refer to all other Specifications Sections, and other Articles in this Section, for coordination requirements of the Work of the GC with Work of other Prime Contracts.

1. Coordinate phasing and scheduling requirements with CM and other Prime Contracts.
2. Coordinate slab penetrations, underslab utilities, and floor drain locations and elevations with affected Prime Contract.
3. Coordinate penetration fireproofing and smoke proofing with other affected Prime Contracts.
4. Coordinate access door and frame sizes and locations with other affected Prime Contracts.
5. Coordinate roof curb, equipment support, and penetrations with other affected Prime Contracts.
6. Coordinate penetrations of building enclosure and air barrier (roof and wall) by other Prime Contracts.

1.7 HVAC CONSTRUCTION CONTRACT NO. 24-S49-01B--02

A. The abbreviation HC, as used in reference to contract work scope on the Drawings or elsewhere in the Contract Documents, refers to the Contract, or the Prime Contractor, for HVAC Construction.

B. General Summary of HC Work, in addition to applicable HC Requirements of Articles 1.4 “**Lead Contractor**” and 1.5 “**All Prime Contracts: General Requirements of Contracts**” above.

1. All work as described in the following Specification Divisions:
 - a. Divisions 21, 22, 26 through 28as applicable to HC scope of Work
 - b. Division 23 – HVACAll Sections
2. All work as identified on the following Drawings:
 - a. General.....All Drawings
 - b. HVACAll Drawings
 - c. Coordination with all other Drawings
3. All HVAC Construction work indicated on the Contract Documents plus other construction operations traditionally recognized as HVAC Construction and not assigned to another Contract.

C. General Outline of HC Responsibility:

1. Energy supply, including hot- and chilled-water supply systems.
2. Interface with existing systems and equipment.
3. HVAC central and terminal systems and equipment.
 - a. Motors, starters, variable frequency drives, and disconnects and electrical components for HVAC equipment where these are indicated to be provided with the HVAC equipment.
4. Air distribution systems and equipment
 - a. Include final air duct cleaning.

5. Hydronic system, piping, valves, fittings, including chemical treatment for piping systems
 6. HVAC instrumentation and controls.
 - a. Interface with the building's existing automatic temperature controls system (Siemens).
 7. HVAC testing, adjusting, and balancing.
 8. Building automation system.
 - a. DDC Automatic Temperature Control System including low-voltage wiring, grounding, Ethernet drops for networking, boxes and fittings, accessories, and integration of existing equipment where specified.
 9. Mechanical connections to equipment of another Prime Contract
 10. Sheet metal work and accessories.
 - a. Low pressure ductwork
 - b. Dampers and turning vanes.
 - c. Grilles, Registers and Diffusers
 - d. Access Panels
 - e. Counterbalanced Relief Air Vents
 - f. Air terminal boxes
 11. Refrigerant piping systems
 12. Terminal heating units.
 13. Humidification units.
 14. Thermal, sound and vibration insulation
 15. Exhaust systems and equipment.
 16. Meters and gages, valves and fittings, hangars and supports, boxes and fittings, vibration isolation and controls, installation accessories and other appurtenances that form part of installed HVAC, automation and controls systems.
 17. Identification for systems, equipment and components
 18. HVAC cleaning and equipment startup, air and water testing, adjusting, and balancing.
 - a. Include final duct and coil cleaning prior to startup.
 - b. Include filter replacement at substantial completion
 19. Starting and testing of control voltage systems and equipment.
 20. Mechanical connections to equipment of other Contracts.
- D. Temporary facilities and controls in the HC Contract, as specified, as identified in the Construction Manager's Phasing and Site Logistics instructions (attached hereto), and as follows:
1. Temporary Heating, Dehumidification, and Ventilation:
 - a. Provide temporary equipment as specified or otherwise indicated.
 - b. Operation of permanent HVAC equipment, subject to Owner approval and requirements of Sections 01 5000 and 01 7700. Do not use permanent cooling equipment for temporary construction use.
 - c. Include temporary filtering and final duct and equipment cleaning prior to permanent startup.
 2. Temporary duct and piping for heating and cooling: schedule to maintain conditioned occupied spaces.
- E. Refer to all other Specifications Sections, and other Articles in this Section, for coordination requirements of the Work of the HC with Work of other Prime Contracts.
1. Coordinate with Lead Contractor and CM to maintain phasing, sequencing, and scheduling.
 2. Initiate and coordinate preparation of interdisciplinary coordination drawings with other Prime Contractors.
 3. Cooperate with and assist other Prime Contractors whose work interfaces with HC Work
 4. Coordinate sizes and locations of building enclosure (roof and wall) penetrations with the GC and CM
 5. Coordinate sizes and locations of access doors and frames with the GC and CM

1.8 PLUMBING AND FIRE PROTECTION CONSTRUCTION CONTRACT NO. 24-S49-01B--03

- A. The abbreviation PC, as used in reference to contract work scope on the Drawings or elsewhere in the Contract Documents, refers to the Contract or the Prime Contractor for Plumbing Construction.
- B. General Summary of PC Work, in addition to applicable PC Requirements of Article 1.5 "**All Prime Contracts: General Requirements of Contracts**" above.
1. All work as described in the following Specification Divisions:
 - a. Division 21 – Fire Suppression.....All Sections
 - b. Division 22 – Plumbing.....All Sections
 - c. Divisions 26 through 28as applicable to PC scope of Work
 - d. Division 31 – Earthwork31 2300 and 31 2333 as they relate to site utility installations.
 - e. Division 33 – Utilities 33 3000, 33 4913, 33 5113.
 2. All work as identified on the following Drawings:
 - a. General.....All Drawings
 - b. CivilDrawings identifying Site Water, Gas, and Sanitary.
 - c. PlumbingAll Drawings
 - d. Fire ProtectionAll Drawings
 - e. Coordination with all other Drawings
 3. All Plumbing and Fire Protection Construction work indicated on the Contract Documents plus other construction operations traditionally recognized as Plumbing and Fire Protection Construction and not assigned to another Contract.
- C. General Outline of PC Responsibility:
1. Piped site utilities and structures, including trenching and backfilling, to the extent described in Article "General Requirements of Contracts" above.
 2. Domestic water distribution.
 3. Connection to existing piping and extend new hot, cold and hot water return piping to fixtures and equipment.
 4. Connect to existing waste system and extend new sanitary waste and vent piping for fixtures as required.
 5. Piped systems within existing and new construction.
 6. Special plumbing systems and equipment, including:
 - a. Electric water heater and associated equipment and pumps.
 - b. Domestic hot water balancing valves
 7. In casework provided under another Prime Contracts, furnish and install drop-in sink bowls, and water fixtures, as scheduled in Plumbing Drawings and Division 12 and 22 Sections. Provide full-size templates to GC.
 - a. GC: Cutouts in countertops.
 8. Building plumbing-fixtures, trim, and specialties, including wall hydrants, hose bibbs, floor drains, roof drains, backflow prevention, fittings, devices and accessories.
 9. Gauges, valves and fittings, hangars and supports, pipe sleeves and seals, escutcheons, insulation, vibration controls, installation accessories and other appurtenances that form part of installed PC systems
 10. Identification tags and schedules for plumbing piping systems, equipment, valves, and components
 11. Plumbing connections to equipment of other Contracts.
 12. Provide points of connections for Building Automation System for designated plumbing equipment alarms, monitoring and controls.
 13. Piped fire suppression systems, as defined in Division 21 and summarized below:
 - a. Final design of fire suppression systems, including the following:
 - 1) Flow tests of municipal water supply
 - 2) Hydraulic design calculations
 - 3) Sprinkler and riser layouts and working plans for submission to authorities having jurisdiction
 - 4) Initial, interim and final municipal approvals and inspections

- 5) Flow and tamper switches to be integrated to the building fire alarm system by the EC
- b. Building fire suppression system and specialties, including riser system, connection to fire service line, sprinklers, test and drains, flow and tamper switches, gauges, valves and fittings, devices, and accessories.
- c. Include the following:
 - 1) Hangars and supports, pipe sleeves and seals, escutcheons, vibration controls, installation accessories and other appurtenances that form part of installed FC systems
 - 2) Identification tags and schedules for piping systems, equipment, valves, and components
- d. Provide points of connections for Building Automation System for designated Fire Suppression equipment alarms, monitoring and controls.
- e. Cooperation with and assistance to separate Prime Contractors whose work interfaces with fire sprinkler Work
 - 1) HC: Wiring and interconnection with Building Automation System
14. Special fire-suppression systems.
15. Post-occupancy inspection service
16. Demonstration, training and support of Owner personnel
- D. Temporary facilities and controls in the Plumbing Contract, as specified, as identified in the Construction Manager's Phasing and Site Logistics instructions (attached hereto), and as follows:
 1. Temporary fire suppression
 2. Piped sewerage and drainage.
 3. Piped gas service.
 4. Piped water service.
 5. Plumbing connections to existing systems and temporary facilities and controls of other Contracts.
 6. Water connections to Construction Manager's Field Office
 7. Temporary piping as required to maintain conditioned occupied spaces.
- E. Refer to all other Specifications Sections, and other Articles in this Section, for coordination requirements of the Work of the PC with Work of other Prime Contracts.
 1. Coordinate with Lead Contractor and CM to maintain phasing and scheduling.
 2. Participate in preparation of interdisciplinary coordination drawings with other Prime Contractors.
 3. Cooperate with and assist other Prime Contractors whose work interfaces with PC Work
 4. Coordinate floor drain locations and elevations with the GC.
 5. Coordinate sizes and locations of equipment pads with the GC and CM
 6. Coordinate sizes and locations of building enclosure (roof and wall) penetrations with the GC and CM
 7. Coordinate sizes and locations of access doors and frames with the GC and CM

1.9 ELECTRICAL CONSTRUCTION CONTRACT NO. 24-S49-01B--04

- A. The abbreviation EC, as used in reference to contract work scope on the Drawings or elsewhere in the Contract Documents, refers to the Contract, or the Prime Contractor, for Electrical Construction.
- B. General Summary of EC Work, in addition to applicable EC Requirements of Article 1.5 "**All Prime Contracts: General Requirements of Contracts**" above.
 1. All work as described in the following Specification Divisions:
 - a. Divisions 21, 22, 23as applicable to EC scope of Work
 - b. Division 26 – ElectricalAll Sections
 - c. Division 27 – CommunicationsAll Sections
 - d. Division 28 – Electronic Safety and SecurityAll Sections
 - e. Division 31 – Earthwork31 2300 and 31 2333 as they relate to site utility installations.
 - f. Division 33 – Utilities33 7000

2. All work as identified on the following Drawings:
 - a. General.....All Drawings
 - b. Electrical.....All Drawings
 - c. Coordination with all other Drawings
3. All Electrical Construction work indicated on the Contract Documents plus other construction operations traditionally recognized as Electrical Construction and not assigned to another Contract.

C. General Outline of EC Responsibility:

1. Electrical site utilities and structures, including trenching and backfilling, to the extent described in Article "General Requirements of Contracts" above.
2. Electrical distribution systems and equipment, including transformers, panelboards, surge suppression equipment, wiring devices, switches and disconnects, cabinets, boxes and fittings.
3. Exterior and interior lighting systems, controls and equipment.
 - a. New lighting
 - b. Relocated lighting in select locations
 - c. Lighting controls and lighting control system upgrades
4. Wiring, conduit, and raceway, including accessories.
5. Hangers and supports, vibration isolation, installation accessories for all electrical, technology, communications, security and surveillance systems.
6. Bonding and grounding for all electrical, technology, communications, security and surveillance systems.
7. Disconnects and power connections for equipment provided under another Contract, unless the equipment provided by another Contract has those devices integral.
8. Identification for systems, equipment and components for all electrical, technology, communications, security and surveillance systems.
9. Expansion of existing lightning protection system to new additions.
10. Addressable Fire Alarm System
 - a. Upgrade existing fire alarm system to a voice annunciation system that shall serve new devices as just tone generator as well as existing devices in portion of the building where there is no work.
 - b. Duct detectors in HVAC units (supplied by EC for installation by HC)
 - c. Emergency responder radio coverage system for entire building.
11. Technology and Communications Systems
 - a. Control voltage devices and distribution not assigned to other Prime Contractors
 - b. Cable tray, telecom pathways with J-hooks, and accessories.
 - c. Backbone and distribution cabling (copper and fiber optic), wiring, grounding, hangers and supports, boxes and fittings, accessories.
 - d. Digital paging system upgrade and expansion in new additions including classroom voice amplification systems.
 - e. Clock system upgrades and expansion in new additions.
 - f. New audio/visual system for Orchestra Room.
 - g. Cellular distributed antenna system for entire building.
 - h. Cellular distributed antenna system for High School (alternate bid).
 - i. Cellular distributed antenna system for Middle School (alternate bid).
12. Security and Surveillance systems:
 - a. Surveillance cameras and associated cabling, licensing, and camera server for the new additions.
 - b. Replacement of existing surveillance cameras (alternate bid).
 - c. Replacement of site surveillance cameras (alternate bid).
 - d. Access Control and associated cabling and accessories for new addition tied into existing access control system.
13. Cooperation with and assistance to other Prime Contractors whose work interfaces with EC Work
14. Electrical connections to equipment of other Contracts.
15. Cooperation and assistance with the commissioning agent
16. Demonstration, training and support of Owner personnel

- D. Temporary facilities and controls in the Electrical Contract, as specified, as identified in the Construction Manager's Phasing and Site Logistics instructions (attached hereto), and as follows:
1. Electric power service and distribution.
 2. Lighting, including site and perimeter lighting.
 3. Electrical connections to existing systems and temporary facilities and controls provided under other Contracts.
 4. Maintain operation of existing fire alarm system
 5. Electric Service to Construction Manager's Field Office and all Prime Contractors field offices and trailers.
- E. Refer to all other Specifications Sections, and other Articles in this Section, for coordination requirements of the Work of the EC with Work of other Prime Contracts.
1. Coordinate with Lead Contractor and CM to maintain phasing, sequencing and scheduling.
 2. Participate in preparation of Interdisciplinary Coordination Drawings with other Prime Contractors and their subcontractors as necessary.
 3. Cooperate with and assist other Prime Contractors whose work interfaces with EC Work
 4. Field verify locations of exposed wall-mounted EC devices and equipment prior to installation.
 5. Coordinate sizes and locations of equipment pads with the GC and CM
 6. Coordinate sizes and locations of building enclosure (roof and wall) penetrations with the GC and CM
 7. Coordinate sizes and locations of access doors and frames with the GC and CM
 8. Furnish duct detectors and associated wiring for installation by HC.
 9. Coordinate with PC and local authorities for the connection of fire alarm system to all necessary fire protection devices or components.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 1200

SECTION 01 2300 - ALTERNATES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for alternates.

1.2 DEFINITIONS

- A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the bidding requirements that may be added to or deducted from the base bid amount if the Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.
 - 1. Alternates described in this Section are part of the Work only if enumerated in the Agreement.
 - 2. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternates into the Work. No other adjustments are made to the Contract Sum.

1.3 PROCEDURES

- A. Coordination: Revise or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.
 - 1. Include, as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation, whether or not indicated as part of alternate.
- B. Propose Alternate Bids "net of insurance," excluding costs or expenses for General Liability, Workers' Compensation, and Builder's Risk Insurance, in accordance with Article 11 of the Conditions of the Contract.
- C. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated modifications to alternates.
- D. Execute accepted alternates under the same conditions as other Work of the Contract.
- E. Schedule: A Part 3 "Schedule of Alternates" Article is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES for GENERAL CONSTRUCTION CONTRACT 24-S49-01B-01

—none scheduled—

3.2 SCHEDULE OF ALTERNATES for HVAC CONSTRUCTION CONTRACT 24-S49-01B-02

A. ALTERNATE H-1 – AUTOMATIC TEMPERATURE CONTROL FOR HVAC

Base Bid: Provide Work as shown and specified using basis-of-design manufacturer Johnson Controls Facility Explorer, Niagara Platform (furnished and installed by OZ Enterprises located at 60 Abele Road, Suite 1101, Bridgeville, PA 15017).

Alternate Bid H-1a: Provide Work using alternate manufacturer Siemens, Talon Niagara Platform, (Located at 400 Mosites Way, Suite 400, Pittsburgh, PA 15205), in lieu of Johnson Controls.

Alternate Bid H-1b: Provide Work using alternate manufacturer KMC, Niagara Platform (furnished and installed by Building Control Systems located at 523 West Main Street, Carnegie, PA), in lieu of Johnson Controls.

3.3 SCHEDULE OF ALTERNATES for PLUMBING CONSTRUCTION CONTRACT 24-S49-01B-03

—none scheduled—

3.4 SCHEDULE OF ALTERNATES for ELECTRICAL CONSTRUCTION CONTRACT 24-S49-01B-04

A. ALTERNATE E-1 – Lighting Controls Manufacturer

Base Bid: Provide all lighting control Work using basis-of-design manufacturer Cooper ILC (through Knight Sound and Communication.)

Alternate Bid E-1a: Provide all lighting control Work using alternate manufacture, Wattstopper DLM, in lieu of Cooper ILC.

Alternate Bid E-1b: Provide all lighting control Work using alternate manufacturer Sensor Switch nLight, in lieu of Cooper ILC.

Alternate Bid E-1c: Provide all lighting control Work using alternate manufacturer Hubbell NX, in lieu of Cooper ILC.

END OF SECTION 01 2300

SECTION 01 2500 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for substitutions after award of Contract.
 - 1. Bid-phase substitution requirements are given in Division 00 Document “*Instructions to Bidders*”.

1.2 DEFINITIONS

- A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents.
 - 1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
 - 2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required to meet other Project requirements but may offer advantage to Contractor or Owner.
 - a. Substitutions for Convenience will not be considered under this Contract without a corresponding reduction in Contract Sum or Contract Time.

1.3 ACTION SUBMITTALS

- A. Substitution Requests:
 - 1. Submit documentation identifying product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 - 2. Substitution Request Form: Use form provided by or otherwise acceptable to Architect.
 - 3. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
 - a. Statement indicating why specified product or fabrication or installation method cannot be provided, or relative advantages of proposed substitution with regard to quality, performance, cost or project scheduling.
 - b. Coordination of information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors that will be necessary to accommodate proposed substitution.
 - c. Detailed comparison of significant qualities of proposed substitutions with those of the Work specified. Include annotated copy of applicable Specification Section. 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.
 - 1) Evaluation criteria may also include reference standards, warranty, operation, finishes, manufacturer's or supplier's history and capability, history and competence of product representatives, installer availability, history and competence.
 - d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
 - e. Samples, where applicable or requested.
 - f. Certificates and qualification data, where applicable or requested.

- g. List of similar installations for completed projects, with project names and addresses as well as names and addresses of architects and owners.
 - h. Material test reports from a qualified testing agency, indicating and interpreting test results for compliance with requirements indicated.
 - i. Research reports evidencing compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.
 - j. Detailed comparison of Contractor's construction schedule using proposed substitutions with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
 - k. Cost information, including a proposal of change, if requested, in the Contract Sum.
 - l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents, except as indicated in substitution request, is compatible with related materials and is appropriate for applications indicated.
 - m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
4. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Architect will notify Contractor, through Construction Manager, of acceptance or rejection of proposed substitution within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
- a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
 - b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

1.4 QUALITY ASSURANCE

- A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

1.5 PROCEDURES

- A. Coordination: Revise or adjust affected work as necessary to integrate work of the approved substitutions.
- B. Contractor may submit a request for substitution (other than for cause) only as part of a Change Order request to reduce the Contract Sum, or Contract Time, or both.

1.6 SUBSTITUTIONS

- A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.
 - 1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
 - a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
 - b. Substitution request is fully documented and properly submitted.
 - c. Requested substitution will not adversely affect Contractor's construction schedule.
 - d. Requested substitution has received necessary approvals of authorities having jurisdiction.
 - e. Requested substitution is compatible with other portions of the Work.
 - f. Requested substitution has been coordinated with other portions of the Work.
 - g. Requested substitution provides specified warranty.

SECTION 01 2926– MODIFICATION AND PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements necessary to prepare and process Contract Modifications and Applications for Payment.

1.2 DEFINITIONS

- A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.3 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the Schedule of Values with preparation of Contractor's Construction Schedule.
 - 1. Prepare and submit Schedule of Values using AIA G703 form.
 - 2. Correlate line items in the Schedule of Values with Application for Payment forms and construction schedule.
 - 3. Correlate line items in Schedule of Values with Construction Phases and major portions of the Project, as appropriate.
 - 4. Separate the line item values for Labor and Materials.
 - 5. Submit the Schedule of Values at earliest possible date but no later than 30 days before the date scheduled for submittal of initial Applications for Payment.
 - 6. Subschedules for Phased Work: Where the Work is separated into phases requiring separately phased payments, provide subschedules showing values coordinated with each phase of payment.
- B. Format and Content: Use the Project Manual table of contents as a guide to establish line items for the Schedule of Values. Provide at least one line item for each Specification Section.
 - 1. Identification: Include the following Project identification on the Schedule of Values:
 - a. Project name and location.
 - b. Owner's Project number.
 - c. Name of Architect and Construction Manager.
 - d. Architect's Project number.
 - e. Contractor's name and address.
 - f. Date of submittal.
 - 2. Arrange schedule of values consistent with format of AIA Document G703. or other equivalent form approved by Architect and Construction Manager at the initial Job Conference.
 - 3. Show a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Show Labor and Materials as separate line items. Coordinate with the Project Manual table of contents. Show several line items for principal subcontract amounts, in excess of five percent of the Contract Sum, or where otherwise appropriate.
 - 4. Round amounts to nearest whole dollar; total shall equal the Contract Sum.

5. Show a separate line item in the Schedule of Values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
 - a. Differentiate between items stored on-site and items stored off-site.
 - 1) Include evidence of insurance or bonded warehousing, a copy of the invoice for said materials, the location of materials, and a photograph of the materials showing the materials clearly labeled for this Project.
6. Each item in the Schedule of Values and Applications for Payment shall be complete. Include total cost and, except as otherwise indicated, proportionate share of general overhead and profit for each item.
7. In addition to detail described above, show separate line items to indicate values, subject to approval by Architect and Construction Manager, for the following activities and overhead items:
 - a. Schedule
 - b. Schedule Sign-off
 - c. Monthly Schedule updates
 - d. Submittals Schedule
 - e. Bonds
 - f. Insurance premiums
 - g. Temporary facilities
 - h. Temporary utilities
 - i. Coordination drawings
 - j. Project Closeout:
 - 1) Record drawings
 - 2) Final cleaning
 - 3) Demobilization
 - 4) Close out documents - O & M and warranties
 - 5) Trailer staging and parking area restoration
- C. Schedule Updating: Update and resubmit the Schedule of Values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.
 1. Include at least one separate line item for each Change Order and Construction Change Directive.

1.4 MINOR CHANGES IN THE WORK

- A. Architect will issue, through Construction Manager, supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on Architect's standard ASI form, via Construction Manager's web-based Project management software.
 1. Construction Manager will host and utilize web-based project management software tools by CMiC (www.cmicglobal.com.)

1.5 CONSTRUCTION CHANGE DIRECTIVE

- A. Construction Change Directive: Architect may issue a Construction Change Directive on form provided as part of web-based Project management software. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
 1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.
- B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.
 1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

1.6 ADMINISTRATIVE CHANGE ORDERS

- A. Unit-Price Adjustment: See Division 01 Section "Unit Prices" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect measured scope of unit-price work.

1.7 PROPOSAL REQUESTS

- A. Owner-Initiated Proposal Requests: Architect, through Construction Manager, will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
 - 1. Work Change Proposal Requests issued by Architect are not instructions either to stop work in progress or to execute the proposed change.
 - 2. Within time specified in Proposal Request or 20 days, when not otherwise specified, after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
 - a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 - b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - c. Include costs of labor and supervision directly attributable to the change.
 - d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
 - e. Quotation Form: Use forms acceptable to Architect.
- B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Architect, through Construction Manager.
 - 1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
 - 2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 - 3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - 4. Include costs of labor and supervision directly attributable to the change.
 - 5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
 - 6. Comply with requirements in Section 01 2500 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.
 - 7. Proposal Request Form: Use form provided as part of web-based Project management software.

1.8 CHANGE ORDER PROCEDURES

- A. On Owner's approval of a Work Change Proposal Request, Architect, through Construction Manager, will issue a Change Order for signatures of Owner and Contractor on AIA Document G701.
 - 1. Change Order contains a description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.

1.9 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment following the initial Application for Payment shall be consistent with previous applications and payments, as certified by Architect and Construction Manager, and paid for by Owner.
 - 1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.
- B. Payment Application Period: The period for each progress payment is approximately thirty days in length. The period shall start on the same day each month and end on the same day of the following month, as indicated in the Agreement, with the period ranging from 28 days through 31 days.
 - 1. Submit draft copy of Application for Payment seven days prior to due date for review by Architect and Construction Manager.
- C. Payment Application Forms: Use AIA Document G732-2019 and AIA Document G703-1992 as form for Applications for Payment and Schedule of Values form specified herein.
- D. Application Preparation: Complete every entry on form. Submittal deadline for timely processing is indicated in the Agreement. At least seven calendar days prior to indicated deadline for submittal of Application, submit a pencil copy to the Architect and Construction Manager for preliminary approval. Upon receipt of approved pencil copy, prepare ink copy notarized and executed by a person authorized to sign legal documents on behalf of Contractor. Construction Manager will return incomplete applications without action.
 - 1. Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions were made.
 - 2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
 - 3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
- E. Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site.
 - 1. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment for stored materials.
 - 2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
 - 3. Provide summary documentation for stored materials indicating the following:
 - a. Value of materials previously stored and remaining stored as of date of previous Applications for Payment.
 - b. Value of previously stored materials put in place after date of previous Application for Payment and on or before date of current Application for Payment.
 - c. Value of materials stored since date of previous Application for Payment and remaining stored as of date of current Application for Payment.
- F. Transmittal: Submit four signed original copies of each Application for Payment to Construction Manager by a method ensuring receipt on or before the day indicated in the Agreement. One copy shall include waivers of lien and similar attachments if required.
 - 1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.
- G. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
 - 1. List of subcontractors.
 - 2. Schedule of Values.
 - 3. Contractor's construction schedule (preliminary if not final).
 - 4. Products list (preliminary if not final).

5. Schedule of unit prices.
 6. Action Submittals schedule (preliminary if not final):
 - a. Schedule of Shop Drawing Submittals.
 - b. Schedule of Data Submittals.
 - c. Schedule of Sample Submittals.
 7. List of Contractor's staff assignments.
 8. List of Contractor's principal consultants.
 9. Copies of building permits.
 10. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
 11. Initial progress report.
 12. Report of preconstruction conference.
 13. Certificates of insurance and insurance policies (unless submitted before executing Contract).
 14. Performance and payment bonds (unless submitted before executing Contract).
 15. Data needed to acquire Owner's insurance (unless submitted before executing Contract).
- H. Application for Payment at Substantial Completion: After Architect issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
 - a. Complete administrative actions, submittals, and Work preceding this application, as described in Section 01 7700 "Closeout Procedures."
 2. This application shall reflect Certificate(s) of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
- I. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
1. Evidence of completion of Project closeout requirements.
 2. Certification of completion of final punch list items.
 3. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
 4. Updated final statement, accounting for final changes to the Contract Sum.
 5. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
 6. AIA Document G706A, "Contractor's Affidavit of Release of Liens."
 7. AIA Document G707 "Consent of Surety to Final Payment."
 8. Evidence that claims have been settled.
 9. Operation and Maintenance Manuals.
 10. Warranties.
 11. Accepted schedule for demonstration and training.
 12. Proof that taxes, fees, and similar obligations are paid.
 13. Waivers and releases.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 2926

SECTION 01 3100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
 - 1. General coordination procedures.
 - a. General Coordination
 - b. Multi-Prime Coordination
 - c. Coordination of Project Space
 - d. Administrative Coordination
 - 2. Administrative and supervisory personnel.
 - 3. Coordination Drawings.
 - 4. Requests for Information (RFIs).
 - 5. Digital project management procedures.
 - 6. Project meetings.
 - a. Preconstruction Conference
 - b. Coordination Meetings
 - c. Progress Meetings
 - d. Preinstallation Conferences
- B. Each Contractor shall participate in coordination requirements. Certain areas of responsibility are assigned to a specific contractor. Certain areas of overall coordination responsibility are assigned to the Lead Contractor.
 - 1. Other Division 01 sections specify additional requirements for separate Prime Contracts, including as applicable preparing and submitting Contractors' Combined Construction Schedule, procedures for coordinating general installation and field-engineering services, establishment of benchmarks and control points, and coordinating closeout of the Contract.

1.2 DEFINITIONS

- A. RFI: Written request from Contractor seeking information, interpretation, or clarifications of the Contract Documents.

1.3 INFORMATIONAL SUBMITTALS

- A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
 - 1. Name, address, telephone number, and email address of entity performing subcontract or supplying products.
 - 2. Number and title of related Specification Section(s) covered by subcontract.
 - 3. Drawing number and detail references, as appropriate, covered by subcontract.

- B. Coordination Drawings: Prepare and distribute drawings in electronic data format as specified. Submit final drawings for record to Architect and Construction Manager in both electronic format and as full-color paper copies.
1. Sheet Size: At least 8-1/2 by 11 inches but no larger than 30 by 42 inches.
 2. Number of Copies:
 - a. Submit one copy of each progress set of coordination drawings.
 - b. Once the coordination drawings have been completed and approved by all Prime Contractors, the Lead Contractor shall submit three sets to the Architect and Construction Manager and one set to each of the other Prime Contractors.
- C. Key Personnel Names: Within 15 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home, office, and cellular telephone numbers, including home, office, and cellular telephone numbers and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.
1. Post copies of list in Project meeting room, in temporary field office, in web-based Project software directory, and in prominent location in built facility. Keep list current at all times.
- D. Schedules:
1. Contractors' Combined Construction Schedule
 2. Schedule of Values
 3. Submittals schedules
 4. Pre-Installation Meeting schedules: Submit with initial issue of Contractor's Combined Construction Schedule. Submit updates and logs along with each Construction Schedule Updating Report per Section 01 3200. Include the following minimum information:
 - a. Prime Contract.
 - b. Anticipated date and location of meeting (30 to 90 days before scheduled installation of the Work).
 - c. Specification Section and product/assembly description, including related products/assemblies requiring coordination.
 - d. Anticipated activity start date.
 - e. Name of Manufacturer and Installer, including related manufacturers/installers requiring coordination.
 - f. Anticipated key attendees.
 5. Other meeting schedules, in accordance with requirements, or as otherwise anticipated. Do not include regular meetings as convened by CM.
 - a. Indicate Prime Contract, meeting purpose, anticipated date and location, key attendees. Provide updates as needed at Contract Manager's bi-weekly Progress Meeting.
- E. Logs and records
1. Meeting minutes
 2. Submittal logs:
 3. RFI logs.
 4. Pre-Installation Meeting logs: Submit along with Pre-Installation Meeting minutes. Include the following minimum information:
 - a. Prime Contract.
 - b. Actual date and location of meeting.
 - c. Specification Section and product/assembly description, including related products/assemblies requiring coordination.
 - d. Scheduled activity start date.
 - e. Name of Manufacturer and Installer, including related manufacturers/installers requiring coordination.
 - f. Actual attendees.
 - g. Outstanding issues and topics of discussion, if any.

1.4 GENERAL COORDINATION PROCEDURES

- A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations included in different Sections that depend on each other for proper installation, connection, and operation.
1. Schedule construction operations in sequence required to obtain the best results, where installation of one part of the Work depends on installation of other components, before or after its own installation.
 2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
 3. Make adequate provisions to accommodate items scheduled for later installation.
- B. Coordination of Multiple Contracts: Each Contractor shall cooperate with Lead Contractor, who shall coordinate its construction operations with those of other contractors and entities to ensure efficient and orderly installation of each part of the Work. Each contractor shall coordinate its own operations with operations included in different Sections that depend on each other for proper installation, connection, and operation.
1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
 2. Coordinate installation of different components with other contractors to ensure maximum performance and accessibility for required maintenance, service, and repair.
 3. Make adequate provisions to accommodate items scheduled for later installation.
 4. Where availability of space is limited, coordinate installation of different components to ensure maximum performance of and accessibility to required components for maintenance, service, and repair, including but not limited to mechanical, electrical, plumbing, communication, fire protection.
- C. Coordination of Project Space: Coordinate use of Project space and sequence of installation of plumbing, fire suppression, mechanical and electrical Work. Follow schematic routings shown for pipes, ducts, and conduits as closely as practicable, with due allowance for available physical space; make runs parallel with building lines.
1. Utilize space efficiency to maximize accessibility for other installations, for maintenance, and for repairs.
 2. Coordinate installation to prevent conflicts and cooperate in making, without extra charge, reasonable modifications in layout as needed.
 3. Provide un-impeded access, with maximum head room, to control points, valves, strainers, control devices, and specialty items of every nature related to such systems and equipment. Provide adequate clearances as necessary for operation and maintenance.
 4. Layout of plumbing, fire protection, mechanical, and electrical systems, equipment, fixtures, piping, ductwork, conduit, specialty items, and accessories indicated on Drawings is diagrammatic. Variations in alignment, elevation, and details required to avoid interferences and satisfy architectural and structural limitations are not necessarily indicated.
 - a. Prior to installation of material and equipment, review and coordinate Work of all Drawings to establish minimum space conditions.
 - b. Prepare Coordination drawings where required to coordinate Work.
 - c. Conduct ad hoc pre-installation conferences where required to coordinate Work.
 - d. Where available space is inadequate or where reasonable modifications are not possible, request information from Architect before proceeding.
 5. General order of priority for project space:
 - a. Drainlines.
 - b. Ductwork.
 - c. Fire suppression piping.
 - d. Other piping.
 - e. Conduit.

- D. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities, scheduled activities of other Prime Contractors, and direction of Lead Contractor and Construction Manager to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities will include, but not be limited to, the following:
1. Preparation of Contractor's construction schedule.
 2. Providing information for the Contractor's Combined Construction Schedule to the Lead Contractor.
 3. Preparation of the Schedule of Values.
 4. Preparation of the Schedule of Submittals, properly linked with the Contractors' Combined Construction Schedule.
 5. Timely and accurate preparation and distribution of Coordination Drawings.
 6. Installation, maintenance, and removal of temporary facilities and controls.
 7. Progress and Coordination Meetings.
 8. Preinstallation conferences.
 9. Updating, coordination and submittal of record documents.
 10. Startup and adjustment of systems.
 11. Project closeout activities.
 12. Checking, Startup, testing and adjustment of components and systems.
- E. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.

1.5 INTERDISCIPLINARY COORDINATION DRAWINGS

- A. General: The Contractor will not be entitled to assume that the Architect and its design consultants have employed software or other methods that automatically or manually coordinate various aspects and disciplines of the design process. It remains each Prime Contractor's responsibility to determine optimal and workable routing and location for its own Work, properly coordinated with the Work of other Prime Contracts, based on actual or anticipated elevations, clearances and site conditions.
- B. Prior to fabricating or installing work, prepare composite Coordination Drawings cooperatively with the various affected Prime Contractors to optimize efficient installation of different systems and components. Include dimensions. Prepare drawings at appropriate scale; detail major elements, components, and systems of architectural, structural, mechanical, and electrical, showing equipment, assemblies, and materials in relationship with building components and with each other. Include discussion of accepted Coordination Drawings at related pre-installation conferences.
1. Each participating Prime Contract shall include a line-item cost in its Schedule of Values for submittal of completed Coordination Drawings.
 - a. Progress payments may be withheld pending proper execution and submittal of Coordination Drawings.
 2. In lieu of the sequence of preparation specified herein, Lead Contractor (HC) may, at its option, with consent of other affected Prime Contractors, and at no additional cost to the Owner, take one of the following actions:
 - a. Negotiate with other affected Prime Contractors to prepare complete Coordination Drawings, subject to compliance with specified requirements, using its own or subcontracted forces, based on input from, and subject to acceptance by, other affected Prime Contractors. Upon successful completion and timely submittal, Prime Contractors shall be entitled to payment according to Schedules of Values.
 - b. Subject to Architect's, Construction Manager's, and Owner's approval, engage a separate independent professional consulting service acceptable to Architect, Construction Manager, and Owner, and specializing in preparation of interdisciplinary construction coordination drawings, to fulfill this requirement. Upon successful completion and timely submittal, Each Prime Contractor other than Lead Contractor may be subject to partial or full reduction in the cost reflected in its Schedule of Values.

3. If Coordination Drawings are not prepared in the time specified, Owner reserves the right, at Contractors' expense, to engage a separate independent professional consulting service specializing in preparation of interdisciplinary construction coordination drawings, to fulfill this requirement. Charges for such consulting service will be equitably assessed to each responsible Contractor, and will be deducted from the Contractors' Request for Payment.

C. Required documentation:

1. Show relationship and integration of different construction elements that require coordination during fabrication or installation to fit in space provided or to function as intended.
2. Indicate locations where space is limited for installation and access and where sequencing and coordination of installations are important to efficient flow of Work.
3. Indicate scheduling, sequencing, movement, and positioning of large equipment into building during construction.
4. Assembly Penetrations: Indicate penetrations in floors, walls, and ceilings and their relationship to assembly construction, other penetrations and installations. Identify where additional bracing and offsets are required.
5. Ceilings: Prepare reflected ceiling plans and other drawings as required to coordinate and integrate installations, air outlets and inlets, light fixtures, communications systems components, sprinklers, other ceiling-mounted devices, components located above suspended ceilings, and suspended ceiling support components.
6. Show interrelationship of components indicated on separate Shop Drawings.
7. Indicate required installation sequences to minimize cutting and patching.
8. Make coordination documents available in field office for review by Architect, Construction Manager, and other Prime Contractors during entire period of construction.

D. General Content: Project-specific information, drawn accurately to scale. Except as specifically allowed in writing, do not base Coordination Drawings on reproductions of the Contract Documents or standard printed data. Include the following information, as applicable:

1. Prepare plans, sections, elevations, and details as needed to describe relationship of various systems and components.
2. Coordinate the addition of trade-specific information to the coordination drawings by multiple contractors in a sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.
3. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
4. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
 - a. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
5. Indicate required installation sequences.
6. Indicate dimensions shown on the Contract Drawings and make specific note of dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect for resolution of such conflicts.
 - a. Minor dimension changes and difficult installations will not be considered changes to the Contract.

E. Coordination Drawing Organization: Organize coordination drawings as follows:

1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire protection, fire alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work.
2. Plenum Space: Indicate subframing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work. Locate components within ceiling plenum to accommodate layout of light fixtures indicated on Drawings. Indicate areas of conflict between light fixtures and other components, including means of suspension.

3. Mechanical Rooms: Provide coordination drawings for mechanical rooms showing plans and elevations of mechanical, plumbing, fire suppression, security/ data/ control/ communication systems, and electrical equipment.
 4. Structural and Fire-resistant Penetrations: Indicate penetrations and openings required for all disciplines.
 5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
- F. Review: Architect will review coordination drawings to confirm that the Work is being coordinated, but not for the details of the coordination, which are the Contractor's responsibility. If the Architect determines that the coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, the Architect, through the Construction Manager, will so inform the Contractor, who shall make changes as directed and resubmit.
- G. Sequence of Preparation: This sequence represents a minimum performance requirement. Subject to Construction Manager's and Architect's approval, Contractors may elect to delegate preparation of Coordination Drawings to Lead Contractor or Lead Contractor's consultant, as described in Paragraph B. of this Article above.
1. Within 15 working days of Notice to Proceed, the HVAC Prime Contractor shall prepare and submit to the Plumbing Prime Contractor and Construction Manager, drawings of 1/4-inch scale that indicate proposed routing of ductwork and piping in this Contract. Provide appropriate information using Floor Plans, Reflected Ceiling Plans, Plenum Space Drawings, Enlarged Mechanical Room Plans, Structural and Fire-resistant Penetrations Layouts, Slab Edge and Embedded Items Details. These Coordination Drawings are to include the following:
 - a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.
 - b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and distribution equipment.
 - 1) HC to indicate sizes, types, locations and clearances for access doors required, whether furnished and/or installed under the HC or the GC.
 - c. Fire dampers and fire-rated enclosures around ductwork.
 - d. Existing ductwork and equipment.
 - e. Exterior and fire-rated roof, wall and floor penetrations and enclosures.
 - f. Indicate size, elevation, and general location of potential obstructions.
 - g. Show equipment, particularly that which is above ceilings; include its minimum required access space.
 - h. Show and dimension services required of other Contractors.
 - i. Indicate required installation sequences.
 2. Within 10 working days of receipt of HVAC Coordination Drawings, the Plumbing/Fire Protection Contractor shall add the piping systems, plumbing equipment and fire protection system to the Coordination Drawings, and submit to the Electrical Contractor and Construction Manager. Include dimensional sizes, locations, and methods of access for the following items:
 - a. Roof penetrations.
 - b. Exterior and fire-rated wall and floor penetrations.
 - c. Recessed or concealed equipment in walls, chases or above ceilings.
 - 1) PC to indicate sizes, types, locations and clearances for access doors required, whether furnished and/or installed under the PC or the GC.
 - d. Domestic water supplies.
 - e. Floor drains, condensate drains.
 - f. Piping mains and large branch piping over 2-inches IPS.
 - g. Existing piping.
 - h. Highlight and note any conflict points that might occur.
 - i. Fire Suppression System: Show standpipes, mains piping, branch lines, pipe drops, and sprinkler heads.

3. Within 10 calendar days of receipt, the Electrical Contractor shall add information to the Coordination Drawings and submit to the Lead Contractor and Construction Manager. Include dimensional sizes, locations, and methods of access for the following items:
 - a. Electrical systems and components:
 - 1) Electrical conduit 1-1/4-inches in diameter and larger .
 - 2) Locations where space is limited and sequencing is required.
 - 3) Electrical feeds.
 - 4) Electrical power, control wiring, cabling layouts, and overcurrent protective devices.
 - 5) Proposed locations of major systems and equipment.
 - 6) Exterior and fire-rated wall and floor penetrations.
 - 7) Light fixture, exit light, emergency battery pack, smoke detector, and other fire alarm locations.
 - 8) Panel board, switch board, switchgear, transformer, busway, generator, and motor control center locations.
 - 9) Location of pull boxes and junction boxes, dimensioned from column center lines.
 - b. Technology systems and components:
 - 1) Proposed locations of major systems and equipment and clearances required.
 - 2) Locations where space is limited and sequencing is required.
 - 3) Backbone cabling runs.
 - 4) Control wiring, cabling layouts, busway requirements..
 - 5) Exterior and fire-rated wall and floor penetrations.
 - 6) Location of pull boxes and junction boxes, dimensioned from column center lines.
4. Within 7 days of receipt, the Lead Contractor shall review the Coordination Drawings to verify that the work shown by the other Prime Contractors will not interfere with the General Construction work scope. Lead Contractor shall then call for a Coordination Meeting. Lead Contractor shall conduct Coordination Meeting to review the Coordination Drawings with all Prime Contractors. At this meeting, all Prime Contractors shall sign off on the completed coordination drawings.
5. Once the Coordination Drawings have been signed by all the Prime Contractors, the Lead Contractor shall distribute the completed Coordination Drawings to each Prime Contractor, and simultaneously submit to Construction Manager and Architect, as informational submittals.
 - a. Submit by uploading to CMiS site as directed by Construction Manager.

1.6 REQUESTS FOR INFORMATION (RFIs)

- A. General: Immediately on discovery of the need for additional information, clarification, or interpretation of the Contract Documents, and if not possible to request interpretation at Project meeting, prepare and submit an RFI in the form provided by Architect at the Preconstruction Conference.
 1. RFIs shall originate with a Prime Contractor. RFIs submitted by entities other than Contractor will be rejected with no response.
 - a. Submit RFI simultaneously to the Architect and Construction Manager using Construction Manager's web-based software.
 2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
- B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
 1. Project name and Architect's Project Number.
 2. Date.
 3. Name of requesting Contractor.
 4. Name of Architect and Construction Manager.

5. RFI number, numbered sequentially.
 6. RFI subject.
 7. Specification Section number and title and related paragraphs, as appropriate.
 8. Drawing number and detail references, as appropriate.
 9. Field dimensions and conditions, as appropriate.
 10. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
 11. Contractor's signature.
 12. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
 - a. Supplementary drawings prepared by Contractor shall include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.
- C. RFI forms and protocols have been established for the Project. Verify standards and procedures with Architect prior to beginning work.
1. Attachments shall be electronic files in Adobe Acrobat PDF format, unless otherwise allowed.
- D. Architect's and Construction Manager's Action: Architect and Construction Manager will review each RFI to determine action required. Architect will provide final response. Allow ten working days for Architect's response for each RFI. RFIs received by Architect or Construction Manager after 1:00 p.m. will be considered as received the following working day.
1. The following Contractor-generated RFIs will be returned without action:
 - a. Requests for approval of submittals.
 - b. Requests for approval of substitutions.
 - c. Requests for approval of Contractor's means and methods.
 - d. Requests for coordination information already indicated in the Contract Documents.
 - e. Requests for adjustments in the Contract Time or the Contract Sum.
 - f. Requests for interpretation of Architect's actions on submittals.
 - g. Incomplete RFIs or inaccurately prepared RFIs.
 2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt by Architect of additional information.
 3. Architect's action on RFIs does not in itself warrant a change to the Contract Time or the Contract Sum.
 - a. Architect's action may result in a change to the Contract Time or Contract Sum only if Contractor submits a Change Proposal per Section 01 2600 "Contract Modification Procedures."
 - b. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect and Construction Manager in writing within 5 working days of receipt of the RFI response.
- E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log at each progress meeting. Construction Manager will then cross-reference using web-based Project management software. Include software log with not less than the following:
1. Project name and number.
 2. Name and address of Contractor.
 3. Name and address of Architect and Construction Manager.
 4. RFI number including RFIs that were returned without action or withdrawn.
 5. RFI description.
 6. Date the RFI was submitted.
 7. Date Architect's response was received.
 8. Identification of related potential Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.

- F. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within seven days if Contractor disagrees with response.

1.7 DIGITAL PROJECT MANAGEMENT PROCEDURES

- A. Use of Architect's Digital Data Files: Architect may elect to make amended CAD drawings for Contractor's limited use during construction.
 - 1. Digital data files may only be used by Contractor in preparing coordination drawings, Shop Drawings, and Project Record Drawings.
 - 2. Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Contract Drawings.
 - 3. Contractor shall execute a data licensing agreement in the form provided by Architect.
 - a. Subcontractors and other parties granted access by Contractor to Architect's digital data files shall execute a separate data licensing agreement.
- B. Web-Based Project Management Software Package: Use Construction Manager's web-based Project management software package for purposes of hosting and managing Project communication and documentation until Final Completion.
- C. PDF Document Preparation: Where PDFs are required to be submitted to Architect, prepare as follows:
 - 1. Assemble complete submittal package into a single indexed file, incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
 - 2. Name file with submittal number or other unique identifier, including revision identifier.
 - a. Naming and filing protocols have been established for the Project. Verify standards and formats with CM prior to beginning work.
 - 3. Certifications: Where digitally submitted certificates and certifications are required, provide a digital signature with digital certificate where indicated.

1.8 PROJECT MEETINGS

- A. **General:** Construction Manager will schedule and conduct meetings and conferences at Project site unless otherwise indicated.
 - 1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner, Construction Manager, and Architect of scheduled meeting dates and times a minimum of seven calendar days prior to meeting.
 - 2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
 - 3. Minutes: Construction Manager will record significant discussions and agreements achieved, and will distribute the meeting minutes to everyone concerned, including Owner, Construction Manager, and Architect, within three working days of the meeting.
 - a. Distribution will be via web-based Project Management system.
- B. Preconstruction Conference: Construction Manager will schedule and conduct a preconstruction conference before starting construction, at a mutually agreed upon time between Owner, Architect, Construction Manager, and Prime Contractors, but no later than 15 calendar days after execution of Agreements.
 - 1. Attendees:
 - a. Authorized representatives of Owner,
 - b. Architect and its consultants,
 - c. Construction Manager,

- d. Prime Contractors and their respective superintendents,
 - e. Major subcontractors; suppliers; and other concerned parties. .
2. Participants at the conference must be familiar with Project and authorized to conclude matters relating to the Work
 3. Agenda: Discuss items of significance that could affect progress, including the following:
 - a. Designation of key personnel and their duties.
 - b. Tentative construction schedule including project phasing.
 - 1) Critical work sequencing and long-lead items.
 - 2) Work by Owner or Owner's separate contractors
 - c. Respective responsibilities for temporary facilities and controls.
 - d. Respective responsibilities for cutting and patching.
 - e. Lines of communications and use of web-based Project software.
 - f. Procedures for processing field decisions and Change Orders.
 - g. Procedures for RFIs.
 - h. Procedures for testing and inspecting.
 - i. Procedures for processing Applications for Payment.
 - j. Distribution of the Contract Documents.
 - k. Submittal procedures.
 - l. Preparation of record documents.
 - m. Use of the premises and existing building.
 - n. Work restrictions.
 - o. Working hours.
 - p. Owner's occupancy requirements.
 - q. Respective responsibilities for temporary facilities and controls.
 - r. Procedures for moisture and mold control.
 - s. Procedures for disruptions and shutdowns.
 - t. Construction waste management.
 - u. Parking availability.
 - v. Office, work, and storage areas.
 - w. Equipment deliveries and priorities.
 - x. First aid, Safety, Security.
 - y. Progress cleaning.
 4. Minutes: Construction Manager will record and distribute meeting minutes.
- C. **Preinstallation Meetings:** Each Prime Contractor shall conduct a preinstallation conference at Project site in compliance with submitted Pre-Installation Conference Schedule and Log, before each construction activity that requires coordination with other construction, and as otherwise required by Specifications.
1. General:
 - a. Each meeting to be narrowly focused on a single project activity, product, or assembly.
 - b. Review the Contract Documents to determine what work activities require a Pre-Installation meeting. Take note of any activities where such meeting is called out in the specifications.
 - c. Develop a list of required Meetings for discussion at the CM's Pre-Construction Conference, and distribute the initial Preinstallation Meeting Schedule prior to first Progress Meeting for review and confirmation by the Construction Manager, Architect, and other Prime Contractors.
 2. Attendees: Architect, Construction Manager, Prime Contractor, Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other installations that have preceded or will follow.
 - a. The Prime Contractor responsible for each Meeting shall recommend which parties to participate, and shall notify proposed attendees of the Meeting Schedule.

3. Coordinate meeting dates with availability of Architect and Construction Manager. Schedule each meeting to occur between 30 and 90 days in advance of respective installation.
 - a. Advise Construction Manager and Architect of upcoming meeting dates.
 - b. Where practicable if not otherwise required or approved, schedule meetings at Project Site, on the day of a regular Progress Meeting, and no more than three weeks prior to when the activity is scheduled to begin.
4. Prepare for each meeting:
 - a. Confirm that any Meeting-specific additional permits or notices are completed and in hand.
 - b. Verify pre- and post- test and inspection requirements and confirm prior to or at the scheduled Meeting.
 - c. Arrange that appropriate shop drawings, samples, and mockups are available for review.
 - d. Edit and distribute the agenda to meet the specific project requirements and Specifications. Identify any special conditions. Provide the Preinstallation Meeting Agenda to all of the Attendees a minimum of 7 days before the scheduled Preinstallation Meeting.
 - e. Prepare a sign-in sheet that includes attendee contact information, to document Meeting attendance.
5. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration. Prepare specific agenda for each meeting as appropriate for system or product being discussed, including requirements for the following, as applicable:
 - a. General Discussion of Activity
 - 1) Identification of Installer and Manufacturer of the Work.
 - 2) Identification of related affected Work, related Installers and Manufacturers.
 - 3) Identification of related affected Work of other Prime Contracts.
 - 4) Quality Assurance and coordination requirements.
 - 5) Field Quality Control requirements, including required performance results and any required preinstallation testing.
 - b. Review of Requirements
 - 1) Contract Documents.
 - 2) Related RFIs, ASIs, CCDs, Change Orders.
 - 3) Installation procedures, including Manufacturer's written instructions and recommendations.
 - 4) Compatibility requirements and potential issues.
 - 5) Potential conflicts and proposed options and remedies.
 - 6) Weather and environment requirements.
 - 7) Submission of any preinstallation testing results before the work begins
 - 8) Warranty requirements.
 - c. Scheduling and Coordination
 - 1) Time schedules and sequencing of installation, including purchases and deliveries, and precedent activities.
 - 2) Review any impacts on the Project Construction Schedule
 - 3) Compatibility of materials.
 - 4) Acceptability of substrates.
 - 5) Coordination and compatibility with Owner's use of facility and grounds.
 - 6) Coordination with other work.
 - d. Review of Submittals and Approvals
 - 1) Product Data, Shop Drawings, Samples.
 - 2) Coordination Drawings
 - 3) Mock-ups and sample panels
 - 4) Regulations of authorities having jurisdiction, including permitting and inspection requirements.
 - e. Special Conditions
 - 1) Space and access limitations.

- 2) Temporary facilities and controls.
 - 3) Temperature, dust, and noise control issues.
 - 4) Permits, Fees, Notices.
 - 5) Utility Interruptions.
 - 6) Special security requirements.
 - 7) Protection of adjacent construction.
 - 8) Protection of installed Work.
 - 9) Protection of property and personnel.
6. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
 7. Reporting: The Prime Contractor who convened the meeting shall record and distribute minutes of the meeting to each party present and to other parties requiring information within seven days of the Preinstallation Meeting.
 - a. Construction Manager will ensure that open issues are flagged and addressed at the next Progress Meeting or earlier if necessary.
 8. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
- D. **Progress Meetings:** Construction Manager will conduct progress meetings at bi-weekly intervals, to be scheduled immediately after regular Lead Contractor's Project Coordination meetings, or more frequently as needed for satisfactory coordination of the Work. Project progress meetings are in addition to specific meetings held for other purposes, such as coordination meetings and preinstallation conferences.
1. Attendees: In addition to representatives of Owner and Architect, each Contractor, major Subcontractors, suppliers, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities must be represented at these meetings. Architect may invite representatives of its design consultants.
 2. Participants at the meeting must be familiar with Project and authorized to conclude matters relating to the Work.
 3. Agenda:
 - a. Review and correct or approve minutes of previous progress meeting.
 - b. Review prior items of significance and introduce new items of significance that could affect progress or delay Project closeout. Include topics for discussion as appropriate to status of Project.
 - c. Contractor's Construction Schedule:
 - 1) Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule.
 - 2) Discuss how to maintain planned progress of the work and construction behind schedule per requirements of the Conditions of the Contract and elsewhere in the Contract Documents; secure commitments from parties involved to do so.
 - 3) Review and discuss schedule for next period.
 - 4) Discuss whether schedule revisions are required to ensure that current and subsequent activities are completed within the Contract Time.
 - 5) Review progress since the last meeting.
 - 6) Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's Construction Schedule.
 - 7) Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so.
 - 8) Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - 9) Access and site utilization.
 - 10) Work hours.
 - 11) Hazards and risks.

- d. Review proceedings of pre-installation conferences since the last Progress Meeting, and discuss scheduled upcoming pre-installation conferences.
 - e. Review present and future needs of each entity present, including the following:
 - 1) Status of Submittals.
 - 2) Interface requirements.
 - 3) Sequence of operations.
 - 4) Deliveries.
 - 5) Off-site fabrication.
 - 6) Access for personnel, materials, equipment.
 - 7) Site utilization.
 - 8) Temporary facilities and controls.
 - 9) Progress cleaning.
 - 10) Quality and work standards.
 - 11) Status of correction of deficient items.
 - 12) Field observations.
 - 13) Status of RFIs.
 - 14) Status of proposal requests, Change Orders, and pending changes.
 - 15) Pending claims and disputes.
 - 16) Documentation of commissioning related requirements.
 - 17) Documentation of information for payment requests.
 - f. Closeout:
 - 1) Preparation of Record Documents.
 - 2) Preparation of Contractor's punch list.
 - 3) Procedures required prior to field observation for Substantial Completion and for final field observation for acceptance.
 - 4) Procedures for completing and archiving web-based Project software site data files.
 - 5) Closeout Submittals.
 - a) Submittal of written warranties.
 - b) Requirements for preparing operations and maintenance data.
 - c) Requirements for delivery of material samples, attic stock, and spare parts.
 - 6) Requirements for demonstration and training.
 - 7) Procedures for processing Applications for Payment at Substantial Completion and for final payment.
 - 8) Owner's partial occupancy requirements.
 - a) Coordination of separate contracts (if any).
 - 9) De-mobilization and responsibility for removing temporary facilities and controls.
 - 4. Minutes: Construction Manager will record and distribute minutes of the meeting to each party present and to parties who should have been present.
 - 5. Schedule Updating: Lead Contractor, with update assistance from the other Prime Contractors, shall revise, update, and re-issue Contractor's Combined Construction Schedule promptly after a Progress Meeting where revisions to the schedule have been made or recognized.
 - a. Issue revised schedule concurrently with the report of meeting.
 - b. Progress Payments may be withheld until schedule update information is properly submitted.
- E. **Coordination Meetings:** Lead Contractor shall conduct Project coordination meetings at biweekly intervals, to be scheduled immediately prior to regular progress meetings, or more frequently as needed for satisfactory coordination of the Work. Coordination Meetings are intended for maintaining coordination among Prime Contractors'
- 1. Attendees:
 - a. Construction Manager
 - b. Field superintendent of each Prime Contractor

- c. Subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities.
 - 2. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
 - 3. Agenda:
 - a. Review and correct or approve minutes of the previous coordination meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - b. Combined Contractor's Construction Schedule:
 - 1) Review progress since the last coordination meeting.
 - 2) Determine whether each contract is on time, ahead of schedule, or behind schedule, in relation to combined Contractor's Construction Schedule.
 - 3) Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so.
 - 4) Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - c. Review current and future needs of each Contractor present, including but limited to the following, as appropriate:
 - 1) Status of Submittals.
 - 2) Interface requirements.
 - 3) Sequence of operations.
 - 4) Deliveries.
 - 5) Off-site fabrication issues.
 - 6) Access for personnel, materials, equipment.
 - 7) Site utilization issues.
 - 8) Temporary facilities and controls.
 - 9) Progress cleaning.
 - 10) Quality and work standards.
 - 11) Work hours.
 - 12) Hazards and risks.
 - 13) Status of RFIs.
 - 14) Status of Changes in the Work
 - a) Proposal Requests.
 - b) Change Orders.
 - c) Pending changes.
 - 15) Progress cleaning.
 - 16) Quality and work standards.
 - 17) Review present and future coordination problems.
 - 18) Commissioning requirements
 - d. Review and prepare to address other pending topics of concern or discussion at Construction Manager's Progress Meeting immediately following Coordination Meeting.
 - 4. Schedule Updating: Prepare to revise Contractors' Combined Construction Schedule promptly after each Coordination Meeting and subsequent Progress meeting, where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with report of Progress Meeting.
 - 5. Reporting: Record meeting results and distribute copies to everyone in attendance, Construction Manager, Architect, and to others affected by decisions or actions resulting from each meeting.
- F. **Project Closeout Conference:** Construction Manager will schedule and conduct a project closeout conference with Prime Contractor Superintendents, at a time convenient to Owner and Architect, but no later than 60 days prior to the scheduled date of Substantial Completion.
- 1. Conduct the conference to review requirements and responsibilities related to Project closeout.

2. Attendees: Authorized representatives of
 - a. Owner
 - b. Owner's Commissioning Authority, at Owner's discretion
 - c. Construction Manager
 - d. Architect and its consultants
 - e. Contractor and its superintendent
 - f. Major subcontractors, suppliers; and other concerned parties
3. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
4. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:
 - a. Preparation of Record Documents.
 - b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
 - c. Procedures for completing and archiving web-based Project software site data files.
 - d. Submittal of written warranties.
 - e. Requirements for preparing operations and maintenance data.
 - f. Requirements for delivery of material samples, attic stock, and spare parts.
 - g. Requirements for demonstration and training.
 - h. Preparation of Contractor's punch list.
 - i. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
 - j. Submittal procedures.
 - k. Coordination of separate contracts (if any).
 - l. Owner's partial occupancy requirements.
 - m. Responsibility for removing temporary facilities and controls.
5. Minutes: Construction Manager will record and distribute meeting minutes.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 3100

SECTION 01 3200 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements of each Multiple Prime Contractor for documenting the progress of construction during performance of the Work, including the following:
 - 1. Startup construction schedule.
 - 2. Contractor's combined construction schedule.
 - 3. Construction schedule updating reports.
 - 4. Daily construction reports.
 - 5. Material location reports.
 - 6. Site condition reports.
 - 7. Special reports.

1.2 DEFINITIONS

- A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.
 - 1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
 - 2. Predecessor Activity: An activity that precedes another activity in the network.
 - 3. Successor Activity: An activity that follows another activity in the network.
- B. Cost Loading: The allocation of the Schedule of Values for the completion of an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum unless otherwise approved by Architect.
- C. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.
- D. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.
- E. Event: The starting or ending point of an activity.
- F. Float: The measure of leeway in starting and completing an activity.
 - 1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.
 - 2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
 - 3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.
- G. Resource Loading: The allocation of manpower and equipment necessary for the completion of an activity as scheduled.

1.3 INFORMATIONAL SUBMITTALS

- A. Format for Submittals: Submit required submittals in the following format:
 - 1. PDF electronic file.
- B. Startup Network Diagram: Of size required to display entire network for entire construction period. Show logic ties for activities.
 - 1. Include list of potential long-lead items, with information and coordination needed for timely procurement.
- C. Contractor's Combined Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.
- D. CPM Reports: Concurrent with CPM schedule, submit each of the following reports. Format for each activity in reports shall contain activity number, activity description, cost and resource loading, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.
 - 1. Activity Report: List of activities sorted by activity number and then early start date, or actual start date if known.
 - 2. Logic Report: List of preceding and succeeding activities for each activity, sorted in ascending order by activity number and then by early start date, or actual start date if known.
 - 3. Total Float Report: List of activities sorted in ascending order of total float.
 - 4. Earnings Report: Compilation of Contractor's total earnings from the Notice to Proceed until most recent Application for Payment.
- E. Construction Schedule Updating Reports: Submit with Applications for Payment and at progress meetings.
- F. Daily Construction Reports: Submit at weekly intervals to the Owner's Representative.
- G. Material Location Reports: Submit with Applications for Payment.
- H. Site Condition Reports: Submit at time of discovery of differing conditions.
- I. Special Reports: Submit at time of unusual event.

1.4 QUALITY ASSURANCE

- A. Prescheduling Conference: Construction Manager and Lead Contractor to jointly conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." Review methods and procedures related to the preliminary construction schedule and Contractor's construction schedule, including, but not limited to, the following:
 - 1. Review software limitations and content and format for reports.
 - 2. Verify availability of qualified personnel needed to develop and update schedule.
 - 3. Discuss constraints, including phasing, work stages, area separations, interim milestones, and partial Owner occupancy.
 - 4. Review delivery dates for Owner-furnished products.
 - 5. Review schedule for work of Owner's separate contracts, if any.
 - 6. Review schedule for work of each Prime Contract.
 - 7. Review submittal requirements and procedures.
 - 8. Review time required for review of submittals and resubmittals.
 - 9. Review time required for fabrication and delivery of equipment and materials, and identify potentially long-lead items.
 - 10. Review requirements for tests and inspections by independent testing and inspecting agencies.
 - 11. Review required AHJ and other inspections.
 - 12. Review time required for Project closeout and Owner startup procedures.
 - 13. Review and finalize list of construction activities to be included in schedule.
 - 14. Review procedures for updating schedule.

1.5 COORDINATION

- A. Lead Contractor to provide CPM Scheduling to coordinate preparation, processing, and updating of Contractors' Combined Construction Schedule, with scheduling input and reporting of multiple Prime Contractors.
- B. All Prime Contractors shall cooperate with Lead Contractor in scheduling and reporting of construction activities within their scope.
- C. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate Prime Contractors.
- D. Coordinate Contractor's construction schedule with the schedule of values, submittal schedule, progress reports, payment requests, and other required schedules and reports.
 - 1. Secure time commitments for performing critical elements of the Work from entities involved.
 - 2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 2 - PRODUCTS

2.1 CONSTRUCTION SCHEDULE, GENERAL

- A. Time Frame: Develop schedule from date established for the Notice to Proceed to the date of Substantial Completion and final completion.
 - 1. Contract completion date is not changed by submission of a schedule that shows completion date that varies from the date established in the Notice to Proceed, unless specifically authorized by Change Order.
 - 2. Failure to include any work item required for performance of this Contract shall not excuse Contractor from completing all work within applicable completion dates, regardless of Architect's approval of the schedule.
- B. Activities: Treat each separate work area as a separate numbered activity for each main element of the Work. Comply with the following:
 - 1. Activity Duration: Define activities as mutually agreed upon among Prime Contractors at initial coordination meeting, but such that no activity is longer than 20 days, unless specifically allowed by Construction Manager.
 - 2. Temporary Facilities: Indicate start and completion dates for the following as applicable:
 - a. Securing of approvals and permits required for performance of the Work.
 - b. Temporary facilities.
 - c. Construction of mock-ups, prototypes and samples.
 - d. Owner interfaces and furnishing of items.
 - e. Interfaces with separate contracts.
 - f. Regulatory agency approvals.
 - g. Punch list.
 - 3. Critical Path Activities: Identify critical path activities, including those for interim completion dates. Scheduled start and completion dates shall be consistent with Contract milestone dates.
 - 4. Procurement Activities: Include procurement process activities for long lead items, and major items requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
 - a. Submit list of long lead items and major items with Construction Schedule.
 - 5. Submittal Review Time: Include review and resubmittal times indicated in Division 01 Section "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's construction schedule with submittal schedule.
 - 6. Startup and Testing Time: Include no fewer than 15 days for startup and testing.
 - 7. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.

8. Punch List and Final Completion: Include not more than 30 days for completion of punch list items and final completion.
- C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
1. Work under More Than One Contract: Include a separate activity for each contract.
 2. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.
 3. Products Ordered in Advance: Include a separate activity for each product. Include delivery date indicated in Division 01 Section "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
 4. Owner-Furnished Products: Include a separate activity for each product. Include Owner-provided delivery date.
 5. Work Restrictions: Show the effect of the following items on the schedule:
 - a. Coordination with existing construction.
 - b. Limitations of continued occupancies.
 - c. Uninterruptible services.
 - d. Partial occupancy before Substantial Completion.
 - e. Use of premises restrictions.
 - f. Provisions for future construction, if any.
 - g. Seasonal variations.
 - h. Environmental control.
 6. Work Stages: Indicate important stages of construction for each applicable major portion of the Work, including, but not limited to, the following:
 - a. Subcontract awards.
 - b. Submittals.
 - c. Purchases.
 - d. Mockups.
 - e. Fabrication.
 - f. Sample testing.
 - g. Deliveries.
 - h. Installation.
 - i. Tests and inspections.
 - j. Adjusting.
 - k. Curing.
 - l. Startup and placement into final use and operation.
 - m. Training and Demonstration.
 7. Construction Areas: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:
 - a. Structural completion.
 - b. Temporary enclosure and space conditioning.
 - c. Permanent space enclosure.
 - d. Completion of mechanical installation.
 - e. Completion of plumbing installation.
 - f. Completion of fire protection and sprinkler installation.
 - g. Completion of electrical installation.
 - h. Completion of inspections by authorities having jurisdiction for issuance of Occupancy Permit or Partial Occupancy Permit.
 - i. Substantial Completion.
 - j. Owner Training
- D. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, Notice to Proceed, last day of school before summer, staff's return at the end of summer, first day of student's return to school, Substantial and Final Completion, and the following:
1. Procurement and Coordination of Drawings
 2. Identification and procurement of long-lead items.
 3. Mobilization

4. Site Clearing, Demolition, Excavation, Removals
5. Completion of Envelope Mockup
6. Underground and Under-Slab Utilities and Utility Structures
7. Foundation Installation, including underpinning, cast retaining wall, waterproofing.
8. Slab on Grade Installation
9. Steel Framing
10. Floor and Roof Framing and Deck, elevated Concrete Slabs
11. Envelope Framing and Sheathing
12. Membrane Roofing Installation
13. Permanent Perimeter Envelope Enclosure (Windows, Doors, Curtainwall, Louvers)
14. Site Improvements completion
15. Interior Construction
16. Interior Finishes installation
17. Fixtures, Furnishings, and Equipment installation
18. Landscaping, Lawns, Planting completion
19. Commissioning
20. Punchlist process
21. Closeout and Demobilization Activities

- E. Cost Correlation: At the head of the schedule, provide a cost correlation timeline, indicating planned and actual costs. On the line, show planned and actual dollar volume of the Work performed as of planned and actual dates used for preparation of payment requests.
1. See Division 01 Section "Modification and Payment Procedures" for cost reporting and payment procedures.
 2. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using a network fragment to demonstrate the effect of the proposed change on the overall Project schedule.
- F. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:
1. Unresolved issues.
 2. Unanswered Requests for Information.
 3. Rejected or unreturned submittals.
 4. Notations on returned submittals.
 5. Pending modifications affecting the Work and Contract Time.
- G. Recovery Schedule: When periodic update indicates the Work is 14 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, and equipment required to achieve compliance, and date by which recovery will be accomplished.
- H. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.

2.2 STARTUP CONSTRUCTION SCHEDULE

- A. Bar-Chart Schedule: Each Prime Contract to submit a startup, horizontal, bar-chart-type construction schedule within seven days of date established for the Notice to Proceed.
- B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line. Outline significant construction activities for first 30 days of construction. Include skeleton diagram for the remainder of the Work.

2.3 CONTRACTORS' COMBINED CONSTRUCTION SCHEDULE

- A. Startup Network Diagram: Within fourteen (14) days after Notice of Award, each Prime Contractor shall submit a detailed list of construction activities to the Lead (General) Contractor and the Construction Manager. This information will be reviewed and used by the General Contractor to develop the master combined CPM schedule. Outline significant construction activities for the duration of construction and include any required predecessors and successors for each activity required.
- B. Schedule Preparation: Within fourteen (14) days after receipt of the detailed schedule and activity information from the Prime Contractors, the Lead (General) Contractor shall prepare the initial baseline combined CPM schedule for review by the Prime Contractors and Construction Manager. Prepare a list of all activities required to complete the Work. Using the startup network diagram, prepare a skeleton network to identify probable critical paths.
1. Activities: Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Include estimated time frames for the following activities:
 - a. Preparation and processing of submittals: Include necessary review time as indicated in Div 01 Specifications.
 - b. Mobilization and demobilization.
 - c. Purchase of materials.
 - d. Delivery.
 - e. Fabrication.
 - f. Utility interruptions.
 - g. Installation.
 - h. Work by Owner that may affect or be affected by Contractor's activities.
 - i. Testing and commissioning: Include not less than 10 days for startup, testing, and commissioning.
 - j. Punch list and final completion.
 - k. Activities occurring following final completion.
 2. Critical Path Activities: Identify critical path activities, including those for interim completion dates. Make scheduled start and completion dates consistent with Contract milestone dates.
 3. Milestones: Include milestone dates indicated in the Contract Documents in the schedule.
- C. Initial Issue of Schedule: Lead (General) Contractor shall prepare and issue the initial baseline combined CPM network diagram from a sorted activity list indicating straight "early start-total float." Identify critical activities. General Contractor shall provide this initial baseline CPM to each Prime Contractor for review, acceptance, and sign-off. Prepare and include tabulated reports showing the following:
1. Contractor or subcontractor and the Work or activity.
 2. Description of activity.
 3. Main events of activity.
 4. Immediate preceding and succeeding activities.
 5. Early and late start dates.
 6. Early and late finish dates.
 7. Activity duration in workdays.
 8. Total float or slack time.
 9. Average size of workforce.
- Failure to include any work item required for performance of the work by any Prime Contractor shall not excuse the Contractor from completing all work required within applicable completion dates, regardless of acceptance of the schedule.
- D. Schedule Updating: Each Prime Contractor shall cooperate with the Lead (General) Contractor in the preparation, maintenance, and updating of the Construction Schedule. The Prime Contractors shall provide to the General Contractor all proposed sequences of operations, time estimates to complete operations, and other data required for the development, updating, and maintenance of the Construction Schedule until the final completion of the Project. Include all required data from subcontractors, material suppliers, and vendors. Concurrent with making revisions to schedule, prepare tabulated reports showing the following:
1. Identification of activities that have changed.
 2. Changes in early and late start dates.

3. Changes in early and late finish dates.
4. Changes in activity durations in workdays.
5. Changes in the critical path.
6. Changes in total float or slack time.
7. Changes in the Contract Time.

E. Value Summaries: Prepare two cumulative value lists, sorted by finish dates.

1. In first list, tabulate activity number, early finish date, dollar value, and cumulative dollar value.
2. In second list, tabulate activity number, late finish date, dollar value, and cumulative dollar value.
3. In subsequent issues of both lists, substitute actual finish dates for activities completed as of list date.
4. Prepare list for ease of comparison with payment requests; coordinate timing with progress meetings.
 - a. In both value summary lists, tabulate "actual percent complete" and "cumulative value completed" with total at bottom.
 - b. Submit value summary printouts at each regularly scheduled progress meeting.

2.4 REPORTS

A. Daily Construction Reports: Prepare a daily construction report recording the following information:

1. List of subcontractors at Project site.
2. List of separate contractors at Project site.
3. Approximate count of personnel at Project site.
4. Equipment at Project site.
5. Material deliveries.
6. Equipment or system tests and startups.

B. Material Location Reports: For each Progress Meeting, prepare and submit a comprehensive list of materials delivered to and stored at Project site. List shall be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project site. Indicate the following categories for stored materials:

1. Material stored prior to previous report and remaining in storage.
2. Material stored prior to previous report and since removed from storage and installed.
3. Material stored following previous report and remaining in storage.

C. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

2.5 SPECIAL REPORTS

A. General: Submit special reports directly to Owner within one day(s) of an occurrence. Distribute copies of report to parties affected by the occurrence.

B. Reporting Unusual Events: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, response by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.

PART 3 - EXECUTION

3.1 SOFTWARE

A. The schedule shall be developed in scheduling software acceptable to Construction Manager and Architect.

3.2 CONTRACTORS' COMBINED CONSTRUCTION SCHEDULE

- A. Lead (General) Contractor is to complete the Contractor's Combined Construction Schedule using the Critical Path Method. Complete the CPM Schedule prior to request of Initial Application for Payment, but no later than 30 days after Notice to Proceed.
1. Prior to the Lead Contractor issuing any revisions and/or updates to the Schedule, all Prime Contractors shall collectively exchange information necessary for the General Contractor to publish the next schedule; such exchange shall be within five (5) days of the General Contractor's issuance of a revised Construction Schedule.
- B. Schedule Updating: At monthly intervals, and at the request of the Construction Manager, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.
1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
 2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
 3. As the Work progresses, indicate final completion percentage for each activity.
- C. Distribution: Distribute copies of approved schedule to Architect, Construction Manager, Owner, separate Prime Contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.
1. Post copies in Project meeting room and temporary field offices.
 2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.
- D. RECOVERY:- Time is of the essence for the completion of the Work. If the Architect, the Construction Manager, and/or the Owner determines that a Prime Contractor is not maintaining adequate progress, the Prime Contractor will be required to prepare a Recovery Plan and Recovery Schedule.
1. Submit recovery plan and recovery schedule within 7 calendar days of notification. Include activities and resource loading to demonstrate the Prime Contractor's plan to recover progress. No payment applications will be processed without submission and approval of the recovery schedule.
 2. There will be no extensions of time on the project. If it becomes apparent that the contractor will not meet any one of the completion dates, some, or all of the following recovery plans are to be instituted by the contractor at no charge to the Owner:
 - a. Increase manpower.
 - b. Increase man-hours per shift, shifts per workday, days per work week, or any combination thereof. Additional cost for Architect, Architect's consultants, Owner or Owner's representatives for overtime or shift work is the responsibility of the Contractor.
 - c. Increase construction equipment or expedite material deliveries.
 - d. Revise the scheduled sequencing of tasks to put project back on schedule.
 - e. If the contractor fails to institute a recovery plan within 7 days from written notice, which will return the project to the original schedule, appropriate action may be taken involving contractual commitments and performance bonds.

END OF SECTION 01 3200

SECTION 01 3233 - PHOTOGRAPHIC DOCUMENTATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for the following:
 - 1. Preconstruction photographs.
 - 2. Concealed Work photographs.
 - 3. Periodic construction photographs.
 - 4. Final Completion construction photographs.
 - 5. Preconstruction video recordings.
 - 6. Periodic construction video recordings.
- B. Related Requirements:
 - 1. Section 01 7700 "Closeout Procedures" for submitting photographic documentation as Project Record Documents at Project closeout.
 - 2. Section 01 7900 "Demonstration and Training" for submitting video recordings of demonstration of equipment and training of Owner's personnel.
 - 3. Section 02 4113 "Site Demolition" for photographic documentation before site demolition operations commence.
 - 4. Section 02 4119 "Selective Demolition" for photographic documentation before selective demolition operations commence.
 - 5. Sections 31 1000 "Site Clearing and Preparation" for photographic documentation before site clearing operations commence.

1.2 INFORMATIONAL SUBMITTALS

- A. Key Plan: Submit key plan of Project site and building with notation of vantage points marked for location and direction of each photograph and video recording. Indicate elevation or story of construction. Include same information as corresponding photographic documentation.
- B. Digital Photographs: Upload image files within three days of taking photographs.
 - 1. Submit photos electronically. Include copy of key plan indicating each photograph's location and direction.
 - 2. Identification: Provide the following information with each image description:
 - a. Name of Project.
 - b. Name and contact information for photographer.
 - c. Name of Architect
 - d. Name of Contractor.
 - e. Date photograph was taken.
 - f. Description of location, vantage point, and direction.
 - g. Unique sequential identifier keyed to accompanying key plan.

- C. Video Recordings: Submit video recordings within three days of recording.
 - 1. Submit video recordings electronically. Include copy of key plan indicating each video's location and direction.
 - 2. Identification: With each submittal, provide the following information:]:
 - a. Name of Project.
 - b. Name and address of photographer.
 - c. Name of Architect
 - d. Name of Contractor.
 - e. Date video recording was recorded.
 - f. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.

1.3 FORMATS AND MEDIA

- A. Digital Photographs: Provide color images in JPG format, produced by a digital camera with minimum sensor size of 12 megapixels, and at an image resolution of not less than 3200 by 2400 pixels, and with vibration-reduction technology. Use flash in low light levels or backlit conditions.
- B. Digital Video Recordings: Provide high-resolution, digital video in MPEG or .MOV format, produced by a digital camera with minimum sensor resolution of 12 megapixels and capable of recording in full high-definition mode with vibration-reduction technology. Provide supplemental lighting in low light levels or backlit conditions.
- C. Digital Images: Submit digital media as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.
- D. File Names: Name media files with date, keyed Project area, and sequential numbering suffix.

1.4 CONSTRUCTION PHOTOGRAPHS

- A. General: Take photographs with maximum depth of field and in focus.
 - 1. Each Prime Contractor shall take photographs before construction commences, during construction, and of finished work.
 - 2. Maintain key plan with each set of construction photographs that identifies each photographic location.
- B. Preconstruction Photographs: Before commencement of the Work, take photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points, as directed by Construction Manager and Architect.
 - 1. Flag excavation areas and construction limits before taking construction photographs.
 - 2. Take 25 photographs to show existing conditions adjacent to property before starting the Work.
 - 3. Take additional photographs as required to record settlement or cracking of adjacent structures, pavements, and improvements.
- C. Concealed Work Photographs: Before proceeding with installing work that will conceal other work, take photographs sufficient in number, with annotated descriptions, to record nature and location of concealed Work, including, but not limited to, the following:
 - 1. Underground and underslab utilities.
 - 2. Underslab installations, including insulation and vapor barrier continuity.
 - 3. Piping (water, storm, sanitary, gas, other utilities and services).
 - 4. Electrical, data, fiberoptic conduit.
 - 5. Flashing, waterproofing, and weather-resistant barriers, including penetrations,

6. Air barrier and continuous insulation, including penetration treatments and continuity.
 7. Structural steel and connections.
 8. Penetration and joint fireproofing, including top of wall and edge of slab continuity.
- D. Periodic Construction Photographs: Take at least 50 photographs coinciding with the cutoff date associated with each Application for Payment. Select vantage points to show status of construction and progress since last photographs were taken.
1. Additional periodic off-site photographs, as applicable. These photographs are not subject to unit prices or unit-cost allowances:
 - a. Photographs taken at fabrication locations away from Project site.
 - b. Photographs of materials included in Application for Payment and stored off-site
- E. Additional Photographs: Architect or Construction Manager may request photographs in addition to periodic photographs specified.
1. Three days' notice will be given, where feasible.
 2. In emergency situations, take additional photographs within 24 hours of request.
 3. Circumstances that could require additional photographs include, but are not limited to, the following:
 - a. Special events planned at Project site.
 - b. Immediate follow-up when on-site events result in construction damage or losses.
 - c. Substantial Completion of a major phase or component of the Work.
 - d. Extra record photographs at time of final acceptance.
 - e. Owner's request for special publicity photographs.
- F. Final Completion Construction Photographs: Take at least 50 photographs after date of Substantial Completion for submission as Project Record Documents.

1.5 CONSTRUCTION VIDEO RECORDINGS

- A. Video Recording Photographer: Engage a qualified videographer to record construction video recordings.
- B. Narration: Describe scenes on video recording by audio narration by microphone while video recording, or dubbing audio narration off site after video is recorded. Include description of items being viewed, recent events, and planned activities. At each change in location, describe vantage point, location, direction (by compass point), and elevation or story of construction.
1. Confirm date and time at beginning and end of recording.
 2. Begin each video recording with name of Project, Contractor's name, videographer's name, and Project location.
- C. Transcript: Provide a typed transcript of the narration. Display images and running time captured from video recording opposite the corresponding narration segment.

- D. Preconstruction Video Recording: Before starting any construction phase, record video of Project site and surrounding properties from different vantage points.
- E. Periodic Construction Video Recordings: Record video monthly. Select vantage points to show status of construction and progress since last video recordings were recorded. Minimum recording time shall be **30** minutes.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 3233

SECTION 01 3300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Submittal schedule requirements.
 2. Administrative and procedural requirements for submittals.

1.2 DEFINITIONS

- A. Action Submittals: Written and graphic information and physical samples that require Architect's and Construction Manager'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 or Construction Manager'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."

1.3 SUBMITTAL SCHEDULE

- A. Submittal Schedule: Contractor shall submit, as an action submittal, a list of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and Construction Manager and additional time for handling and reviewing submittals required by those corrections.
1. Submit submittal schedule within 30 days of Award of Contract.
 2. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
 3. Initial Submittal Schedule: Submit within 14 days of Notice to Proceed. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
 4. Final Submittal Schedule: Submit concurrently with the first complete submittal of Contractor's construction schedule.
 - a. Submit revised submittal schedule as required to reflect changes in current status and timing for submittals.
 5. Format: Arrange the following information in a tabular format:
 - a. Scheduled date for first submittal.
 - b. Specification Section number and title.
 - c. Submittal Category: Action; informational.
 - d. Name of subcontractor.
 - e. Description of the Work covered.
 - f. Scheduled date for Architect's and Construction Manager's final release or approval.
 - g. Scheduled dates for purchasing.
 - h. Scheduled date of fabrication.
 - i. Scheduled dates for installation.
 - j. Activity or event number.

1.4 SUBMITTAL FORMATS

- A. Submittal Information: Include the following information in each submittal:
1. Project name.
 2. Date.
 3. Name of Architect and Construction Manager.
 4. Name of Contractor.
 5. Submitting Contractor's approval stamp.
 6. Name of firm or entity that prepared submittal.
 7. Names of subcontractor, manufacturer, and supplier.
 8. Unique submittal number, including revision identifier.
 - a. Observe DRAW Collective standards. Include Specification Section number with sequential alphanumeric identifier and alphanumeric suffix for resubmittals.
 9. Category and type of submittal.
 10. Submittal purpose and description.
 11. Number and title of Specification Section, with paragraph number and generic name for each of multiple items.
 12. Drawing number and detail references, as appropriate.
 13. Indication of full or partial submittal.
 14. Location(s) where product is to be installed, as appropriate.
 15. Other necessary identification.
 16. Remarks.
 17. Signature of transmitter.
- B. Options: Identify options requiring selection by Architect.
- C. Deviations and Additional Information: On each submittal, clearly indicate deviations from requirements in the Contract Documents, including minor variations and limitations; include relevant additional information and revisions, other than those requested by Architect or Construction Manager on previous submittals. Indicate by highlighting on each submittal or noting on attached separate sheet.
- D. Submittals Utilizing Web-Based Project Software: Prepare submittals as PDF files or other format indicated by Project management software.

1.5 SUBMITTAL PROCEDURES

- A. Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
1. Prepare submittals as PDF package and upload to web-based Project management software website.
 - a. Include PDF transmittal form or enter required data in web-based software site, as applicable, to fully identify submittal.
 - b. Architect will return annotated file and retain copy of file as a digital Project Record Document file.
- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
 3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.

4. Coordinate transmittal of submittals for related parts of the Work specified in different Sections, so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Architect and Construction Manager reserve the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on both Architect's and Construction Manager's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
 1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
 - a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
 2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
 3. Resubmittal Review: Allow 15 days for review of each resubmittal.
 4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 21 days for initial review of each submittal.
- D. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
 1. Note date and content of previous submittal.
 2. Note date and content of revision in label or title block, and clearly indicate extent of revision.
 3. Indicate revision number as a suffix to unique submittal number.
 4. Resubmit submittals until they are marked with approval notation from Architect's and Construction Manager's action stamp.
- E. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- F. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's action stamp.

1.6 SUBMITTAL REQUIREMENTS

- A. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
 1. If information must be specially prepared for submittal because standard published data are unsuitable for use, submit as Shop Drawings, not as Product Data.
 2. Mark each copy of each submittal to show which products and options are applicable.
 3. Include the following information, as applicable:
 - a. Manufacturer's catalog cuts, technical data sheets, product specifications.
 - b. Standard color charts.
 - c. Statement of compliance with specified referenced standards.
 - d. Testing by recognized testing agency.
 - e. Application of testing agency labels and seals.
 - f. Notation of coordination requirements.
 - g. Availability and delivery time information.
 4. For equipment, include the following in addition to the above, as applicable:
 - a. Wiring diagrams that show factory-installed wiring.
 - b. Printed performance curves.

- c. Operational range diagrams.
 - d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
 - 5. Submit Product Data before Shop Drawings, and before or concurrently with Samples.
- B. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data unless submittal based on Architect's digital data drawing files is otherwise permitted.
 - 1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
 - a. Identification of products.
 - b. Schedules.
 - c. Compliance with specified standards.
 - d. Notation of coordination requirements.
 - e. Notation of dimensions established by field measurement.
 - f. Relationship and attachment to adjoining construction clearly indicated.
 - g. Seal and signature of professional engineer if specified.
- C. Samples: Submit Samples for review of type, color, pattern, and texture for a check of these characteristics with other materials.
 - 1. Transmit Samples that contain multiple, related components, such as accessories together in one submittal package.
 - 2. Identification: Permanently attach label on unexposed side of Samples that includes the following:
 - a. Project name and submittal number.
 - b. Generic description of Sample.
 - c. Product name and name of manufacturer.
 - d. Sample source.
 - e. Number and title of applicable Specification Section.
 - f. Specification paragraph number and generic name of each item.
 - 3. Electronic Transmittal: Provide PDF transmittal. Include digital image file illustrating Sample characteristics and identification information for record.
 - a. Enter required data in web-based software site to fully identify submittal.
 - b. Include PDF transmittal, including complete submittal information indicated.
 - 4. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
 - a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
 - b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
 - 5. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units, showing the full range of colors, textures, and patterns available.
 - a. Number of Samples: Submit two full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect, through Construction Manager, will return submittal with options selected.

6. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
 - a. Number of Samples: Submit three sets of Samples. Architect and Construction Manager will each retain one Sample set; remainder will be returned. Mark up and retain one returned Sample set as a project record Sample.
 - 1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
 - 2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.
- D. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
 1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
 2. Manufacturer and product name, and model number if applicable.
 3. Number and name of room or space.
 4. Location within room or space.
- E. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.
- F. Design Data: Prepare and submit written and graphic information indicating compliance with indicated performance and design criteria in individual Specification Sections. Include list of assumptions and summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Number each page of submittal.
- G. Certificates:
 1. Certificates and Certifications Submittals: Submit 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. Provide a notarized signature where indicated.
 2. Installer Certificates: Submit written statements on manufacturer's letterhead, certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
 3. Manufacturer Certificates: Submit written statements on manufacturer's letterhead, certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
 4. Material Certificates: Submit written statements on manufacturer's letterhead, certifying that material complies with requirements in the Contract Documents.
 5. Product Certificates: Submit written statements on manufacturer's letterhead, certifying that product complies with requirements in the Contract Documents.
 6. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of AWS B2.1/B2.1M on AWS forms. Include names of firms and personnel certified.
- H. Test and Research Reports:
 1. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for substrate preparation and primers required.

2. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
3. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
4. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
5. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
6. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
 - a. Name of evaluation organization.
 - b. Date of evaluation.
 - c. Time period when report is in effect.
 - d. Product and manufacturers' names.
 - e. Description of product.
 - f. Test procedures and results.
 - g. Limitations of use.

1.7 CONTRACTOR'S USE OF ARCHITECT'S CAD FILES

- A. General: At Contractor's written request, copies of Architect's CAD files may be provided to Contractor, for Contractor's use in connection with Project shop drawings, subject to the conditions on the request form.
 1. Obtain request form from Architect and complete the information requested on the form.

1.8 DELEGATED-DESIGN SERVICES

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
 1. If criteria indicated are insufficient to perform services or certification required, submit a written request for additional information to Architect.
- B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF file and three paper copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
 1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 2 - PRODUCTS

2.1 ACTION SUBMITTALS

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

- B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
1. If information must be specially prepared for submittal because standard printed data are not suitable for use, submit as Shop Drawings, not as Product Data.
 2. Mark each copy of each submittal to show which products and options are applicable, making appropriate reference to specification Section Number, Article and Paragraph.
 3. Include the following information, as applicable:
 - a. Manufacturer's written recommendations.
 - b. Manufacturer's product specifications.
 - c. Manufacturer's installation instructions.
 - d. Manufacturer's color charts, as required by Contract Documents
 - e. Manufacturer's catalog cuts.
 - f. Wiring diagrams showing factory-installed wiring.
 - g. Standard product operating and maintenance manuals.
 - h. Compliance with recognized trade association standards.
 - i. Notation of coordination requirements.
- C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data, unless submittal of drawings adapted from Architect's CAD/BIM Drawings are otherwise permitted.
1. Preparation: Include the following information, as applicable:
 - a. Dimensions.
 - b. Identification of products.
 - c. Roughing-in and setting diagrams.
 - d. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring.
 - e. Compliance with specified standards.
 - f. Notation of coordination requirements.
 - g. Relationship to adjoining construction clearly indicated.
 - h. Seal and signature of professional engineer, if specified.
 - i. Notation of coordination requirements.
 - j. Notation of dimensions established by field measurement.
 2. Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring.
 3. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches but no larger than 30 by 40 inches.
- D. Coordination Drawings: Comply with requirements in Division 01 Section "Project Management and Coordination."
- E. Samples: Prepare physical units of materials or products, including the following:
1. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
 2. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from the same material to be used for the Work, cured and finished in manner specified, and physically identical with the product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
 - a. Submit Samples for review of kind, color, pattern, and texture for a final check of these characteristics with other elements and for a comparison of these characteristics between final submittal and actual component as delivered and installed.
 - b. Submit a single sample where assembly characteristics, workmanship, fabrication techniques, connections, or operations are to be demonstrated. Sample will be retained by Architect.

3. Preparation: Mount, display, or package Samples in manner specified to facilitate review of qualities indicated. Prepare Samples to match Architect's sample where so indicated. Attach label on unexposed side that includes the following:
 - a. Generic description of Sample.
 - b. Product name or name of manufacturer.
 - c. Sample source.
 - d. Number and title of appropriate Specification Section.
 4. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
 - a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
 - b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
- F. Product Schedule or List: Prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
1. Type of product. Include unique identifier for each product.
 2. Number and name of room or space.
 3. Location within room or space.
- G. Delegated-Design Submittal: Comply with requirements in Division 01 Section "Quality Requirements."
- H. Application for Payment: Comply with requirements in Division 01 Section "Modification and Payment Procedures."
- I. Schedule of Values: Comply with requirements in Division 01 Section "Modification and Payment Procedures."
- J. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
1. Name, address, and telephone number of entity performing subcontract or supplying products.
 2. Number and title of related Specification Section(s) covered by subcontract.
 3. Drawing number and detail references, as appropriate, covered by subcontract.

2.2 INFORMATIONAL SUBMITTALS

- A. Prepare and submit Informational Submittals required by other Specification Sections.
1. Number of Copies: Submit electronically, as with Action Submittals, except that Architect will log and acknowledge receipt but is not obligated to return processed Informational Submittal.
 2. Certificates and Certifications: Provide a notarized statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
 3. Test and Inspection Reports: Comply with requirements in Division 01 Section "Quality Requirements."
- B. Contractors Combined Construction Schedule: Comply with requirements in Division 01 Section "Construction Progress Documentation."
- C. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

- D. Product Certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements.
- E. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements. Submit record of Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) on AWS forms. Include names of firms and personnel certified.
- F. Installer Certificates: Prepare written statements on manufacturer's letterhead certifying that Installer complies with requirements and, where required, is authorized for this specific Project.
- G. Manufacturer Certificates: Prepare written statements on manufacturer's letterhead certifying that manufacturer complies with requirements. Include evidence of manufacturing experience where required.
- H. Material Certificates: Prepare written statements on manufacturer's letterhead certifying that material complies with requirements.
- I. Preconstruction Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements.
- J. Compatibility Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
- K. Field Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
- L. Design Data: Prepare written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations.
 - 1. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.
- M. Maintenance Data: Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment. Comply with requirements in Division 01 Section "Operation and Maintenance Data."
- N. Manufacturer's Instructions: Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer. Include the following, as applicable:
 - 1. Preparation of substrates.
 - 2. Required substrate tolerances.
 - 3. Sequence of installation or erection.
 - 4. Required installation tolerances.
 - 5. Required adjustments.
 - 6. Recommendations for cleaning and protection.
- O. Manufacturer's Field Reports: Prepare written information documenting factory-authorized service representative's tests and inspections. Include the following, as applicable:
 - 1. Name, address, and telephone number of factory-authorized service representative making report.
 - 2. Statement on condition of substrates and their acceptability for installation of product.
 - 3. Statement that products at Project site comply with requirements.
 - 4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.

5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 6. Statement as to whether conditions, products, and installation will affect warranty.
 7. Other required items indicated in individual Specification Sections.
- P. Insurance Certificates and Bonds: Prepare written information indicating current status of insurance or bonding coverage. Include name of entity covered by insurance or bond, limits of coverage, amounts of deductibles, if any, and term of the coverage.
- Q. Construction Photographs and/or Video recordings: Comply with requirements in Division 01 Section Selective Demolition.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

- A. Action Submittals and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect and Construction Manager.
- B. Contractor's Approval: Indicate Contractor's approval for each submittal with indication in web-based Project management software. Include name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.
1. Architect, Architect's consultants, and Construction Manager will not review submittals received from Contractor that do not have Contractor's review and approval.

3.2 ARCHITECT'S AND CONSTRUCTION MANAGER'S REVIEW

- A. Architect and Construction Manager will not review submittals that do not bear Contractor's approval stamp and will return them without action.
- B. Action Submittals: Architect and Construction Manager will review each submittal, indicate corrections or revisions required, and return.
- C. Informational Submittals: Architect and Construction Manager will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.
- D. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.
- E. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.
- F. Submittals received from sources other than Contractor will be returned without action.
- G. Submittals not required by the Contract Documents will be returned without action.

END OF SECTION 01 3300

SECTION 01 4000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspection services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
- C. Specific quality-assurance and quality-control requirements for individual work results are specified in their respective Specification Sections. Requirements in individual Sections may also cover production of standard products.
- D. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and quality-control procedures that facilitate compliance with the Contract Document requirements.
- E. Requirements for Contractor to provide quality-assurance and quality-control services required by Architect, Owner, Construction Manager, or authorities having jurisdiction are not limited by provisions of this Section.

1.2 DEFINITIONS

- A. Experienced: When used with an entity or individual, "experienced," unless otherwise further described, means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.
- B. Field Quality-Control Tests and Inspections: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- C. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, subcontractor, or sub-subcontractor, to perform a particular construction operation, including installation, erection, application, assembly, and similar operations.
 - 1. Use of trade-specific terminology in referring to a Work result does not require that certain construction activities specified apply exclusively to specific trade(s).
- D. Mockups: Full-size physical assemblies that are constructed either as freestanding temporary built elements or as part of permanent construction.
 - 1. Mockups are constructed to:
 - a. Verify selections made under Sample submittals
 - b. Demonstrate aesthetic effects and qualities of materials and execution
 - c. Review coordination, testing, or operation
 - d. Show interface between dissimilar materials
 - e. Demonstrate compliance with specified installation tolerances.
 - 2. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.

3. Integrated Exterior Mockups: Mockups of the exterior envelope constructed on-site as freestanding temporary built elements, consisting of multiple products, assemblies, and subassemblies, with cutaways enabling inspection of concealed portions of the Work.
 - a. Include each system, assembly, component, and part of the exterior wall and roof to be constructed for the Project. Colors of components shall be those selected by the Architect for use in the Project.
 - b. Where directed, sequence construction of mockup to allow for interim viewing and acceptance of stages of the Work.
 4. Product Mockups: Mockups that may include multiple products, materials, or systems specified in a single Section.
 5. In-Place Mockups: Mockups constructed on-site in their actual final location as part of permanent construction.
- E. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria. Unless otherwise indicated, copies of reports of tests or inspections performed for other than the Project do not meet this definition.
- F. Product Tests: Tests and inspections that are performed by a nationally recognized testing laboratory (NRTL) according to 29 CFR 1910.7, by a testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program (NVLAP), or by a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.
- G. Source Quality-Control Tests and Inspections: Tests and inspections that are performed at the source (e.g., plant, mill, factory, or shop).
- H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. The term "testing laboratory" shall have the same meaning as the term "testing agency."
- I. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work, to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- J. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work, to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Contractor's quality-control services do not include contract administration activities performed by Architect or Construction Manager.

1.3 DELEGATED-DESIGN SERVICES

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
 1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.
- B. Delegated-Design Services Statement: Submit a statement signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional, indicating that the products and systems are in compliance with performance and design criteria indicated. Include list of codes, loads, and other factors used in performing these services.

1.4 CONFLICTING REQUIREMENTS

- A. Conflicting Standards and Other Requirements: If compliance with two or more standards or requirements is specified and the standards or requirements establish different or conflicting requirements for minimum quantities or

quality levels, inform the Architect regarding the conflict and obtain clarification prior to proceeding with the Work. Refer conflicting requirements that are different, but apparently equal, to Architect for clarification before proceeding.

- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.5 INFORMATIONAL SUBMITTALS

- A. Contractor's Quality-Control Plan: For quality-assurance and quality-control activities and responsibilities.
- B. Qualification Data: For Contractor's quality-control personnel.
- C. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility submitted to authorities having jurisdiction before starting work on the following systems:
 - 1. Seismic-force-resisting system, designated seismic system, or component listed in the Statement of Special Inspections.
 - 2. Primary wind-force-resisting system or a wind-resisting component listed in the Statement of Special Inspections.
- D. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
- E. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
 - 1. Specification Section number and title.
 - 2. Entity responsible for performing tests and inspections.
 - 3. Description of test and inspection.
 - 4. Identification of applicable standards.
 - 5. Identification of test and inspection methods.
 - 6. Number of tests and inspections required.
 - 7. Time schedule or time span for tests and inspections.
 - 8. Requirements for obtaining samples.
 - 9. Unique characteristics of each quality-control service.
- F. Delegated-Design Submittal: In addition to Shop Drawings, Product Data, and other required submittals, submit a statement, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional, indicating that the products and systems comply with performance and design criteria indicated. Include list of codes, loads, and other factors used in performing these services.
- G. Permits, Licenses, and Certificates: For Owner's record, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents established for compliance with standards and regulations bearing on performance of the Work.

1.6 CONTRACTOR'S QUALITY-CONTROL PLAN

- A. Quality-Control Plan, General: Submit quality-control plan within 10 days of Notice to Proceed, and not less than five days prior to preconstruction conference. Submit in format acceptable to Architect. Identify personnel, procedures, controls, instructions, tests, records, and forms to be used to carry out Contractor's quality-assurance and quality-

control responsibilities and to coordinate Owner's quality-assurance and quality-control activities. Coordinate with Contractor's Construction Schedule.

- B. Quality-Control Personnel Qualifications: Engage qualified personnel trained and experienced in managing and executing quality-assurance and quality-control procedures similar in nature and extent to those required for Project.
 - 1. Project quality-control manager may also serve as Project superintendent.
- C. Submittal Procedure: Describe procedures for ensuring compliance with requirements through review and management of submittal process. Indicate qualifications of personnel responsible for submittal review.
- D. Testing and Inspection: In quality-control plan, include a comprehensive schedule of Work requiring testing or inspection, including the following:
 - 1. Contractor-performed tests and inspections, including subcontractor-performed tests and inspections. Include required tests and inspections and Contractor-elected tests and inspections. Distinguish source quality-control tests and inspections from field quality-control tests and inspections.
 - 2. Special inspections required by authorities having jurisdiction and indicated on the Statement of Special Inspections.
 - 3. Owner-performed tests and inspections indicated in the Contract Documents.
- E. Continuous Inspection of Workmanship: Describe process for continuous inspection during construction to identify and correct deficiencies in workmanship in addition to testing and inspection specified. Indicate types of corrective actions to be required to bring the Work into compliance with standards of workmanship established by Contract requirements and approved mockups.
- F. Monitoring and Documentation: Maintain testing and inspection reports, including log of approved and rejected results. Include Work Architect has indicated as nonconforming or defective. Indicate corrective actions taken to bring nonconforming Work into compliance with requirements. Comply with requirements of authorities having jurisdiction.

1.7 REPORTS AND DOCUMENTS

- A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:
 - 1. Date of issue.
 - 2. Project title and number.
 - 3. Name, address, telephone number, and email address of testing agency.
 - 4. Dates and locations of samples and tests or inspections.
 - 5. Names of individuals making tests and inspections.
 - 6. Description of the Work and test and inspection method.
 - 7. Identification of product and Specification Section.
 - 8. Complete test or inspection data.
 - 9. Test and inspection results and an interpretation of test results.
 - 10. Record of temperature and weather conditions at time of sample-taking and testing and inspection.
 - 11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
 - 12. Name and signature of laboratory inspector.
 - 13. Recommendations on retesting and reinspecting.
- B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:
 - 1. Name, address, telephone number, and email address of technical representative making report.
 - 2. Statement on condition of substrates and their acceptability for installation of product.
 - 3. Statement that products at Project site comply with requirements.

4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
 5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 6. Statement of whether conditions, products, and installation will affect warranty.
 7. Other required items indicated in individual Specification Sections.
- C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:
1. Name, address, telephone number, and email address of factory-authorized service representative making report.
 2. Statement that equipment complies with requirements.
 3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 4. Statement of whether conditions, products, and installation will affect warranty.
 5. Other required items indicated in individual Specification Sections.

1.8 QUALITY ASSURANCE

- A. Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units. As applicable, procure products from manufacturers able to meet qualification requirements, warranty requirements, and technical or factory-authorized service representative requirements.
- C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. Installer Qualifications: A firm or individual experienced in installing, erecting, applying, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- E. Professional Engineer Qualifications: A professional engineer who is licensed to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that is similar in material, design, and extent to those indicated for this Project.
- F. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged in the activities indicated.
1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.
- G. Testing and Inspecting Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspection indicated, as documented in accordance with ASTM E329, and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.
- H. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

- I. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect, demonstrate, repair, and perform service on installations of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- J. Preconstruction Testing, when required: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following Contractor's responsibilities, including the following:
 - 1. Provide test specimens representative of proposed products and construction.
 - 2. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
 - 3. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
 - 4. When required, build site-assembled test assemblies and mockups, using installers who will perform same tasks for Project.
 - 5. When required, build laboratory mockups at testing facility, using personnel, products, and methods of construction indicated for the completed Work.
 - 6. When testing is complete, remove test specimens and test assemblies, and mockups; do not reuse products on Project.
 - 7. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect, through Construction Manager, with copy to Contractor. Interpret tests and inspections, and state in each report whether tested and inspected Work complies with or deviates from the Contract Documents.
- K. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
 - 1. Build mockups of size indicated. Refer to 'Mockup Notes' on Drawings.
 - 2. Build mockups in location indicated or, if not indicated, as directed by Architect or Construction Manager.
 - 3. Notify Architect and Construction Manager seven days in advance of dates and times when mockups will be constructed.
 - 4. Employ supervisory personnel who will oversee mockup construction. Employ workers who will be employed to perform same tasks during the construction at Project.
 - 5. Demonstrate the proposed range of aesthetic effects and workmanship.
 - 6. Obtain Architect's and Construction Manager's approval of mockups before starting corresponding Work, fabrication, or construction.
 - a. Allow seven days for initial review and each re-review of each mockup.
 - 7. Promptly correct unsatisfactory conditions noted by Architect's preliminary review, to the satisfaction of the Architect, before completion of final mockup.
 - 8. Approval of mockups by the Architect does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 9. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 - 10. Demolish and remove mockups when directed unless otherwise indicated.
- L. Integrated Exterior Mockups, as required: Construct integrated exterior mockup as indicated on Drawings. Coordinate installation of exterior envelope materials and products for which mockups are required in individual Specification Sections, along with supporting materials. Comply with requirements in "Mockups" Paragraph.
 - 1. Coordinate construction of the mockup to allow observation of air barrier installation, flashings, air barrier integration with fenestration systems, and other portions of the building air/moisture barrier and drainage assemblies, prior to installation of veneer, cladding elements, and other components that will obscure the work.

1.9 QUALITY CONTROL

- A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspection they are engaged to perform.
 2. Costs for retesting and reinspecting construction that replaces or is necessitated by Work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.
- B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities, whether specified or not, to verify and document that the Work complies with requirements.
1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
 - a. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
 2. Engage a qualified testing agency to perform quality-control services.
 - a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
 3. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspection will be performed.
 4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
 5. Testing and inspection requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
 6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
 7. Special tests and inspections performed by the Owner shall not negate the Contractor's responsibility for Contractor's testing and reporting.
- C. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.
- D. Testing Agency Responsibilities: Cooperate with Architect, Construction Manager, and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
1. Notify Architect, Construction Manager, and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
 2. Determine the locations from which test samples will be taken and in which in-situ tests are conducted.
 3. Conduct and interpret tests and inspections, and state in each report whether tested and inspected Work complies with or deviates from requirements.
 4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
 5. Do not release, revoke, alter, or increase the Contract Document requirements, or approve or accept any portion of the Work.
 6. Do not perform duties of Contractor.
- E. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 01 3300 "Submittal Procedures."
1. Manufacturer's authorized representative shall attend applicable pre-installation conferences and at intervals necessary to ensure components are installed according to the Manufacturer's standards and according to the Manufacturer's instructions.

- F. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.
- G. Contractor's Associated Requirements and Services: Cooperate with agencies and representatives performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
 - 1. Access to the Work.
 - 2. Incidental labor and facilities necessary to facilitate tests and inspections.
 - 3. Adequate quantities of representative samples of materials that require testing and inspection. Assist agency in obtaining samples.
 - 4. Facilities for storage and field curing of test samples.
 - 5. Delivery of samples to testing agencies, unless testing agency is contracted to pick up samples from site.
 - 6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
 - 7. Security and protection for samples and for testing and inspection equipment at Project site.
- H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and quality-control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspection.
 - 1. Schedule times for tests, inspections, obtaining samples, and similar activities.
- I. Schedule of Contractor-engaged Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents as a component of Contractor's quality-control plan. Coordinate and submit concurrently with Contractor's Construction Schedule. Update and submit with each Application for Payment.
 - 1. Schedule Contents: Include tests, inspections, and quality-control services, including Contractor- and Owner-retained services, commissioning activities, and other Project-required services paid for by other entities.
 - 2. Distribution: Distribute schedule to Owner, Construction Manager, Architect, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

1.10 SPECIAL TESTS AND INSPECTIONS

- A. Special Tests and Inspections: Owner will engage a qualified testing agency to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner, and as follows:
 - 1. Notifying Architect, Construction Manager, and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
 - 2. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect, through Construction Manager, with copy to Contractor and to authorities having jurisdiction.
 - 3. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
 - 4. Interpreting tests and inspections, and stating in each report whether tested and inspected Work complies with or deviates from the Contract Documents.
 - 5. Retesting and reinspecting corrected Work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

- A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:
 - 1. Date test or inspection was conducted.
 - 2. Description of the Work tested or inspected.
 - 3. Date test or inspection results were transmitted to Architect.
 - 4. Identification of testing agency or special inspector conducting test or inspection.
- B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect's, Construction Manager's, and authorities' having jurisdiction reference during normal working hours.
 - 1. Submit log at Project closeout as part of Project Record Documents.

3.2 REPAIR AND PROTECTION

- A. General: On completion of testing, inspection, sample-taking, and similar services, repair damaged construction and restore substrates and finishes.
 - 1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 01 7300 "Execution."
- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 01 4000

SECTION 01 4100 - REGULATORY REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. This section specifies Federal and State statutes, rules, and regulations that must be followed during execution of Project Work.

1.2 REGULATORY REQUIREMENTS

- A. Abide by and follow applicable Federal, State and local codes.
- B. Access for Persons with Physical Disabilities: Follow ICC/ANSI A117.1 and ADA including ADA Accessibility Guidelines.
- C. Fully comply with Act 247 of 1972 Session of General Assembly of Commonwealth of Pennsylvania, and ensure compliance by lower tier contractors.
- D. Discrimination Prohibited: According to 62 Pa. C.S.A. § 3701, Contractor agrees that:
 - 1. In the hiring of employees for the performance of Work under the Contract or any subcontract, no contractor, subcontractor, or any person acting on behalf of the Contractor or subcontractor may by reason of gender, race, creed, or color discriminate against any citizen of this Commonwealth who is qualified and available to perform the work to which the employment relates.
 - 2. No Contractor or subcontractor or any person on their behalf may in any manner discriminate against or intimidate any employee hired for the performance of Work under the Contract on account of gender, race, creed, or color.
 - 3. The Contract may be cancelled or terminated by the Owner and all money due or to become due under the Contract may be forfeited for a violation of the terms or conditions of that portion of the Contract.
- E. Human Relations Act: The provisions of the Pennsylvania Human Relations Act, Act 222 of October 27, 1955 (P.L. 744) (43 P.S. Section 951, et. seq.) of the Commonwealth of Pennsylvania prohibit discrimination because of race, color, religious creed, ancestry, age, sex, national origin, handicap, or disability, by employers, employment agencies, labor organizations, contractors, and others. The Contractor agrees to comply with the provisions of this Act as amended that is made part of these Contract Documents. Your attention is directed to the language of the Commonwealth's non-discrimination clause in 16 PA. Code 49.101. Pennsylvania Prevailing Wage Rates: This regulation and the general Pennsylvania prevailing minimum wage rates (Act 442 of 1961, P.L. 987, amended), as determined by the Secretary of Labor and Industry, which must be paid for each craft or classification of workers needed to perform the Contract during the anticipated term thereof in the locality in which public work is performed, are made part of these Contract Documents.
- F. Standard of Quality: The various materials and products specified in the Contract Documents by name or description are given to establish a standard of quality and of cost for bid purposes. It is not the intent to limit the bidder, the bid, or the evaluation of the bid to any one material or product specified but rather to describe the minimum standard. When proprietary names are used, they are followed by the words "or alternatives of the quality necessary to meet the requirements of the Contract Documents." A bid containing an alternative which does not meet the requirements of the Contract Documents may be declared non-responsive. A bid containing an alternative may be accepted but, if an award is made to that a bidder, the bidder is required to replace any alternatives which do not meet the requirements of the Contract Documents.

- G. Provision for the Use of Steel and Steel Products Made in the U.S.: In accordance with Act 3 of the 1978 General Assembly of the Commonwealth of Pennsylvania, if any steel or steel products are to be used or supplied in the performance of the Contract, only those produced in the United States as defined therein may be used or supplied in the performance of the Contract or any subcontracts thereunder.
1. In accordance with Act 161 of 1982, cast iron products are also included and must be produced in the United States. Act 144 of 1984 further defines "steel products" to include machinery and equipment. The act also provides clarifications and penalties.
- H. No Cash Allowances: Cash allowances are prohibited under this Contract.
- I. FBI Federal Criminal History Records for Prospective Employees:
1. (Act No. 114 of 2006; Section 111, Public School Code of Pennsylvania amended effective 1 April 2007). Act 114 of 2006 requires that independent contractors and their employees must provide to their employer a copy of their Federal Criminal History Record from the FBI. Therefore, any person working on this Project and entering upon School District property must present an official Record to the District's Business Office before beginning work. Cost of obtaining an official Record, which may not be more than 1 year old, is the responsibility of Contractors' and lower-tier contractors' employees. Notify lower-tier contractors of these requirements.
- a. PDE contracted with Cogent Systems to manage this program for the Commonwealth of Pennsylvania. The management process includes establishing a website, manning a help desk, and establishing fixed site locations for the taking of and transmitting of applicants' fingerprints.
2. Act 114 of 2006 specifies that employees (independent contractors and their employees) of public and private schools, Intermediate Units, and area vocational-technical schools hired as of 1 April 2007 must have an FBI Federal Criminal History Record. Employees must follow the multiple-step process described below.
- a. The applicant registers before going to the fingerprint site. Walk in service without prior registration is not provided at any fingerprinting location. Registration is completed online or over the phone. Registration is available online 24 hours per day seven days per week at www.pa.cogentid.com. Telephonic registration is available at 1.888.439.2486 Monday through Friday 8 am to 6 pm EST. During the registration process, demographic data for the applicant is collected (name, address, SSN, etc.) so there is no data entry required at the fingerprint collection site.
- b. The applicant pays a \$40.00 fee for the fingerprint service and to secure the Criminal History Record. Applicants may make their payment online at www.pa.cogentid.com using a credit card or debit card. Money orders or cashiers checks payable to Cogent Systems are accepted on site for those applicants who do not have the means to pay electronically. No cash transactions or personal checks are accepted.
- 1) Cogent Systems establishes a billing procedure for these services from an appropriate requesting agency that is willing to pay the applicant's fee. Billing only occurs after the requesting agency has completed the Cogent Systems' Agency Pay Agreement. To establish a billing account, visit the website www.pa.cogentid.com and download an application. The billing account must be established before sending applicants to the fingerprint site.
- c. The applicant proceeds to the fingerprint site of their choice for fingerprinting. The location of the fingerprint sites and days and hours of operation for each site are posted on Cogent Systems' website www.pa.cogentid.com. Fingerprint site locations may change over time therefore applicants are encouraged to confirm the site location they plan to visit.
- d. At the fingerprint site the Applicant Livescan Operators (ALO) manage the fingerprint collection process.
- e. The fingerprint transaction begins when the ALO reviews the applicant's qualified State or Federal photo ID before processing the applicant's transaction. An approved ID types list can be found on the Cogent Systems' website www.pa.cogentid.com. Applicants will not be processed if they do not produce an acceptable photo ID.
- f. After the identity of the applicant has been established, all fingers and thumbs are scanned to complete the process. The entire fingerprint capture process should take no more than 3 to 5 minutes.

- g. The applicant's scanned fingerprints are electronically transmitted to the Pennsylvania State Police who in turn submits the fingerprints and demographic information to the FBI as required by federal statute.
 - h. PDE receives the Federal Criminal History Record from the FBI. PDE's School Services Unit returns the Federal Criminal History Record to the applicant. The Record is printed on standard 8.5-by 11-inch paper with the Commonwealth Seal imbedded in the paper. This document constitutes the official Record. If an applicant presents their Federal Criminal History Record and the Commonwealth Seal is not embedded in the paper, it is invalid and cannot be accepted as an official Record. If the applicant does not receive the Criminal History Record from PDE within 8 weeks after being fingerprinted, they should call 717.783.3750 or email PDE at dwolfgang@state.pa.us.
 - i. The applicant then provides the Federal Criminal History Record to their prospective employer (the School District).
3. The Act allows Administrators to employ applicants on a provisional basis for a single period not to exceed 90 days, except during a lawful strike proceeding under the provisions of the act of 23 July 1970, known as the "Public Employee Relations Act", when all of the following conditions are met:
- a. the applicant has applied for the information required under subsection (b) and, where applicable, subsection (c) or (c.1) and the applicant provides a copy of the appropriate completed request forms to the Administrator;
 - b. the Administrator has no knowledge of information pertaining to the applicant which would disqualify them from employment pursuant to subsection (e);
 - c. the applicant swears or affirms in writing that they are not disqualified from employment pursuant to subsection (e);
 - d. if the information obtained pursuant to subsection (b), (c), or (c1) reveals that the applicant is disqualified from employment pursuant to subsection (e), the applicant must be suspended and subject to termination proceedings as provided for by law; and
 - e. the Administrator requires that the applicant not be permitted to work alone with children and that the applicant work in the vicinity of a permanent employee.
4. Fingerprint Corrections and Resubmissions: In circumstances where a classifiable fingerprint record was not or could not be obtained and immediately upon indication, Cogent Systems takes corrective action to resubmit or reprint the applicant at no cost to the applicant. This corrective action is completed at the earliest possible time and, when applicable, that is convenient for the applicant. Cogent Systems contacts the applicant directly if this occurs. Reprinting can be applied to each applicant one time only. If fingerprinting must take place a third time the applicant must pay the full fee.
5. Group Fingerprinting Support: When there is a requirement to fingerprint a large group of applicants (i.e. a contractor's entire staff of 120 employees). Cogent Systems and the fixed site providers try to accommodate that request. Some fingerprint service sites have the ability to bring portable equipment to your site. If you need Group Fingerprinting Support, visit www.pa.cogentid.com. Service sites in your area that have mobile equipment are listed. This mobile service requires the visited site to provide broadband internet access and access through any firewall. The sites that offer mobile services can provide you instructions in advance of their visit that allow fingerprinting at your site. Requirements for hosting a mobile Livescan operation are found at www.pa.cogentid.com.
- a. We encourage you to utilize this service, but you must plan ahead. Please do not overwhelm the service by sending large groups of applicants to the fixed site locations. If you must send a large group of applicants to a fixed site, please plan for their arrival to occur over days and weeks, not over hours.
6. Confidentiality (Security) of Applicant Information: On-site access to the Livescan equipment and the data traveling from the equipment is comprehensively secured and regulated by both Cogent Systems and the regulations governing the use of that data.
- a. The Computer System: Is housed within a secured network that is protected by firewall devices configured explicitly to allow only permissible protocols and traffic. Cogent Systems ensures that devices procured under this process continue to adhere to the Commonwealth's security requirements. Systems are configured to provide a point of defense with controlled access from both inside and outside the network. The Livescan systems are configured to support logging and audit capability. The Livescan system supports 128 bit encryption.

J. State Police Background Checks of Prospective Employees:

1. (Act No. 34 of 1985; Section 111, School Laws of Pennsylvania). Act 34 of 1985 requires that Contractor's employees, subcontractors, and subcontractors' employees produce reports of criminal history record from Pennsylvania State Police, or a statement from State Police that State Police central repository contains no criminal history before beginning work on School District Projects. (Different procedures apply with regard to out-of-state employees.) Thus, any person working on this Project and entering upon School District property must produce original of said statement to, and leave a copy with, the District's Business Office prior to beginning work. Cost of obtaining said statement, which may not be more than 1 year old, is responsibility of employees of Contractor or lower tier contractors (or their employers), but in no event are they responsibility of School District. Notify subcontractors of these requirements.
2. Act 34 of 1985 specifies that employees of public and private schools hired as of January 1, 1986, must undergo background checks. Job applicants must follow procedures listed below.
 - a. Procedure for Pennsylvania Residents
 - 1) Secure Form SP4-164 - Pennsylvania State Police "Request for Criminal History Record Information." Form SP4-164 is available from School Districts and at State Police stations.
 - 2) Complete Parts I and IV only.
 - a) Part I - Ignore SID No. and OTN or OCA No. if none or not known.
 - b) Part I - Aliases includes Maiden Name.
 - c) Part I - Check boxes for Noncriminal Justice Agency - Individual (Requestor Identification) and Noncriminal Justice Employment (Reason for Request).
 - d) Part IV - Check box for Individual - Noncriminal Justice Agency - \$10 fee enclosed. Information in Part IV is job applicant's name, address, and telephone number.
 - 3) Submit completed Form SP4-164 along with a check for \$10 to address on reverse side of form.
 - a) Make checks payable to "Commonwealth of Pennsylvania."
 - b) Personal checks are acceptable.
 - 4) State Police return background check directly to applicant within 4 weeks.
 - 5) Present background checks information to prospective employer. Background check is good for 1 year from date of return to applicant.
 - b. Procedure for Non-Residents.
 - 1) Follow same procedures outlined in Steps 1.a. and 1.b. for Pennsylvania residents, filing Form SP4-164 - Pennsylvania State Police "Request for Criminal History Record Information."
 - 2) Secure an FBI Fingerprint Card from School District or Pennsylvania Department of Education, Bureau of Basic Education Support Services, 333 Market Street, Harrisburg, PA 17126-0333, Telephone 1.717.783.3755.
3. (Act No. 151 of 1994; amendment to Pennsylvania Child Protective Services Law (23 Pa. C.S.A. § 6301 et seq.). Act 151 of 1994 requires that Contractor's employees, subcontractors, and subcontractors' employees produce an "Official Clearance Statement (OCS)" before beginning work on School District Projects. Thus, any person working on this project and entering upon School District property must produce original of OCS to, and leave a copy with, the District's Business Office prior to beginning work. Cost of obtaining OCS, which may not be more than 1 year old, is responsibility of employees of Contractor or lower tier contractors (or their employers), but in no event are they responsibility of School District. Notify subcontractors of these requirements.

K. Owner's Compliance in Retaining Payments: Owner retains payments in accordance with 62 Pa. C.S.A. § 3921.

L. Civil Rights Act of 1964, As Amended

1. Contractor agrees to be bound by and comply with provisions of Act of Congress of United States of July 2, 1964, commonly known as "Civil Rights Act of 1964," P.L. 88-352; 42 U.S.C.A. Section 2000a, et seq., and any and all amendments thereto, together with all Rules, Regulations, and Executive Orders issued pursuant thereto, insofar as said Act, Rules, Regulations, and Executive Orders may be applicable to work performed under its Contract.

M. According to Act of October 26, 1972 (P.L. 1017, No. 247), 53 P.S. Section 1611, of the Commonwealth of Pennsylvania must include in all advertisements and invitations for bids for construction projects a list of those provisions of Federal and State statutes, rules, and regulations dealing with prevention of environmental pollution and preservation of public natural resources that affect a project.

1. The Contractor is hereby notified that this Project is subject to those statutes, rules, and regulations shown below or enacted since this list was compiled and must be carried out in compliance with those statutes, rules, and regulations.

a. State Law

- 1) I. Purdon's Statutes - Title 3 (Agriculture)
 - a) Soil Conservation Law, Act of May 15, 1945 (P.L. 547, No.), as amended, 3 P.S. 849 et seq.
- 2) IX. Purdon's Statutes - Title 35 (Health and Safety)
 - a) The Public Bathing Law, Act of June 23, 1931 (P.L. 899, No.), as amended, 35 P.S. 672 et seq.
 - b) The Clean Streams Law, Act of June 22, 1937 (P.L. 1987, No.), as amended, 35 P.S. 691.1 et seq. and Department of Environmental Protection regulations promulgated thereunder.
 - c) Worker and Community Right-to-Know Act, Act of October 5, 1984 (P.L. 734, No. 159), as amended, 35 P.S. 7301 et seq. and regulations promulgated pursuant thereto.
- 3) XII. Purdon's Statutes - Title 52 (Mines and Mining)
 - a) PA Bituminous Coal Mine Act, Act of July 17, 1961 (P.L. 659, No.), as amended, 52 P.S. 701-101 et seq.
 - b) (Related to Abandoned Mines), Act of May 7, 1935 (P.L. 141, No.), as amended, 52 P.S. 809 et seq.
 - c) (Related to maps and plans), Act of June 15, 1911 (P.L. 954, No.), as amended, 52 P.S. 823.
 - d) Surface Mining Conservation and Reclamation Act, Act of May 31, 1945 (P.L. 1198, No.), as amended, 52 P.S. 1396.1 et seq. and Department of Environmental Resources Promulgated thereunder.
 - e) The Bituminous Mine Subsidence and Land Conservation Act, Act of April 27, 1966 (P.L. 31, 1st Sp. Sess., No.), 52 P.S. 1406.1 et seq.
 - f) (Related to cave-in or subsidence of surface above mines), Act of July 2, 1937 (P.L. 2787, No.), as amended, 52 P.S. 1407 et seq.
- 4) IXX. Purdon's Statutes - Title 73 (Trade and Commerce)
 - a) (Related to Explosives), Act of July 1, 1937 (P.L. 2681, No.), as amended, 73 P.S. 151 et seq.
 - b) (Related to Explosives), Act of July 10, 1957 (P.L. 685, No.), as amended, 73 P.S. 164 et seq.
 - c) (Related to Black Powder), Act of May 31, 1974 (P.L. 304, No. 96), as amended, 73 P.S. 169 et seq.
 - d) (Related to excavation and demolition), Act of December 10, 1974 (P.L. 852, No. 287), as amended, 73 P.S. 176 et seq.
- 5) XX. Purdon's Statutes - Title 75 (Vehicles)
 - a) Vehicle Code, Act of June 17, 1976 (P.L. 162, No. 81), as amended, 75 Pa. C.S.A. 101 et seq. and regulations promulgated thereto.
 - b) Hazardous Substances Transportation Act, Act of November 9, 1965 (P.L. 657), 75 P.S. 2401 et seq. and regulations promulgated pursuant thereto.

- 6) XXI. Purdon's Statutes - Title 77 (Workmen's Compensation)
 - a) PA Workmen's Compensation Act, Act of June 21, 1939 (P.L. 1520, No.), as amended, 77 P.S. 1 et seq.
 - b) PA Occupational Disease Act, Act of June 21, 1939 (P.L. 566, No. 284), as amended, 77 P.S. 1201 et seq.
 - 7) XXII. Other Statutes
 - a) Amending Act 484 (August 23, 1961) bringing clay mines within the scope (Subsidence Insurance) of the Act, Act of July 1, 1971.
 - b) Act limiting the amount of noise produced by motor vehicles, providing noise testing and fixing penalties, Act of January 26, 1972.
 - c) Act regulating vehicle emission systems, Act of June 16, 1972.
- b. Federal Law
- 1) Asbestos Hazard Emergency Response Act of 1986 [see Toxic Substances Control Act Secs. 201-214 (15 U.S.C. 2641-2654)].
 - 2) Asbestos School Hazard Abatement Act of 1984, 20 U.S.C. 4011 et seq.
 - 3) Asbestos School Hazard Detection and Control Act of 1980, 20 U.S.C. 3601 et seq.
 - 4) Clean Air Act (42 U.S.C. 7401-7642) and regulations promulgated pursuant thereto.
 - 5) Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (42 U.S.C. 9601-9675) as amended by Superfund Amendments and Reauthorization Act of 1986 (SARA), Pub. L. 99-499, approved 10-17-86; and regulations promulgated pursuant thereto.
 - 6) Emergency Planning and Community Right-to-Know Act of 1986 (42 U.S.C. 11001-11050).
 - 7) Endangered Species Conservation Act of 1969, 16 U.S.C. 668aa, et seq.
 - 8) Energy Supply and Environmental Coordination Act of 1974 (15 U.S.C. 791-798).
 - 9) Environmental Quality Improvement Act of 1970 (42 U.S.C. 4371-4375).
 - 10) Federal Insecticide, Fungicide, and Rodenticide Act (7 U.S.C. 136-136v) and regulations promulgated pursuant thereto.
 - 11) Hazardous Material Transportation Act, 49 U.S.C. 1801 et seq. and regulations promulgated pursuant thereto.
 - 12) Hazardous Substance Response Revenue Act of 1980 (see 26 U.S.C. 4611, 4612, 4661, 4662).
 - 13) Lead-Based Paint Poisoning Prevention Act of 1971, 42 U.S.C. 4801 et seq.
 - 14) Low-Level Radioactive Waste Policy Act (42 U.S.C. 2021b-2021d).
 - 15) National Emission Standards Act, 42 U.S.C. 7521 et seq. and regulations promulgated thereto.
 - 16) National Energy Conservation Act, Pub. L. No. 95-619, 92 Stat. 320b (1978) (codified in various sections of Titles 12, 15 and 42 U.S.C.).
 - 17) National Environmental Policy Act of 1969 (42 U.S.C. 4321-4370a) and regulations promulgated pursuant thereto.
 - 18) Noise Control Act of 1972 (42 U.S.C. 4901-4918).
 - 19) Radon Gas and Indoor Air Quality Research Act of 1986.
 - 20) Soil and Water Resources Conservation Act of 1977 (16 U.S.C. 2001-2009).
 - 21) Solid Waste Disposal Act (42 U.S.C. 6901-6991i) and regulations promulgated pursuant thereto.
 - 22) Toxic Substances Control Act (15 U.S.C. 2601-2654) and regulations promulgated pursuant thereto.
 - 23) Wetlands Acquisition Act, 16 U.S.C. 715k-3 to 715k-5, as amended et seq. and regulations promulgated pursuant thereto.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 4100

SECTION 01 4200 - REFERENCES

PART 1 - GENERAL

1.1 DEFINITIONS

- A. General: Basic Contract definitions are included in the Conditions of the Contract.
- B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.
- C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."
- D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."
- E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.
- F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- G. "Install": Unload, temporarily store, unpack, assemble, erect, place, anchor, apply, work to dimension, finish, cure, protect, clean, and similar operations at Project site.
- H. "Provide": Furnish and install, complete and ready for the intended use.
- I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

1.2 INDUSTRY STANDARDS

- A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.
- B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.
 - 1. For standards referenced by applicable building codes, comply with dates of standards as listed in prevailing building codes, as defined by applicable code enforcement authority.
- C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
 - 1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

1.3 ABBREVIATIONS AND ACRONYMS

- A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Gale's "Encyclopedia of Associations: National Organizations of the U.S." or in Columbia Books' "National Trade & Professional Associations of the United States."
- B. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities listed here, unless superseded as of the date of the Contract Documents.
1. DIN - Deutsches Institut für Normung e.V.; www.din.de.
 2. IAPMO - International Association of Plumbing and Mechanical Officials; www.iapmo.org.
 3. ICC - International Code Council; www.iccsafe.org.
 4. ICC-ES - ICC Evaluation Service, LLC; www.icc-es.org.
- C. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities listed here, unless superseded as of the date of the Contract Documents.
1. COE - Army Corps of Engineers; www.usace.army.mil.
 2. CPSC - Consumer Product Safety Commission; www.cpsc.gov.
 3. DOC - Department of Commerce; National Institute of Standards and Technology; www.nist.gov.
 4. DOD - Department of Defense; www.quicksearch.dla.mil.
 5. DOE - Department of Energy; www.energy.gov.
 6. EPA - Environmental Protection Agency; www.epa.gov.
 7. FAA - Federal Aviation Administration; www.faa.gov.
 8. FG - Federal Government Publications; www.gpo.gov/fdsys.
 9. GSA - General Services Administration; www.gsa.gov.
 10. HUD - Department of Housing and Urban Development; www.hud.gov.
 11. LBL - Lawrence Berkeley National Laboratory; Environmental Energy Technologies Division; www.eetd.lbl.gov.
 12. OSHA - Occupational Safety & Health Administration; www.osha.gov.
 13. SD - Department of State; www.state.gov.
 14. TRB - Transportation Research Board; National Cooperative Highway Research Program; The National Academies; www.trb.org.
 15. USDA - Department of Agriculture; Agriculture Research Service; U.S. Salinity Laboratory; www.ars.usda.gov.
 16. USDA - Department of Agriculture; Rural Utilities Service; www.usda.gov.
 17. USDOJ - Department of Justice; Office of Justice Programs; National Institute of Justice; www.ojp.usdoj.gov.
 18. USP - U.S. Pharmacopeial Convention; www.usp.org.
 19. USPS - United States Postal Service; www.usps.com.
- D. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations listed here, unless superseded as of the date of the Contract Documents.
1. CFR - Code of Federal Regulations; Available from Government Printing Office; www.govinfo.gov.
 2. DOD - Department of Defense; Military Specifications and Standards; Available from DLA Document Services; www.quicksearch.dla.mil.
 3. DSCC - Defense Supply Center Columbus; (See FS).
 4. FED-STD - Federal Standard; (See FS).

5. FS - Federal Specification; Available from DLA Document Services; www.quicksearch.dla.mil.
 - a. Available from Defense Standardization Program; www.dsp.dla.mil.
 - b. Available from General Services Administration; www.gsa.gov.
 - c. Available from National Institute of Building Sciences/Whole Building Design Guide; www.wbdg.org.
 6. MILSPEC - Military Specification and Standards; (See DOD).
 7. USAB - United States Access Board; www.access-board.gov.
 8. USATBCB - U.S. Architectural & Transportation Barriers Compliance Board; (See USAB).
- E. State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities listed here, unless superseded as of the date of the Contract Documents.
1. CBHF; State of California; Department of Consumer Affairs; Bureau of Electronic and Appliance Repair, Home Furnishings and Thermal Insulation; www.bearhfti.ca.gov.
 2. CCR; California Code of Regulations; Office of Administrative Law; California Title 24 Energy Code; www.calregs.com.
 3. CDHS; California Department of Health Services; (See CDPH).
 4. CDPH; California Department of Public Health; Indoor Air Quality Program; www.cal-iaq.org.
 5. CPUC; California Public Utilities Commission; www.cpuc.ca.gov.
 6. SCAQMD; South Coast Air Quality Management District; www.aqmd.gov.
 7. TFS; Texas A&M Forest Service; Sustainable Forestry and Economic Development; www.txforests-service.tamu.edu.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 4200

SECTION 01 5000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes requirements for temporary facilities and controls, including support facilities, and security and protection facilities.
 - 1. Include the products, systems and assemblies listed below, as appropriate, and other facilities, whether or not listed, as necessary for successful prosecution of a complete project.
 - 2. Observe additional requirements of Construction Manager's most current Building and Site Phasing and Logistics Diagrams for limitations to and requirements for Contractors' use of project site.
- B. Support facilities:
 - 1. Project identification and other project signs.
 - 2. Sanitary facilities, including toilets, wash facilities, and drinking-water facilities.
 - 3. Waste disposal facilities.
 - 4. Storage and fabrication trailers.
 - 5. Scaffolding.
 - 6. Lifts and hoists.
 - 7. Construction aids and miscellaneous services and facilities.
- C. Temporary Utilities:
 - 1. Water service and distribution.
 - 2. Heating, cooling, ventilation and dehumidification.
 - 3. Electrical power service.
 - 4. Lighting.
 - 5. WiFi web access.
- D. Security and protection facilities:
 - 1. Environmental protection.
 - 2. Site enclosure fence.
 - 3. Security enclosure and lockup.
 - 4. Barricades, warning signs, and lights.
 - 5. Temporary enclosures.
 - 6. Temporary partitions.
 - 7. Fire protection.

1.2 DEFINITIONS

- A. Temporary Enclosure (of new and existing construction): As determined by Architect and Construction Manager, including, but not limited to:
 - 1. Permanent roofing system has been installed and is weathertight.
 - 2. Exterior walls, studs and sheathing or masonry are in place and insulated, and air barriers/weather barriers installed.
 - 3. Concrete floor slab installation has been completed.
 - 4. Insulated temporary closures, plywood, tarpaulins or reinforced polyethylene film are placed in all window and door openings. Provide access doors where deemed appropriate to facilitate construction activities.

- B. Permanent Enclosure (of new and existing construction): As determined by Architect and Construction Manager, including, but not limited to:
 - 1. Permanent roofing system has been installed and is weathertight.
 - 2. Exterior walls, metal studs and sheathing and masonry are complete and weathertight.
 - 3. Concrete floor slab installation is complete.
 - 4. Permanent windows are installed and weathertight.
 - 5. Permanent doors are installed.
 - a. To prevent damage to permanent doors during construction, Architect and Construction Manager may approve insulated, weathertight, self-closing temporary closures.
- C. Major Portion: A fully enclosed wing or section of the building, or an addition being constructed; as determined by Architect and Construction Manager during construction per the Construction Schedule.
 - 1. A Major Portion shall be field determined, based on the sequencing and relative progress of the construction, and is subject to approval by Construction Manager and Architect. This determination does not necessarily correspond to any relationship to any building area, matchline, or room designation schedule indicated in the Contract Documents.
- D. Web-Based Project Software: Construction Manager will host Web-Based CMiS Project Management account for posting and distribution of project documents.

1.3 USE CHARGES

- A. General: Utility use charges for temporary utilities will be paid by the Owner as long as the source is available from the Owner's existing utilities. If the type of utility source needed for temporary service is not available from the Owner's existing utilities, the Prime Contractor responsible for providing the temporary service shall be responsible for supplying and paying for the utility or fuel source needed.
- B. Water and Sewer Service from Existing System: Water from Owner's existing water system is not available for use without metering and without payment of use charges.
 - 1. Provide temporary services as required for construction operations and include use charges in Contract Sum.
- C. Electric Power Service from Existing System: Electric power from Owner's existing system is not available for use without metering and without payment of use charges.
 - 1. Provide temporary services as required for construction operations and include use charges in Contract Sum.

1.4 INFORMATIONAL SUBMITTALS

- A. Site Utilization Plan: Show temporary facilities, temporary utility lines and connections, staging areas, construction site entrances, vehicle circulation, and parking areas for construction personnel.
- B. Implementation and Termination Schedule: Within 15 days of date established for commencement of the Work, submit schedule indicating implementation and termination dates of each temporary utility.
- C. Project Identification and other Temporary Signs: Show fabrication and installation details, including plans, elevations, details, layouts, typestyles, graphic elements, and message content.
- D. Project Health and Safety Statement: Written company policy identifying how health and safety will be managed on the Project, and indicating a commitment to the health, safety, and injury and illness prevention of workers and others. Include training provided for field personnel regarding awareness, communication, enforcement, and

documentation policies. Observe requirements of this Section and appropriate occupational health and safety regulations and standards, including State requirements, OSHA/29 CFR 1926 and ANSI/ASSE A10.6.

- E. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.
- F. Moisture- and Mold-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage and mold. Describe delivery, handling, storage, installation, and protection provisions for materials subject to water absorption or water damage.
 - 1. Indicate procedures for discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and requirements for replacing water-damaged Work.
 - 2. Indicate methods to be used to avoid trapping water in finished work.
 - 3. Indicate sequencing of work that requires water, and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.
- G. Odor-, dust- and HVAC-Control Plan: Submit coordination drawing and narrative that indicates control measures proposed for use, proposed locations, and proposed time frame for their operation. Include the following:
 - 1. Locations of dust-control partitions at each phase of work.
 - 2. HVAC system isolation schematic drawing.
 - 3. Location of proposed air-filtration system discharge.
 - 4. Waste-handling procedures.
 - 5. Other odor- and dust-control measures.
- H. Noise and Vibration Control Plan: Identify construction activities that may impact the occupancy and use of existing spaces within the building, whether occupied by others, or occupied by the Owner. Include the following:
 - 1. Methods used to meet the goals and requirements of the Owner.
 - 2. Concrete cutting method(s) to be used.
 - 3. Location of construction devices on the site.
 - 4. Show compliance with the use and maintenance of quieted construction devices for the duration of the Project.
 - 5. Indicate activities that may disturb building occupants and that are planned to be performed during non-standard working hours as coordinated with the Owner.
 - 6. Indicate locations of sensitive areas or other areas requiring special attention as identified by Owner. Indicate means for complying with Owner's requirements as applicable.

1.5 QUALITY ASSURANCE

- A. Standards: Comply with ANSI A10.6, NECA's "Temporary Electrical Facilities," and NFPA 241.
 - 1. Trade Jurisdictions: Assigned responsibilities for installation and operation of temporary utilities are not intended to interfere with trade regulations and union jurisdictions.
 - 2. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
- B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.
- C. Accessible Temporary Egress: Comply with applicable provisions in ICC/ANSI A117.1.

1.6 PROJECT CONDITIONS

- A. General: Installation and removal, as well as occasional relocating where deemed necessary, of temporary facilities and controls shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Owner's construction forces, Construction Manager, Architect, testing agencies, authorized visitors, and authorities having jurisdiction.
- B. Keep temporary services and facilities clean and neat.
- C. Any Contractor who fails to carry out its responsibility in supplying utilities required for execution of the Work shall be held responsible for such failure. Owner will have the right to take action, as it deems proper for the protection and conduct of the Work and will deduct the cost involved from the amount due the Contractor at fault.
- D. Temporary Water and Electric: At earliest feasible time, as coordinated with Owner, change over from use of temporary service to use of permanent service.
- E. Temporary Use of Permanent Facilities: Engage Installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility until Final Completion and commencement of applicable warranties; and for restoration to condition prior to commencement of temporary use, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Provide new materials. Undamaged, previously used materials in serviceable condition may be used if approved by Architect. Provide materials suitable for use intended.
- B. Pavement: Comply with Division 32 Section "Asphalt Paving."
- C. Chain-Link Fencing: Minimum 2-inch, 0.148-inch-thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet high with galvanized-steel pipe posts; minimum 2-3/8-inch-OD line posts and 2-7/8-inch-OD corner and pull posts, with 1-5/8-inch-OD top rails.
 - 1. Secure fence posts into the earth or provide steel bases for supporting posts, as appropriate for conditions after consulting with CM.
 - 2. Walk Gates: 4-ft wide x 6-ft high single-swing hung on 2 1/2-in OD galv post set in concrete footing.
 - 3. Drive Gates: 12-ft wide x 6-ft high double-swing (24-ft opening) hung on 4-in OD galv posts set in concrete footing.
 - 4. Portable Panels: 6-ft high free-standing galvanized pipe-frame/ metal fabric fence.
 - a. Base Support: Galv. welded pipe stands or alternative base subject to CM approval. Include sandbags.
 - b. Fabric: 2 1/2-in x 11 1/2 ga chain-link mesh or 2 x 4-in 12-ga welded wire mesh
 - c. Frame: Manufacturer's standard galvanized pipe or tube
- D. Polyethylene Sheet: Reinforced, fire-resistive sheet, 10-mil minimum thickness, with flame-spread rating of 15 or less in accordance with ASTM E84 and passing NFPA 701 Test Method 2.
- E. Dust-Control Adhesive-Surface Walk-Off Mats: Provide mats, minimum 36 by 60 inches.
- F. Gypsum Board: Minimum 1/2 inch thick by 48 inches wide by maximum available lengths; regular-type panels with tapered edges. Comply with ASTM C 36.

- G. Insulation: Unfaced mineral-fiber blanket, manufactured from glass, slag wool, or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.
- H. Roofings: Comply with requirements in appropriate Division 07 Sections.
- I. Paint: Comply with requirements in Division 09 Section "Painting."
- J. Tarpaulins: Fire-resistive labeled with flame-spread rating of 15 or less.
- K. Water: Potable.

2.2 TEMPORARY FACILITIES

- A. Sanitary Facilities:
 - 1. Provide and maintain temporary toilets and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
 - 2. Location: In accordance with Construction Manager's Logistics Diagrams, or as otherwise approved by Construction Manager
- B. Field Offices:
 - 1. Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.
 - 2. Location: In accordance with Phasing and Logistics Diagrams, or as otherwise approved by Construction Manager
- C. Common-Use Field Office: Of sufficient size to accommodate needs of Owner, Architect, and Construction Manager personnel office activities and to accommodate Project meetings specified in other Division 01 Sections. Provide approximately 50 ft x 12 ft trailer including delivery, anchoring, leveling, skirting, entrance stairs. Floor plan to include conference room, two private offices, and drawing plan table area. Restroom can be hooked up as a portable system with separate holding tank for sanitary and potable water for washing hands. Furnish and equip offices as follows:
 - 1. Location: In accordance with Construction Manager's Logistics Diagrams, or as otherwise approved by Construction Manager
 - 2. Conference room of sufficient size to accommodate meetings of 12 individuals. Furnish room with conference table, chairs, and 4-foot-square tack and marker boards.
 - 3. Drinking water and private toilet.
 - 4. Heating and cooling equipment necessary to maintain a uniform indoor temperature of 68 to 72 deg F.
 - 5. Lighting fixtures capable of maintaining average illumination of 20 fc at desk height.
 - 6. Provide electrical power service and 120-V ac duplex receptacles, with no fewer than one receptacle every 8 feet on each wall.
 - 7. Furniture required for Project-site documents, including file cabinets, plan tables, plan racks, desks, and bookcases.
 - a. Provision field office in accordance with Construction Manager's Site Logistics Diagram
 - 8. Field office shall be cleaned, maintained and serviced by the General Contractor until Substantial Completion.
- D. Project Computer: Each Contractor or individual worker will be responsible to provide a laptop computer for its own use, capable of accessing and operating the Construction Manager's web-based project software system.
 - 1. Refer to Section 01 3100 for project-specific information about web-based project software system

- E. Printer: For use by Construction Manager, Architect, Owner, their respective consultants, agents, and subcontractors, and others as authorized by CM
 - 1. "All-in-one" unit equipped with printer server, combining color printing, photocopying, scanning, and faxing, or separate units for each of these three functions.
 - a. Printer needs to accommodate color printing for 8-1/2" x 11" and 11"x17".
 - 2. Maintain printer in proper operating condition and with consumable supplies to meet project needs.
 - 3. Lead Contractor to provide and pay for printer consumables (paper and toner or ink) throughout the entire project.
- F. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.
 - 1. Location: In accordance with Logistics Diagrams, or as otherwise approved by Construction Manager
 - 2. Store combustible materials apart from building.

2.3 EQUIPMENT

- A. General: Provide equipment suitable for use intended, properly sized and engineered specifically for the temporary construction demands of this project.
- B. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
 - 1. Comply with NFPA 10 and NFPA 241 for classification, extinguishing agent, and size required by location and class of fire exposure.
- C. Self-Contained Toilet Units: Single-occupant units of chemical, aerated recirculation, or combustion type; vented; fully enclosed with a glass-fiber-reinforced polyester shell or similar nonabsorbent material.
 - 1. Each unit to contain hand sanitizing stations.
- D. Electrical Outlets: Properly configured, NEMA-polarized outlets to prevent insertion of 110- to 120-V plugs into higher-voltage outlets; equipped with ground-fault circuit interrupters, reset button, and pilot light.
- E. Power Distribution System Circuits: Where permitted and overhead and exposed for surveillance, wiring circuits, not exceeding 125-V ac, 20-A rating, and lighting circuits may be nonmetallic sheathed cable.
- F. Temporary HVAC Equipment: . Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained heaters with individual space thermostatic control.
 - 1. If portable heaters are required, provide individual vented, self-contained, air-recirculating units with individual space control, as needed for job conditions.
 - a. Safety features and operating controls:
 - 1) Fuel-fired units to include air proving switch, high temperature limit switch, electronic ignition with flame safe-guard system.
 - 2) Electric units to include fan-only switch and variable thermostat and high-temperature cut-out switch with auto-reset. Provide self-contained industrial grade fan units, painted safety yellow with safety screens cover each end of the heat drum, with protected finned tubular heating elements, long-life motor and fan assembly, magnetic contactor, input terminal power block, and factory-standard cordset.
 - b. Units listed and labeled by a testing agency acceptable to authorities having jurisdiction, and marked for intended use for type of fuel being consumed.
 - c. Use of gasoline- or kerosene-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.

2. Area Cooling: Portable, self-contained packaged refrigeration air conditioning units with individual programmable electronic space control, removable condensate tank and flexible duct hose designed to provide quiet event, maintenance, supplemental or construction spot cooling.
 3. Drying: Portable industrial desiccant dehumidifier, suitable for use as positive pressure system or negative pressure systems, as recommended by manufacturer for removal of excess humidity or to accelerate reduction of moisture emission in new concrete in affected areas, or as otherwise directed or approved. Provide quiet units designed for constant running as well as individual electronic humidistat control.
- G. Permanent HVAC System: If Owner and Architect authorize use of permanent HVAC system for temporary use during construction, provide filter with MERV of 8 at each return-air grille in system and provide new filters at end of construction. Clean HVAC system as required in Section 01 7700 "Closeout Procedures."

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Conservation: Coordinate construction and use of temporary facilities with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.
 1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. See other Sections for disposition of salvaged materials that are designated as Owner's property.
- B. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Location subject to approval by Construction Manager. Relocate and modify facilities as required by progress of the Work.
 1. Locate facilities to limit site disturbance as specified in Section 01 1000 "Summary."
 2. Locate field offices, storage trailers, sanitary facilities, and other temporary construction and support facilities for easy access and as directed by CM, but a minimum distance of 30 feet from existing and new structures.
- C. Provide each facility ready for use when needed to avoid delay. Maintain until removed. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.
- D. Construction Aids: Each Prime Contractor shall provide construction aids and equipment required by its personnel and to facilitate execution of its own work; scaffolds, staging, ladders, stairs, ramps, runways, platforms, railings, hoists, cranes, chutes, and other such facilities and equipment.
 1. Relocate construction aids as required by progress of construction, by storage or work requirements.
- E. Refer to and comply with applicable local, state, and federal regulations and Contractor's project health and safety statement, as well as Owner's Project health and safety requirements, if any, for worker safety, public safety, fire protection, and other precautions.

3.2 TEMPORARY UTILITY INSTALLATION

- A. General: Provide temporary service, using appropriately certified personnel, as approved by Owner and Construction Manager. Comply with utility company requirements.
 1. Arrange with utility company, and Owner for time when service can be interrupted, if necessary, to make connections for temporary services.
 2. Provide adequate capacity at each stage of construction. Before temporary utility is available, provide trucked-in services.

- B. Water Service: Provide temporary water service and distribution piping in sizes and pressures adequate for construction.
- C. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.
 - 1. Connect temporary sewers to municipal system as directed by authorities having jurisdiction.
- D. Temporary Electric Power: Provide temporary electric service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.
 - 1. Install temporary electric power service overhead unless otherwise indicated.
- E. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
 - 1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
 - 2. 20% of the temporary lighting shall be provided to illuminate interior work spaces on a 24-hour per day basis. Lights shall be placed in corridors and entryway and be circuited to remain energized when the balance of the temporary system has been shut down.
- F. Temporary Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity for the entire duration of the project. Select equipment that will not have a harmful effect on completed installations or elements being installed.
 - 1. Provide temporary dehumidification systems when required to reduce ambient and substrate moisture levels to level required to allow installation or application of finishes and their proper curing or drying.
- G. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.
 - 1. Prior to commencing work, isolate the HVAC system in areas where work is to be performed according to coordination drawings.
 - a. Disconnect supply and return ductwork in work area from HVAC systems servicing occupied areas.
 - b. Maintain negative air pressure within work area, using HEPA-equipped air-filtration units, starting with commencement of temporary partition construction, and continuing until removal of temporary partitions is complete.
 - 2. Maintain dust partitions during the Work. Use vacuum collection attachments on dust-producing equipment. Isolate limited work within occupied areas using portable dust-containment devices.
 - 3. Perform daily construction cleanup and final cleanup using approved, HEPA-filter-equipped vacuum equipment.
 - 4. As directed by Construction Manager, post lists of important telephone numbers.
 - a. Police and fire departments.
 - b. Ambulance service.
 - c. Contractor's home office.
 - d. Contractor's emergency after-hours telephone number.
 - e. Architect's office.
 - f. Construction Manager's home office].
 - g. Engineers' offices.
 - h. Owner's office.
 - i. Principal subcontractors' field and home offices.

- H. Electronic Communication Service: Provide secure WiFi wireless connection to internet with provisions for access by Construction Manager, Architect and Owner, and others as authorized by Construction Manager.
1. Internet Service: Broadband modem, router, and ISP, equipped with hardware firewall, with minimum Wi-Fi 5 meeting the IEEE standard 802.11ac,-providing at least 50 Mbps upload and 100 Mbps download speeds at each computer.
 2. Internet Security: Integrated software, providing secure logins, software firewall, virus, spyware, phishing, and spam protection in a combined application.
 3. Backup: External hard drive or cloud-based storage, minimum 2 terrabytes, with automated backup software providing daily backups.
 4. Provide, locate, and maintain additional wireless access points, as directed or approved by Construction Manager, to provide secure web access within construction areas of the building. Relocate access points as directed or otherwise necessary from phase to phase.
 5. Provide interface as needed for separate Prime Contractors to provide remote web access devices for their use in their respective field office trailers. Coordinate standards and specifications with CM and separate Contractors.
 6. Provide devices built to survive transient surges and maintain continuous power during 5V brownouts and spikes
 7. Provide devices with built-in battery charge protection to monitor ignition state and battery voltage
 8. Comply with IP64 standard for resistance to dust and water ingress and MIL-STD-810G specifications for shock, vibration, temperature, and humidity.

3.3 SUPPORT FACILITIES INSTALLATION

- A. Comply with the following:
1. Provide placement and construction for temporary field offices, shops, and sheds located within construction area or within 30 feet of building lines that is noncombustible in accordance with ASTM E136. Comply with NFPA 241.
 2. Maintain support facilities until Architect schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.
 3. Relocate extant temporary facilities as directed by CM upon initial mobilization of other Prime Contractors.
- B. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate for construction operations. Locate and install temporary roads and paved areas as indicated on Construction Manager's current Phasing and Logistics Diagrams.
1. Provide dust-control treatment that is nonpolluting and nontracking. Reapply treatment as required to minimize dust.
- C. Temporary Use of Planned Permanent Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate for construction operations. Extend temporary roads and paved areas, as indicated on Drawings, Construction Manager's Phasing and Logistics Diagrams, or subject to approval, as necessary for construction operations.
1. Coordinate elevations of temporary roads and paved areas with permanent roads and paved areas.
 2. Prepare subgrade and install subbase and base for temporary roads and paved areas in accordance with Section 31 2000 "Earth Moving."
 3. Recondition base after temporary use, including removing contaminated material, regrading, proofrolling, compacting, and testing.
 4. Delay installation of final course of permanent hot-mix asphalt pavement until immediately before Substantial Completion. Repair hot-mix asphalt base-course pavement before installation of final course in accordance with Section 32 1216 "Asphalt Paving."

- D. Traffic Controls: Comply with requirements of authorities having jurisdiction.
 - 1. Protect existing site improvements to remain, including curbs, pavement, and utilities.
 - 2. Maintain access for fire-fighting equipment and access to fire hydrants.
- E. Parking: Use designated areas of Owner's existing parking areas for construction personnel.
- F. Storage and Staging: Use designated areas of Project site for storage and staging needs.
- G. Dewatering Facilities and Drains (if required): Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.
 - 1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.
 - 2. Remove snow and ice as required to minimize accumulations.
- H. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from demolition and construction operations. Comply with requirements of authorities having jurisdiction. Comply with progress cleaning requirements in Section 01 7300 "Execution."
 - 1. General disposal containers to be provided and maintained by Lead Contractor.
- I. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.
 - 1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.
 - 2. Restrict hoisting over new or existing construction to times of day when spaces are unoccupied. Confirm in writing that spaces exposed to risk are not occupied prior to beginning each hoisting operation.
- J. Stair Usage: Use of permanent stairs will be permitted, provided stairs are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore stairs to condition existing before initial use.
 - 1. Provide protective coverings, barriers, devices, signs, or other procedures to protect stairs and to maintain means of egress. If stairs become damaged, restore damaged areas, so no evidence remains of correction work.

3.4 PROJECT IDENTIFICATION AND INFORMATION SIGNAGE

- A. Project Signs: Provide project signs as indicated. Unauthorized signs are not permitted.
 - 1. Identification Signs: Provide Project identification sign as indicated.
 - 2. Temporary Signs: Provide signs as indicated and as required to inform public and individuals seeking entrance to Project.
 - a. Provide temporary directional signs for construction personnel and visitors.
 - 3. Maintain and touch up signs, so they are legible at all times.
- B. Project Identification: Lead Contractor to provide one project sign of exterior grade plywood and wood frame construction, painted, with exhibit lettering by professional sign painter, to Architect's design and colors as indicated.
 - 1. List title of Project, names of Owner, Construction Manager, Architect, and Prime Contractors.
- C. Within 20 days of the receipt of the Notice to Proceed, erect project signs on- site at locations established by Owner and Architect.
- D. No other signs are allowed without Owner permission except those required by law.

- E. Remove or relocate signs as directed by the Construction Manager as work progresses and shall remove these signs after completion of the Project.

3.5 PROJECT PROGRESS CLEANING

- A. Provide debris collection facilities at locations acceptable to Construction Manager:
 - 1. Lead Contractor shall be responsible for the removal and replacement of trash collection containers from the jobsite for the duration of the Work, for normal demolition waste of all Prime Contracts as indicated below, and the maintaining of overall cleanliness of the entire jobsite.
 - a. Dismantle crates, crush cardboard boxes, and otherwise attempt to compact all such trash deposited in these collection facilities.
 - b. Remove debris, garbage, litter, rubble, and rubbish from pipe chases, plenums, attics, crawlspaces, and other closed or remote spaces, prior to enclosing those spaces.
 - 2. In addition to the trash collection facilities, the Lead Contractor shall be responsible to provide 55 gallon trash collection barrels within each building construction area, one for every 10,000 square foot area under construction and renovation. Lead Contractor shall be responsible for emptying the barrels at the end of each work day.
 - a. Each Prime Contractor shall be responsible to collect and to deposit his demolition and construction waste in such collection facilities daily.
 - 3. Contractor who does not comply with overall procedures and standards shall be reported to the Owner for possible reduction of its Contract Sum in order to have Contractor's trash picked up by another separate contractor.
 - 4. Stock wood pallets neatly on-site in area designated by the Construction Manager. Remove pallets from site on a weekly basis.
 - 5. Broom-clean the entire project at least once a week.
 - a. Broom and vacuum clean interior areas at least once a week to eliminate dust and dirt from being present.
 - b. Provide cleaning equipment and materials for daily and weekly cleaning operations.
 - c. Broom and vacuum clean interior areas prior to start of surface finishing and continue through to Substantial Completion or acceptance by Owner.
 - 6. Accumulations of trash, dust, and dirt of any kind will not be allowed.
 - 7. No burning of trash, debris, and rubbish allowed.
- B. The Prime Contractor responsible for cutting, patching, and demolition work is responsible to remove from the site the demolition debris, trash, dirt, scrap, rubbish, and dust created by that demolition work. This demolition debris shall not be placed in General Contractor's collection facilities.
- C. Contractors and each Subcontractor shall collect and remove their own liquid waste from the jobsite. Hazardous materials shall not be placed in the shared trash collection containers, but shall be removed from the site by the Contractor or Subcontractor responsible for the material.
- D. Overall General Clean-Up: In addition to the cleaning procedure specified within this Section, each Prime Contractor shall provide one worker for one half day per week to participate in a general trash clean-up of the project during renovation and construction of the building, at the direction of the Construction Manager. This clean-up will require picking up incidental trash of other Prime Contractors. However, this does not preclude each Prime Contractor from cleaning up their particular trash on a daily basis. Those Prime Contractors who do not comply with these procedures will be charged \$500.00 per week for compensation to the Owner, in accord with Conditions of the Contract for Construction. Lead Contractor shall provide cleaning equipment and materials for this general trash clean-up crew.
- E. Contractors' personnel will not be allowed to eat meals within the confines of the building.

- F. Contractor receiving materials at the jobsite shall be responsible for prevention of mud or other deposits on public roadways and other areas outside project limit lines, which may result due to methods of material delivery. Contractor shall instruct delivery conveyor to take appropriate measures to prevent depositing mud and other construction deposits outside contract limit lines. Total responsibility of clean-up of mud and other construction deposits outside contract limits lines shall be the responsibility of the Prime Contractor receiving the delivery.
- G. Lead Contractor shall maintain and clean existing paved parking and access road areas, and shall be responsible for keeping public roads adjacent to the project site clean at all times during the construction period. Lead Contractor shall clean public roads and existing access areas within a two-hour period after being directed to do so by the Construction Manager.
 - 1. The use of water to clean roadways is prohibited. Mechanical means must be used to clean roadways.

3.6 SHARED SUPPORT FACILITIES

- A. Sanitary Facilities: Lead Contractor to provide and maintain temporary toilets for use by all Prime Contractors personnel for the entire Contract Time. Existing facilities shall not be used. Comply with regulations and health codes for type, number, location, operation, and maintenance of fixtures and facilities.
 - 1. Follow or exceed OSHA requirements for portable toilet quantities, plus one additional unit at Common-Use Project Office.
 - 2. Each unit shall comply with the following:
 - a. Disposable Supplies: Provide toilet tissue and similar disposable materials for each facility. Maintain adequate supply.
 - b. Supply and pay for antibacterial hand sanitizer for each facility. Maintain adequate supply.
 - 3. Locate toilets so personnel need not walk more than 200 feet to facilities.
 - 4. Permit no public nuisance or unsanitary conditions to exist on the project site.
 - 5. Relocate and remove temporary facilities when directed by the Construction Manager.
 - 6. At end of construction, return area surrounding the temporary facilities to same or better condition than originally found.
- B. Lifts and Hoists: Each Prime Contractor shall provide facilities necessary for hoisting materials and personnel as required for its own construction operations.
 - 1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.
- C. Janitorial Services:
 - 1. The Lead Contractor is responsible for providing Janitorial Services for the project field office on a bi-weekly basis.
 - 2. Each Prime Contractor to provide janitorial services for its own field office and similar areas.

3.7 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.
- B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
 - 1. Comply with work restrictions specified in Section 01 1000 "Summary."

- C. Temporary Erosion and Sedimentation Control: Comply with authorities having jurisdiction and requirements specified in Section 31 2500 "Erosion and Sediment Control"
- D. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.
- E. Tree and Plant Protection: Provide temporary fencing located outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.
- F. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals, so Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using materials approved by authorities having jurisdiction.
- G. Site Enclosure Fence: Prior to commencing earthwork, furnish and install site enclosure fence in a manner that will prevent people from easily entering work area of site except by entrance gates.
 - 1. Extent of Fence: As indicated on Logistic and Phasing Diagrams.
 - 2. Location and extent of fencing is subject to change in accord with directions of Construction Manager and Architect if necessary, as work progresses. Lead Contractor shall be responsible to maintain and reposition fencing until scheduled for removal.
 - 3. Maintain fencing, drive gates and walk gates appropriately located in accord with project requirements, coordinated with the Documents, and as directed by the Construction Manager.
 - 4. Provide padlocks at all gate locations and provide keys to each Prime Contractor, Construction Manager and Architect.
 - 5. Missing, damaged, and vandalized fencing shall be replaced by Lead Contract within 24 hours of notification of the occurrence.
 - 6. When no longer needed, completely remove fencing and restore site in compliance with requirements.
- H. Security Enclosure and Lockup by Lead Contractor:
 - 1. Provide temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each workday.
 - 2. Provide secure fencing around project staging and storage areas. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security.
- I. Each Prime Contractor shall be responsible for the security of its own materials and equipment stored within the Project site.
- J. Each Prime Contractor shall coordinate with Owner's existing security program.
- K. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting. Paint with appropriate colors, graphics, and warning signs to inform personnel and public of possible hazard.
- L. Temporary Egress: Provide temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction. Provide signage directing occupants to temporary egress.
- M. Temporary Enclosures: Lead Contractor to provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight insulated enclosure for building exterior.
 - 1. Where heating or cooling is needed and permanent enclosure is not complete, provide insulated temporary enclosures. Coordinate enclosure with ventilating and material drying or curing requirements to avoid dangerous conditions and effects.

2. Vertical Openings: Close openings with plywood or similar materials.
 - a. Vertical openings fronting on areas of new construction shall be sound-insulated as well.
 3. Horizontal Openings: Close openings in floor or roof decks and horizontal surfaces with load-bearing, wood-framed construction in accordance with authorities having jurisdiction.
 4. Install tarpaulins securely using fire-retardant-treated wood framing and other materials.
- N. Temporary Partitions: Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by Owner and occupants from fumes and noise.
1. Construct dustproof partitions with gypsum wallboard, with joints taped on occupied side, and fire-retardant-treated plywood on construction operations side.
 - a. At Contractor's discretion, where acceptable to Construction Manager and Architect, employ reusable modular containment assemblies similar to Starc Systems, www.starcsystems.com where applicable, in lieu of temporary studwall assemblies.
 - b. If doorways are required within temporary partitions/corridors, they shall be hollow metal doors and frames with the appropriate hardware to suit their function. Keys for this hardware, if any, will be provided to the Owner.
 - c. Provide fire-rated construction where indicated or otherwise necessary.
 2. Where fire-resistance-rated temporary partitions are indicated or are required by authorities having jurisdiction, construct partitions according to the rated assemblies.
 3. Insulate partitions to control noise transmission to occupied areas.
 4. Seal joints and perimeter. Equip partitions with gasketed dustproof doors and security locks where openings are required.
 5. Protect air-handling equipment. Block air-return registers.
 6. Provide walk-off mats at each entrance through temporary partition.
 7. Paint surfaces exposed to view from occupied areas.
 8. Weatherstrip exterior openings.
 9. Relocate temporary partitions as required by progress of construction, by storage or work requirements, and to accommodate legitimate requirements by Owner and other contractors employed at the site
- O. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire-prevention program.
1. Prohibit smoking in construction areas. Comply with additional limits on smoking specified in other Sections.
 2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition in accordance with requirements of authorities having jurisdiction.
 3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
 4. Provide portable fire extinguishers, installed on walls on mounting brackets, where convenient and effective for their intended purpose, visible and accessible from space being served, with sign mounted above.
 5. Temporary fire protection equipment used for fire protection during construction shall be replaced by the Contractor responsible for its use.
 6. Equipment shall be in accord with OSHA standards and requirements.
- P. Lead Contractor shall provide temporary first-aid facilities as follows:
1. First-Aid Supplies: Approved by a physician licensed to practice in the Commonwealth of Pennsylvania, conforming to the requirements of OSHA 1926.50, and accessible for immediate use. One 16-unit first-aid kit (or equivalent) shall be provided for each 25 persons, or fraction thereof, employed on the worksite, in location approved by the Construction Manager, and maintained, protected, and readily accessible at all times.
 2. First-Aid Station: To be clearly identified as such, and shall be an enclosed space protected from the weather, cooled in hot weather, warmed in cold weather, and lighted. First-aid station shall be located adjacent to either access road or public street. First-aid station shall have facilities permitting the rendering

- of minor medical services. First-aid station shall be checked on a weekly basis, and first-aid supplies used shall be replaced in kind.
3. Removal: Contractor shall completely remove the temporary first-aid facilities from the worksite upon Acceptance of Final Inspection by the Construction Manager.
 4. Each Prime Contractor shall provide:
 - a. First-Aid Personnel: Personnel trained in the rendering of first-aid, with valid certificate issued by either the U.S. Bureau of Mines, or the American Red Cross. First-aid emblem shall be affixed to rear of hard hats worn by first-aid personnel. First-aid personnel training shall conform to the requirements of OSHA 1926.50 Not fewer than one such trained person shall be furnished for every ten employees in any single location on the worksite; not fewer than two such trained persons shall be furnished for every 25 employees on the worksite.

3.8 MOISTURE AND MOLD CONTROL

- A. Moisture and Mold Protection: Protect stored materials and installed Work in accordance with Moisture and Mold Protection Plan.
- B. Exposed Construction Period: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:
 1. Protect porous materials from water damage.
 2. Protect stored and installed material from flowing or standing water.
 3. Keep porous and organic materials from coming into prolonged contact with concrete.
 4. Remove standing water from decks.
 5. Keep deck openings covered or dammed.
- C. Partially Enclosed Construction Period: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:
 1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
 2. Keep interior spaces reasonably clean and protected from water damage.
 3. Periodically collect and remove waste containing cellulose or other organic matter.
 4. Discard or replace water-damaged material.
 5. Do not install material that is wet.
 6. Discard and replace stored or installed material that begins to grow mold.
 7. Perform work in a sequence that allows wet materials adequate time to dry before enclosing the material in gypsum board or other interior finishes.
- D. Controlled Construction Period: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:
 1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
 2. Use temporary or permanent HVAC system to control humidity within ranges specified for installed and stored materials.
 3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.
 - a. Hygroscopic materials that may support mold growth, including wood and gypsum-based products, that become wet during the course of construction and remain wet for 48 hours will be considered defective and require replacing.
 - b. Measure moisture content of materials that have been exposed to moisture during construction operations or after installation. Record readings beginning at time of exposure and continuing daily for 48 hours. Identify materials containing moisture levels higher than allowed. Report findings in writing to Architect.

- c. Remove and replace materials that cannot be completely restored to their manufactured moisture level within 48 hours.

3.9 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- B. Maintenance: Maintain facilities in good operating condition until removal. Protect from damage caused by freezing temperatures and weather events.
 1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
- C. Temporary Facility Changeover: Coordinate change over from using temporary security and protection facilities to permanent facilities with Owner and Construction Manager. Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.
- D. Termination and Removal: Each Prime Contractor shall be responsible for the removal of each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
 1. Materials and facilities that constitute temporary facilities are property of installing Contractor except as otherwise specified herein. Owner reserves right to take possession of Project identification signs and temporary fencing materials.
 2. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
 3. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Division 01 Section "Closeout Procedures."

3.10 TEMPORARY HEATING AND COOLING RESPONSIBILITIES

- A. **Temporary responsibilities by phase:** Requirements of this Article relative to Temporary Enclosure, Permanent Enclosure, and Major Portion apply in equal force to each respective phase of the Work.
- B. **Work by Separate Prime Contracts:**
 1. Lead Contract (General Contract):
 - a. Provide and maintain adequate equipment, along with necessary hoses, connections, and other accessories to provide specified temporary heat as needed for the duration of the Project.
 - b. Provide and maintain adequate dehumidification and air moving equipment as needed for the duration of the Project, to be used for needed dehumidification.
 2. Electrical Contract:
 - a. Temporary Enclosure: Provide a dedicated temporary 120 V circuit for each piece of equipment.
 - b. Permanent Enclosure: Provide a dedicated 120 V circuit to a central location within each Designated Area (Area A, Area B, etc.) on each Floor of the building to support the temporary heating equipment. Location shall be coordinated with the Lead Contractor and Construction Manager.

3. Plumbing Contract:
 - a. Temporary Enclosure: Provide temporary supply and connections required for operation of temporary heat
 - b. Permanent Enclosure: Provide temporary gas line to a central location on each Floor of the Addition to support the use of temporary heating equipment. Location shall be coordinated with the Lead Contractor and Construction Manager.

- C. **Construction-Phase Use of Temporary Equipment:** Where project conditions, construction schedule or manufacturer's recommendations require additional mechanical cooling, humidification or dehumidification, the Lead Contractor shall employ a service or consultant acceptable to the Construction Manager who specializes in temporary construction heating, cooling, ventilating and humidity control, at no cost to the Owner.

- D. **Conditions and Limitations of Construction-Phase Use of Permanent Heating Equipment:**
 1. The entire piping system serving the permanent heating equipment being used for temporary heat must be complete, tested, flushed and treated prior to operation.
 2. Boilers, boiler pumps, heating pumps and related equipment must be operational and under control before permanent heating equipment can be used to supply temporary heat.
 3. For any permanent heating units with heat recovery wheels are used for temporary heat, the heat wheels should be temporarily de-powered and covered on both faces with plastic film; the wheel bypass damper should then be locked open for the duration of temporary heat. Once the need for temporary heat is over, these measures should be undone.
 4. If permanent equipment, piping and valves is used for temporary heat to extend, go around and/or bypass unenclosed areas, install in manner to keep equipment and piping from freezing. If necessary, provide temporary insulation and heat tracing for permanent equipment, piping and valves in unenclosed areas.
 5. If radiator valves and traps are used to supply heat during construction, properly clean and adjust valves and traps to efficiently operate in permanent system.
 6. Install temporary filters until construction phase is completed.
 - a. Replace filters as needed or at weekly intervals, whichever is shorter. If dust causing construction activities need to occur in areas where the permanent heating system is being used for temporary heat, the HVAC Contractor conducting this work must install filtering materials on the ductwork in the areas where the dust causing activities will occur.
 - b. Install permanent filters in permanent system just prior to testing and balancing
 7. Operate and maintain permanent heating system until Final Completion and acceptance of the Work.
 8. Heating coils on all Fan Powered VAV boxes shall be cleaned prior to final balancing. Change filters as described above.
 9. Operate the permanent heating system in a manner which does not interfere with the project balancing and commissioning.

- E. **Construction-phase use of permanent equipment for cooling or dehumidification is prohibited.**

- F. **Prior to Temporary Enclosure:** Each Prime Contractor shall provide, operate, and maintain provisions, including costs of installation, fuel, operation, maintenance, and removal of equipment necessary to provide temporary heat for the purpose of construction related activities on the building exterior (i.e. masonry, EIFS, metal panel installation, concrete slab placement, window or door installations, etc.) This requirement also extends to all site related construction activities.

- G. **Temporary Enclosure:**
 1. During period of temporary enclosure of any major portion, Lead Contractor shall provide temporary ambient heating and ventilation required by construction activities, for preparing new construction to receive finish work, or for protecting installed construction from adverse effects of improper conditions. Use equipment that will not have a harmful effect on completed installations or elements being installed. Except as otherwise noted, comply with the following minimum requirements:
 - a. Maintain minimum temperature of 45 degrees F in temporary enclosed portions of the Work.

- b. Maintain minimum temperature of 55 degrees F in permanently enclosed portions of building for normal construction activities, and 65 degrees F for finishing activities and areas where finished Work has been installed.
- 2. At all times, each Prime Contractor and its subcontractors shall provide the necessary equipment to properly ventilate or otherwise spot-condition enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases for their particular work and product requirements. This obligation exists independently of Lead Contractor's obligation to provide general ambient construction heat and ventilation.
 - a. Other responsibilities for climate control in individual spaces remain as follows:
 - 1) Ventilation and exhaust: If construction activities within a space create conditions that require additional tempered outside air or evacuation of inside air, fumes, dust, etc., beyond the design capacity of the equipment providing temporary heat, the responsibility remains with each Prime Contractor requiring that condition
 - 2) Maintain for the durations required by the particular construction activity
 - b. Cooling and dehumidification: If construction activities within a space, or activities related to adherence to the approved Combined Construction Schedule or Remedial Construction Schedule, require additional cooling or dehumidification beyond the design capacity of the equipment providing temporary heat, the responsibility remains with each Prime Contractor requiring that condition.
 - 1) Where project conditions, construction schedule or manufacturer's recommendations require additional mechanical cooling, humidification or dehumidification, employ a service or consultant acceptable to Architect and specializing in temporary construction heating, cooling, ventilating and humidity control, at no cost to the Owner.
 - 2) Maintain continuously 24 hours a day until conditions are acceptable to flooring manufacturer and approved by Architect.
- 3. Remove, to the satisfaction of the Architect, Construction Manager and Owner, soot, smudges, stains and other deposits resulting from the use of portable heating equipment, prior to the application or installation of any finish work.
- 4. Include costs of installation, power wiring, operation, maintenance, and removal of equipment.
- 5. If the type of utility source needed for portable heaters is not available from the Owner's existing utilities, the Lead Contractor shall be responsible for supplying and paying for the utility source needed to operate portable heaters.
- 6. When building or major portion thereof is a Permanent Enclosure notify Architect, Construction Manager and Owner in writing. If Architect, construction Manager, and Owner concur with Lead Contractor, give notice of Permanent Enclosure at regularly scheduled job conference and record in meeting minutes.
- 7. Lead Contractor shall give written notice to HC and Construction Manager that Permanent Enclosure has been established. Verify at weekly job conference and record notice in meeting minutes.

H. Permanent Enclosure:

- 1. Upon acceptance by Architect and Construction Manager of a Permanent Enclosure of any major portion of the building is established, the HVAC Contractor has 14 calendar days to supply (take over) the temporary heat to the permanently enclosed portion of the building. The HVAC Contractor will be responsible for temporary heat, temporary cooling, temporary ventilation and dehumidification and maintain until the entire project is substantially complete.
- 2. All Prime Contractors are required to have permanent or temporary utilities to the permanent mechanical equipment within the 14 calendar days if permanent equipment is to be used for temporary heat.
- 3. At all times, each Prime Contractor and its subcontractors shall provide the necessary equipment to properly ventilate or otherwise spot-condition enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases for their particular work and product requirements. This obligation exists independently of HVAC Contractor's obligation to provide general ambient construction heat and ventilation.
 - a. Select appropriate equipment that will not have a harmful effect on completed installations or elements being installed.

- b. Ventilation and exhaust: If construction activities within a space create conditions that require additional tempered outside air or evacuation of inside air, fumes, dust, etc., beyond the design capacity of the equipment providing temporary heat, the responsibility remains with each Prime Contractor creating that condition.
 - 1) Maintain for the durations required by the particular construction activity.
 - c. Cooling and dehumidification: If construction activities within a space, or activities related to adherence to the approved Combined Construction Schedule or Remedial Construction Schedule, require additional cooling or dehumidification beyond the design capacity of the equipment providing temporary heat, the responsibility remains with each Prime Contractor creating that condition.
 - 1) Where project conditions, construction schedule or manufacturer's recommendations require additional mechanical cooling, humidification or dehumidification, employ a service or consultant acceptable to Architect and specializing in temporary construction heating, cooling, ventilating and humidity control, at no cost to the Owner.
 - 2) Maintain continuously 24 hours a day until conditions are acceptable to flooring manufacturer and approved by Architect and Construction Manager.
- 4. Maintain appropriate design temperature in completed areas scheduled to receive finishes, furnishings and equipment; and meet requirements below in existing areas under construction.
 - a. Maintain minimum temperature of 55 degrees F in permanently enclosed portions of building for normal construction activities, and 65 degrees F for finishing activities and areas where finished Work has been installed.
 - 1) Use appropriate equipment that will not have a harmful effect on completed installations or elements being installed.
 - b. Maintain more stringent conditions where required by manufacturers of systems, finishes or assemblies being installed in an area under construction.
 - c. Conditions to be maintained 24 hours a day, 7 days a week.
 - d. If the type of utility source needed for portable heaters is not available from the Owner's existing utilities, the HVAC Contractor shall be responsible for supplying and paying for the utility source needed to operate portable heaters.
 - e. Clean soot, smudges, stains and other deposits resulting from the use of heaters equipment to the satisfaction of the Architect and Construction Manager.
- 5. Construction-phase use of permanent heating equipment is prohibited, except as strictly limited in subparagraph 6 below.
- 6. Conditions and limitations of construction-phase use of permanent heating equipment:
 - a. The entire piping system serving the permanent heating equipment being used for temporary heat must be complete, tested, flushed and treated prior to operation. This includes system water piping to and thru the evaporative cooler
 - b. Boilers, boiler pumps, heating pumps and related equipment must be operational and under control before permanent heating equipment can be used to supply temporary heat.
 - c. For any permanent heating units with heat recovery wheels are used for temporary heat, the heat wheels should be temporarily de-powered and covered on both faces with plastic film; the wheel bypass damper should then be locked open for the duration of temporary heat. Once the need for temporary heat is over, these measures should be undone.
 - d. If permanent equipment, piping and valves is used for temporary heat to extend, go around and/or bypass unenclosed areas, install in manner to keep equipment and piping from freezing. If necessary, provide temporary insulation and heat tracing for permanent equipment, piping and valves in unenclosed areas.
 - e. If radiator valves and trap are used to supply heat during construction, properly clean and adjust valves and trap to efficiently operate in permanent system.

- f. Install temporary filters until construction phase is completed.
 - 1) Replace filters as needed or at weekly intervals, whichever is shorter. If dust causing construction activities need to occur in areas where the permanent heating system is being used for temporary heat, the HVAC Contractor conducting this work must install filtering materials on the ductwork in the areas where the dust causing activities will occur.
 - 2) Install permanent filters in permanent system just prior to testing and balancing.
- g. Operate and maintain permanent heating system until Final Completion and acceptance of the Work.
- h. All mechanical units and equipment shall be thoroughly cleaned inside and out prior to final balancing. Change filters as described above.
- i. Operate the permanent heating system in a manner which does not interfere with the project balancing and commissioning.

END OF SECTION 01 5000

SECTION 01 6000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

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

1. Selection of products for use in Project
2. Product delivery, storage, and handling
3. Manufacturers' standard warranties on products
4. Special warranties
5. Comparable products

1.2 DEFINITIONS

A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature that is current as of date of the Contract Documents.
2. New Products: Items that have not previously been incorporated into another project or facility. Salvaged items or items reused from other projects are not considered new products. Items that are manufactured or fabricated to include recycled content materials are considered new products, unless indicated otherwise.
3. Comparable Product: Product by named manufacturer that is demonstrated and approved through the comparable product submittal process described in Part 2 "Comparable Products" Article, to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.
4. Products may also include existing materials or components required for reuse, if so specified.

B. Basis-of-Design Product Specification: A specification in which a single manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation. Published attributes and characteristics of basis-of-design product establish salient characteristics of products.

1. Evaluation of Comparable Products: In addition to the basis-of-design product description, product attributes and characteristics may be listed to establish the significant qualities related to type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other special features and requirements for purposes of evaluating comparable products of additional manufacturers named in the specification. Manufacturer's published attributes and characteristics of basis-of-design product also establish salient characteristics of products for purposes of evaluating comparable products.

C. Subject to Compliance with Requirements: Where the phrase "Subject to compliance with requirements" introduces a product selection procedure in an individual Specification Section, provide products qualified under the specified product procedure. In the event that a named product or product by a named manufacturer does not, in the judgement of the Architect, meet the other requirements of the specifications, select another named product or product from another named manufacturer that does meet the requirements of the specifications; submit a comparable product request or substitution request, if applicable.

D. Comparable Product Request Submittal: An action submittal requesting consideration of a comparable product, including the following information:

1. Identification of basis-of-design product or fabrication or installation method to be replaced, including Specification Section number and title and Drawing numbers and titles.

- 2. Data indicating compliance with the requirements specified in Part 2 "Comparable Products" Article.
- E. Basis-of-Design Product Specification Submittal: An action submittal complying with requirements in Division 01 Section "Submittal Procedures."
- F. Whenever the words "or equal" appear in the Contract Documents, they shall be interpreted to mean "or alternatives of quality necessary to meet the specifications."
- G. Substitution: Refer to Division 01 Section "Substitution Procedures" for definition and limitations on substitutions.

1.3 QUALITY ASSURANCE

- A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.
- B. Provide material and equipment for incorporated into the Work that:
 - 1. Conforms to applicable specifications and standards.
 - 2. Complies with size, make, type, and quality specified, or as specifically approved in writing by the Architect.
- C. Manufactured and Fabricated Products; Generally observe the following, unless otherwise indicated:
 - 1. Design, fabricate, and assemble in accord with specified standards and current standard of care.
 - 2. Manufacture like parts of duplicate units to standard sizes and gages, to be interchangeable.
 - 3. Two or more items of the same kind shall be identical, by the same manufacturer.
 - 4. Products shall be suitable for service conditions.
 - 5. Meet or exceed specified equipment capacities, and adhere to sizes, and dimensions shown or specified, unless variations are specifically approved in writing.
- D. Do not use material or equipment for any purpose other than that for which it is designed or specified.
- E. Do not use materials and equipment removed from existing premises, except as specifically permitted by the Contract Documents.
- F. Identification of Products: Except for required labels and operating data, do not attach or imprint manufacturer or product names or trademarks on exposed surfaces of products or equipment that will be exposed to view in occupied spaces or on the exterior.
 - 1. Labels: Locate required product labels and stamps on a concealed surface, or, where required for observation following installation, on a visually accessible surface that is not conspicuous.
 - a. Observe referenced industry standards and prevailing building code requirements.
 - 2. Equipment Nameplates: Provide a permanent nameplate on each item of service- or power-operated equipment. Locate on a visually accessible but inconspicuous surface. Include information essential for operation, including the following:
 - a. Name of product and manufacturer.
 - b. Model and serial number.
 - c. Capacity.
 - d. Speed.
 - e. Ratings.
 - 3. See individual identification Sections in Divisions 21, 22, 23, 26, 27 and 28 for additional equipment identification requirements.

1.4 COORDINATION

- A. Modify or adjust affected work as necessary to integrate work of approved comparable products and approved substitutions.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products, using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.
- B. Contractor shall be responsible for the properly located, secure, and weather resistant storage as required of materials. Place materials so as not to obstruct passage on site or within building structures or in any way which causes impediment or obstruction to normal building operations.
- C. Delivery and Handling:
 - 1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
 - 2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
 - 3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
 - 4. Inspect products on delivery to determine compliance with the Contract Documents and that products are undamaged and properly protected.
- D. Staging and Storage:
 - 1. Provide a secure location and enclosure at Project site for storage of materials and equipment. Coordinate location with Construction Manager .
 - 2. Store products to allow for inspection and measurement of quantity or counting of units.
 - 3. Store and protect products with manufacturer's seals and labels intact and legible.
 - 4. Store materials in a manner that will not endanger Project structure.
 - a. Do not allow excessive loads on building structure.
 - 5. Store products that are subject to damage by the elements under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation and with adequate protection from wind.
 - 6. Store loose granular materials on solid surfaces such as paved areas, or provide plywood or sheet materials to prevent mixing with foreign matter.
 - a. Provide surface drainage to prevent flow or ponding of rainwater.
 - b. Prevent mixing with refuse, chemically injurious materials, or liquids.
 - 7. Protect stored products from damage and liquids from freezing.
 - a. Store cementitious products and materials on elevated platforms.
 - b. Protect foam plastic and other UV- and sunlight-sensitive materials from exposure to sunlight, except to extent necessary for period of installation and concealment.
 - c. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
 - d. Provide substantial platforms, blocking, or skids to support fabricated products above ground, prevent soiling, or staining.
 - e. For exterior storage of fabricated products, place on sloped supports, above ground.
 - f. Cover products subject to discoloration or deterioration from exposure to the elements, with impervious sheet coverings.
 - 8. Provide off-site storage and protection at no additional cost to Owner when site does not permit on-site storage or protection.

- E. Coordination: Coordinate delivery and storage on the jobsite of all significant materials by subcontracts and suppliers. Coordinate delivery and storage of materials on the site with the Construction Manager.
1. Contractor is required to properly instruct material suppliers and vendors to address deliveries to them specifically by named responsible party at the jobsite and require advance notice.
 2. Deliveries addressed to the project in general, the Owner, Construction Manager, or Architect, will be refused and returned to shipper.
 - a. Owner will not be responsible for receipt, handling, and loss of materials shipped to the Owner in error and received unknowing of relationship to the project.
 3. Arrange deliveries of products in accord with project construction schedules, each Contractor to coordinate the deliveries to avoid conflict of work, and to suit site conditions. Notify Construction Manager 48 hours in advance of major deliveries.
 4. Promptly inspect shipments to assure that products comply with requirements, are in manufacturer's original containers with identifying labels intact, quantities are correct, and products are undamaged.
 5. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.
 - a. Enforce transporting and handling of products in accord with manufacturer's instructions.

1.6 PRODUCT WARRANTIES

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
1. Manufacturer's Warranty: Written standard warranty form furnished by individual manufacturer for a particular product and issued in the name of the Owner or endorsed by manufacturer to Owner.
 2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner and issued in the name of the Owner or endorsed by manufacturer to Owner.
- B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.
1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
 2. Specified Form: When specified forms are included in the Project Manual, prepare a written document, using indicated form properly executed.
 3. See other Sections for specific content requirements and particular requirements for submitting special warranties.
- C. Warranty Period and Timing: Comply with requirements in Division 01 Section "Closeout Procedures."
- D. Submittal Time: Comply with requirements in Division 01 Section "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

- A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.
1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
 2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.

3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," Architect will make selection.
5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
6. Or Equal: For products specified by name and accompanied by the term "or equal," or "or alternatives of quality necessary to meet the specifications," or "or approved equal," or "or as otherwise approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.
 - a. Submit additional documentation required by Architect in order to establish equivalency of proposed products. Unless otherwise indicated, evaluation of "or equal" product status is by the Architect, whose determination is final.

B. Product Selection Procedures:

1. Limited List of Products ("Available Products"): Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will be considered unless otherwise indicated.
 - a. Limited list of products may be indicated by the phrase "Subject to compliance with requirements, provide one of the following."
2. Non-Limited List of Products ("Products"): Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed or an unnamed product that complies with requirements.
 - a. Non-limited list of products is indicated by the phrase "Subject to compliance with requirements, available products that may be incorporated in the Work include, but are not limited to, the following."
 - b. Provision of an unnamed product is not considered a substitution, if the product complies with requirements.
3. Limited List of Manufacturers ("Available Manufacturers"): Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will be considered unless otherwise indicated.
 - a. Limited list of manufacturers is indicated by the phrase "Subject to compliance with requirements, provide products by one of the following."
4. Non-Limited List of Manufacturers: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed or a product by an unnamed manufacturer that complies with requirements.
 - a. Non-limited list of manufacturers is indicated by the phrase "Subject to compliance with requirements, available manufacturers whose products may be incorporated in the Work include, but are not limited to, the following."
 - b. Provision of products of an unnamed manufacturer is not considered a substitution, if the product complies with requirements.
5. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications may additionally indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.
 - a. For approval of products by unnamed manufacturers, comply with requirements in Division 01 Section "Substitution Procedures" for substitutions for convenience.

- C. Visual Matching Specification: Where Specifications require the phrase "match sample" or "match Architect's sample," provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.
 - 1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Division 01 Section "Substitution Procedures" for proposal of product.
- D. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's colors, patterns, textures" or a similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes either standard or standard and premium items, as indicated.
 - 1. Standard Range: Where Specifications include the phrase "standard range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, or texture from manufacturer's product line that does not include premium items.
 - 2. Full Range: Where Specifications include the phrase "full range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, or texture from manufacturer's product line that includes both standard and premium items.

2.2 COMPARABLE PRODUCTS

- A. Conditions for Consideration of Comparable Products: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with the following requirements:
 - 1. Evidence that proposed product does not require revisions to the Contract Documents, is consistent with the Contract Documents, will produce the indicated results, and is compatible with other portions of the Work.
 - 2. Detailed comparison of significant qualities of proposed product with those of the named basis-of-design product. Significant product qualities include attributes, such as type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other specific features and requirements.
 - 3. Evidence that proposed product provides specified warranty.
 - 4. List of similar installations for completed projects, with project names and addresses and names and addresses of architects and owners, if requested.
 - 5. Samples, if requested.
- B. Architect's Action on Comparable Products Submittal: If necessary, Architect will request additional information or documentation for evaluation, as specified in Division 01 Section "Submittal Procedures."
 - 1. Form of Approval of Submittal: As specified in Division 01 Section "Submittal Procedures."
 - 2. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.
- C. Submittal Requirements, Two-Step Process: Approval by the Architect of Contractor's request for use of comparable product is not intended to satisfy other submittal requirements. Comply with specified submittal requirements.

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 6000

SECTION 01 7300 - EXECUTION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes general administrative and procedural requirements governing execution of the Work, including, but not limited to, the following:
 - 1. Installation of the Work.
 - 2. Cutting and patching.
 - 3. Progress cleaning.
 - 4. Protection of installed construction.
 - 5. Correction of the Work

1.2 DEFINITIONS

- A. Cutting: Removal of in-place construction necessary to permit installation or performance of subsequent work.
- B. Patching: Fitting and repair work required to restore construction to original conditions after installation of subsequent work.
- C. Drilling of holes to install fasteners and similar operations are also not considered to be "cutting and patching".
- D. "Selective Demolition" is recognized as related but separate category of work, which may or may not include cutting and patching as defined in this specification.

1.3 PREINSTALLATION MEETINGS

- A. Cutting and Patching Conference: Conduct conference at Project site.
 - 1. Prior to commencing work requiring cutting and patching, review extent of cutting and patching anticipated and examine procedures for ensuring satisfactory result from cutting and patching work. Inform Architect and Construction Manager of scheduled meeting. Require representatives of each entity directly concerned with cutting and patching to attend, including the following:
 - a. Contractor's superintendent.
 - b. Trade supervisor responsible for cutting operations.
 - c. Trade supervisor(s) responsible for patching of each type of substrate.
 - d. Mechanical, electrical, and utilities subcontractors' supervisors, to the extent each trade is affected by cutting and patching operations.
 - 2. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

1.4 ACTION SUBMITTALS

A. Request for Instructions:

1. Submit a written request prior to cutting, coring, or alteration which may affect the structural safety or operational performance, including weather tightness, of any portion of the project, or for the following reasons:
 - a. To uncover portions of the work for observation of covered work.
 - b. To remove samples of installed materials for testing beyond that specified.
 - c. To remove work to provide for alteration of previously installed work.
2. Include the following at a minimum:
 - a. Identification of the project.
 - b. Description of the affected work.
 - c. The necessity for doing the cutting, coring, or alteration.
 - d. The effect on the work of any separate contractor, or on the structural integrity or operational performance of the project.
 - e. Description of the proposed work:
 - 1) The scope of cutting, patching, coring, or alteration.
 - 2) The Contractor and trades who will execute the work.
 - 3) Product proposed to be used.
 - f. Alternatives to cutting, coring, or patching.
 - g. Designation of the responsibility for the cost of cutting and patching.
3. Submit a written notice designating the date and the time the work will be uncovered.

1.5 INFORMATIONAL SUBMITTALS

A. Cutting and Patching Plan: Submit plan describing procedures at least 10 days prior to the time cutting and patching will be performed. Include the following information:

1. Extent: Describe reason for and extent of each occurrence of cutting and patching.
2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building appearance and other significant visual elements.
3. Products: List products to be used for patching and firms or entities that will perform patching work.
4. Dates: Indicate when cutting and patching will be performed.
5. Utilities and Mechanical and Electrical Systems: List services and systems that cutting and patching procedures will disturb or affect. List services and systems that will be relocated and those that will be temporarily out of service. Indicate length of time permanent services and systems will be disrupted.
 - a. Include description of provisions for temporary services and systems during interruption of permanent services and systems.
 - b. Provide notification to Owner, through Construction Manager, in advance of service interruptions, as required in General Conditions of the Contract, Summary Sections of Division, and elsewhere in the Contract Documents.

1.6 QUALITY ASSURANCE

- A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.
- B. Professional Engineer Qualifications: Refer to Section 01 4000 "Quality Requirements."

- C. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
1. Structural Elements: When cutting and patching structural elements, or when encountering the need for cutting and patching of elements whose structural function is not known, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection.
 2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Submit a plan for cutting and patching for the following types of systems and equipment:
 - a. Primary operational systems and equipment.
 - b. Fire separation assemblies.
 - c. Air or smoke barriers.
 - d. Fire-suppression systems.
 - e. Plumbing piping systems.
 - f. Mechanical systems piping and ducts.
 - g. Control systems.
 - h. Communication systems.
 - i. Fire-detection and -alarm systems.
 - j. Conveying systems.
 - k. Electrical wiring systems.
 - l. Security systems including CCTV and duress alarms.
 - m. Operating systems of special construction.
 3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety. Submit a plan for cutting and patching the following types of miscellaneous elements:
 - a. Water, moisture, or vapor barriers.
 - b. Membranes and flashings.
 - c. Exterior curtain-wall construction.
 - d. Sprayed fire-resistive material.
 - e. Fire stopping
 - f. Equipment supports.
 - g. Piping, ductwork, vessels, and equipment.
 - h. Noise- and vibration-control elements and systems.
 - i. Insulating systems.
 4. Visual Elements: Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
- D. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of specified products and equipment.
- E. Cutting and Patching Conference: Before proceeding, meet at the Jobsite with parties involved in cutting and patching. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

1.7 WARRANTY

- A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during cutting and patching operations, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Comply with requirements specified in other Sections.
 - 1. Where materials needed to comply with requirements to match adjacent work are not specified in other Sections, request additional direction, or Contract modification where appropriate, from the Architect.
- B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
 - 1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials. Use materials that are not considered hazardous.
- C. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work.
 - 1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, gas service piping, and water-service piping; underground electrical services; fiberoptics, and other utilities.
 - 2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.
- B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
 - 1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
 - 2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
 - 3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
- C. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
 - 1. Description of the Work, including Specification Section number and paragraph, and Drawing sheet number and detail, where applicable.
 - 2. List of detrimental conditions, including substrates.
 - 3. List of unacceptable installation tolerances.
 - 4. Recommended corrections.
- D. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
- E. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Existing Utility Information: Furnish information to local utility and Owner that is necessary to adjust, move, or relocate existing utility structures, poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
- B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information to Architect, through Construction Manager, in accordance with requirements in Section 01 3100 "Project Management and Coordination."
- E. Temporary Support: Provide temporary support of Work to be cut. Confirm structural adequacy and applicable regulatory compliance of temporary supports prior to proceeding with Work.
- F. Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- G. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
- H. Existing Services: Where existing services are required to be removed, relocated, or abandoned, bypass such services before cutting to minimize interruption of services to occupied areas.

3.3 INSTALLATION

- A. Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure satisfactory results as judged by Architect. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy of type expected for Project.
- E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on-site and placement in permanent locations.
- F. Tools and Equipment: Select tools or equipment that minimize production of excessive noise levels.
- G. Templates: Obtain and distribute to the parties involved templates for Work specified to be factory prepared and field installed. Check Shop Drawings of other portions of the Work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions with manufacturer.
 - 1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.

2. Allow for building movement, including thermal expansion and contraction.
 3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- I. Repair or remove and replace damaged, defective, or nonconforming Work.
1. Comply with Section 01 7700 "Closeout Procedures" for repairing or removing and replacing defective Work.

3.4 CUTTING AND PATCHING

- A. General: Employ skilled workers to perform cutting, coring, fitting, infill, and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
 2. Cut and patch existing construction damaged or defaced during new construction as required to restore to existing or better condition at the time of award of Contract.
 3. Cut and patch as required to:
 - a. Install or correct non-coordinated or ill-timed Work.
 - b. Remove and replace defective and non-conforming Work.
 - c. Provide routine penetrations of non-structural surfaces for installation of piping and electrical conduit
 - d. Remove samples of installed Work for testing.
 4. Restore the integrity of fire rated construction at cutting and patching work.
- B. Comply with coordination requirements and division of responsibilities for cutting and patching as specified in Section 01 2000 "Summary of Multiple Contracts"
- C. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.
- D. Containment: Comply with applicable dust, noise, pollution, fire resistance, and security requirements in Section 01 5000 "Temporary Facilities and Controls"
- E. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- F. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching in accordance with Owner's Use and notification requirements in Section 01 1000 "Summary" and 01 2000 "Summary of Multiple Contracts".
- G. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to prevent interruption to occupied areas.
- H. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
 4. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.

5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
 6. Proceed with patching after construction operations requiring cutting are complete in compliance with coordination and other requirements of Section 01 2000 "Summary of Multiple Contracts"
- I. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as practicable, as judged by Architect. Provide materials and comply with installation requirements specified in other Sections, where applicable.
1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
 2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing. New work shall be indistinguishable from existing.
 - a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
 - b. Restore damaged pipe covering to its original condition.
 3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
 - a. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch, corner to corner of wall and edge to edge of ceiling. Provide additional coats until patch blends with adjacent surfaces.
 4. Ceilings: Patch, repair, or rehang in-place ceilings as indicated and as necessary to provide an even-plane surface of uniform appearance.
 5. Structural Modifications: Where not shown on Drawings, provide work in accordance with delegated-design provisions specified, subject to Architect's approval, or request additional information, or Contract modification, from Architect.
 6. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.
- J. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.5 PROGRESS CLEANING

- A. Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
 2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F.
 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
 - a. Use containers intended for holding waste materials of type to be stored.
 4. Coordinate progress cleaning for joint-use areas where other Contractors are working concurrently. Comply with cooperation requirements and respective responsibilities of Contractors per Section 01 2000 "Summary of Multiple Contracts"
- B. Site: Maintain Project site free of waste materials and debris.

- C. Work Areas: Clean areas where Work is in progress to the level of cleanliness necessary for proper execution of the Work.
 - 1. Remove liquid spills promptly.
 - 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Section 01 5000 "Temporary Facilities and Controls."
- H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- J. Limiting Exposures: Supervise construction operations to ensure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.6 PROTECTION AND REPAIR OF INSTALLED and EXISTING CONSTRUCTION

- A. Provide final protection and maintain conditions that ensure installed Work, Work in progress, and existing construction affected by construction activities, are without damage or deterioration at time of Substantial Completion.
 - 1. Use proven protection methods, appropriate to each area and surface being protected.
 - 2. Provide temporary barricades, barriers, and directional signage to exclude the public from areas where alteration Work is being performed.
 - 3. Erect temporary barriers to form and maintain fire-egress routes.
 - 4. Contain dust and debris generated by Work, and prevent it from reaching the public or adjacent surfaces.
 - 5. Provide shoring, bracing, and supports as necessary. Do not overload structural elements.
 - 6. Protect floors and other surfaces along hauling routes from damage, wear, and staining.
 - 7. Provide supplemental sound-control treatment to isolate demolition work from other areas of the building.
- B. Repair Work previously completed and subsequently damaged during construction period. Repair to like-new condition.
- C. Protection of Existing Items: Provide protection and ensure that existing items to remain undisturbed by construction are maintained in condition that existed at commencement of the Work.
- D. Comply with manufacturer's written instructions for temperature and relative humidity.
- E. Coordinate protection and repair requirements for areas where other Contractors are working concurrently. Comply with cooperation requirements and respective responsibilities of contractors per Section 01 2000 "Summary of Multiple Contracts"

- F. Utility and Communications Services:
1. Notify Owner, Architect, Construction Manager, authorities having jurisdiction, and entities owning or controlling wires, conduits, pipes, and other services affected by Work before commencing operations.
 2. Disconnect and cap pipes and services as required by authorities having jurisdiction, as required for alteration work.
 3. Maintain existing services unless otherwise indicated; keep in service, and protect against damage during operations. Provide temporary services during interruptions to existing utilities.
- G. Existing Drains: Prior to the start of work in an area, test drainage system to ensure that it is functioning properly. Notify Architect and Construction Manager immediately of inadequate drainage or blockage. Do not begin work in an area until the drainage system is functioning properly.
1. Prevent solids such as adhesive or mortar residue or other debris from entering the drainage system. Clean out drains and drain lines that become sluggish or blocked by sand or other materials resulting from alteration work.
 2. Protect drains from pollutants. Block drains or filter out sediments, allowing only liquid to pass.
- H. Existing Roofing: Prior to the start of Work in an area, provide adequate roofing protection acceptable to Architect and Construction Manager.
1. Where existing roofing is covered by a manufacturer's warranty, perform work in compliance with applicable manufacturer requirements.
- I. Fire-Prevention Plan: Prepare a written plan for preventing fires during the Work, including placement of fire extinguishers, fire blankets, rag buckets, and other fire-control devices during each phase or process. Coordinate plan with Owner's fire-protection equipment and requirements. Include fire-watch personnel's training, duties, and authority to enforce fire safety.
1. Comply with NFPA 241 requirements unless otherwise indicated. Perform duties titled "Owner's Responsibility for Fire Protection."
 2. Remove and keep area free of combustibles, including rubbish, paper, waste, and chemicals, unless necessary for the immediate work.
 - a. If combustible material cannot be removed, provide fire blankets to cover such materials.
- J. Heat-Generating Equipment and Combustible Materials: Comply with the following procedures while performing work with heat-generating equipment or combustible materials, including welding, torch-cutting, soldering, brazing, removing paint with heat, or other operations where open flames or implements using high heat or combustible solvents and chemicals are anticipated:
1. Obtain Architect's, Construction Manager's, and Owner's approval for operations involving use of welding or other high-heat equipment. Use of open-flame equipment is not permitted. Notify Architect, Construction Manager, and Owner at least 72 hours before each occurrence, indicating location of such work.
 2. Do not perform work with heat-generating equipment in or near rooms or in areas where flammable liquids or explosive vapors are present or thought to be present. Use a combustible gas indicator test to ensure that the area is safe.
 3. Use fireproof baffles to prevent flames, sparks, hot gases, or other high-temperature material from reaching surrounding combustible material.
 4. Prevent the spread of sparks and particles of hot metal through open windows, doors, holes, and cracks in floors, walls, ceilings, roofs, and other openings.
 5. Fire Watch: Before working with heat-generating equipment or combustible materials, station personnel to serve as a fire watch at each location where such work is performed. Fire-watch personnel shall have the authority to enforce fire safety. Station fire watch according to NFPA 51B, NFPA 241, and as follows:
 - a. Train each fire watch in the proper operation of fire-control equipment and alarms.
 - b. Prohibit fire-watch personnel from other work that would be a distraction from fire-watch duties.
 - c. Cease work with heat-generating equipment whenever fire-watch personnel are not present.

- d. Have fire-watch personnel perform final fire-safety inspection each day beginning no sooner than 30 minutes after conclusion of work in each area to detect hidden or smoldering fires and to ensure that proper fire prevention is maintained.
- K. Fire-Control Devices: Provide and maintain fire extinguishers, fire blankets, and rag buckets for disposal of rags with combustible liquids. Maintain each as suitable for the type of fire risk in each work area. Ensure that nearby personnel and the fire-watch personnel are trained in fire-extinguisher and blanket use.

3.7 CORRECTION OF THE WORK

- A. Repair or remove and replace defective construction. Restore damaged substrates and finishes.
 - 1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.
 - 2. Coordinate correction requirements for areas where other Contractors are working concurrently. Comply with cooperation requirements and respective responsibilities of contractors per Section 01 2000 "Summary of Multiple Contracts"
- B. Restore permanent facilities used during construction to their specified condition.
- C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.
- D. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.
- E. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION 01 7300

SECTION 01 7700 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for Contract closeout, including, but not limited to, the following:
 - 1. Closeout submittals
 - 2. Maintenance materials
 - 3. Substantial Completion procedures.
 - 4. Final completion procedures.
 - 5. Punch List
 - 6. Record Documents
 - 7. Warranties.
 - 8. Final adjustment of accounts
 - 9. Final cleaning.
 - 10. Correction and Protection of Work

1.2 DEFINITIONS

- A. List of Incomplete Items: Contractor-prepared list of items to be completed or corrected, prepared for the Architect's use prior to Architect's inspection, to determine if the Work is substantially complete.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of cleaning agent.
- B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.
- C. Certified List of Incomplete Items: Final submittal at Final Completion.

1.4 CLOSEOUT SUBMITTALS

- A. Certificates of Release: Evidence of compliance with requirements of governing authorities.
 - 1. Certificate of Occupancy.
 - 2. Certificates of Inspection, as follows or as otherwise applicable:
 - a. Mechanical.
 - b. Electrical.
 - c. Food Service Equipment.
 - d. Fire Marshall.
- B. Operating and Maintenance Data: Per requirements of Division 01 Section "Operation and Maintenance Data".
- C. Warranties and bonds.

- D. Keys and Keying Schedules.
- E. Spare parts and Maintenance materials.
- F. Contractor's Affidavit of Payment and Debts and Claims (AIA G706) and Affidavit of Release of Liens (AIA G706A): Per requirements of General Conditions of the Contract for Construction.
- G. Final Contractors Weekly Payroll Certifications.
- H. Consent of Surety Company to Final Payment (AIA G707).
- I. Certificate of Insurance: For continuing coverage.

1.5 SUBSTANTIAL COMPLETION PROCEDURES

- A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's "punch list"), indicating the value of each item on the list and reasons why the Work is incomplete.
- B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
 - 1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction, permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
 - 2. Submit closeout submittals specified in other Division 01 Sections, including Project Record Documents, operation and maintenance manuals, damage or settlement surveys, and similar final record information.
 - 3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
 - 4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Construction Manager. Label with manufacturer's name and model number.
 - 5. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
- C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
 - 1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
 - 2. Advise Owner of pending insurance changeover requirements.
 - 3. Make final changeover of permanent locks and deliver keys to Owner, as specified. Advise Owner's personnel of changeover in security provisions.
 - 4. Perform preventive maintenance on equipment used prior to Substantial Completion.
 - 5. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner, through Construction Manager. Label with manufacturer's name and model number where applicable.
 - 6. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.
 - 7. Advise Owner of changeover in utility services.
 - 8. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
 - 9. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
 - 10. Advise Owner in changeover of heat and other utilities.
 - 11. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
 - 12. Complete final cleaning requirements, including touchup painting.
 - 13. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.
 - 14. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.

15. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
 16. Prepare and submit Project Record Documents, Operation and Maintenance Manuals, Final Completion construction photographs, damage or settlement surveys, property surveys, and similar final record information.
- D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 10 days prior to date the Work will be completed and ready for final inspection and tests. On receipt of request, Architect and Construction Manager will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect and Construction Manager will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect and Construction Manager, that must be completed or corrected before certificate will be issued.
1. At least one authorized, responsible representative of each Prime Contractor requesting inspection, with full authority to make decisions on behalf of the Contractor, shall accompany the Architect and Construction Manager during the entirety of the inspection. Such Contractor's representatives shall consist of at least one of the following:
 - a. Contractor's on-site superintendent
 - b. Contractor's project manager
 2. The Owner shall be invited, but not required to attend inspections.
 3. Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
 - a. Re-inspection may result in additional costs to Contractor, to reimburse Owner for fees and costs incurred by Architect and its consultants.
 4. Results of completed inspection will form the basis of requirements for Final Completion.

1.6 FINAL COMPLETION PROCEDURES

- A. Submittals Prior to Final Completion: Before requesting final inspection for determining Final Completion, complete the following:
1. Submit a final Application for Payment in accordance with Section 01 2900 "Payment Procedures."
 2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
 3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
 4. Submit Final Completion photographic documentation, where required by Contract.
 5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training videotapes.
- B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to date the Work will be completed and ready for final inspection and tests. On receipt of request, Architect and Construction Manager will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will request Contractor to prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be requested.
1. Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
 2. If more than one re-inspection is required, the Contractor shall be charged for the Architect's and Construction Manager's fees, in accordance with the Contract Documents.

1.7 LIST OF INCOMPLETE ITEMS (Punch List)

- A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.
 - 1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor, listed by room or space number.
 - 2. Organize items applying to each space by major element, including categories for ceilings, individual walls, floors, equipment, and building systems.
 - 3. Include the following information at the top of each page:
 - a. Project name.
 - b. Date.
 - c. Name of Architect and Construction Manager.
 - d. Name of Contractor.
 - e. Page number.
 - 4. Submit list of incomplete items in the following format:
 - a. Web-Based Project Software Upload: Utilize software feature for creating and updating list of incomplete items (punch list).

1.8 PROJECT RECORD DOCUMENTS

- A. General: Submit record documents as specified in Section 01 7839 "Project Record Documents."

1.9 SUBMITTAL OF PROJECT WARRANTIES

- A. Time of Submittal: Except as otherwise indicated, submit written warranties as follows.
 - 1. On request of Architect for designated portions of the Work where warranties are indicated to commence on dates other than date of Substantial Completion, or
 - 2. When delay in submittal of warranties might limit Owner's rights under warranty, or
 - 3. On request of Architect for designated portions of the Work that have been determined to be substantially complete, or
 - 4. At Project Closeout for otherwise unsubmitted warranties.
- B. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.
- C. Warranty Electronic File: Provide warranties and bonds in PDF format. Assemble complete warranty and bond submittal package into a single electronic PDF file with bookmarks enabling navigation to each item. Provide bookmarked table of contents at beginning of document.
 - 1. Submit electronically using digital media acceptable to Architect and Construction Manager.

1.10 FINAL ADJUSTMENT OF ACCOUNT

- A. Submit a final statement of accounting to Construction Manager and Architect.
- B. Statement shall reflect adjustments to the Contract Sum:
 - 1. The original Contract Sum.
 - 2. Additions and deductions resulting from:
 - a. Previous Charge Orders.
 - b. Unit Prices.

- c. Deductions for uncorrected work.
 - d. Deductions for liquidated damages.
 - e. Deductions for re-inspection payments.
 - f. Other adjustments.
- 3. Total Contract Sum, as adjusted.
 - 4. Previous Payments.
 - 5. Sum remaining due.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 - EXECUTION

3.1 FINAL CLEANING

- A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
- C. Unless otherwise directed in writing, complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:
 - 1. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
 - 2. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
 - 3. Remove tools, construction equipment, machinery, and surplus material from Project site.
 - 4. Clean exposed exterior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
 - 5. Remove debris and surface dust from limited-access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
 - 6. Remove labels that are not permanent.
 - 7. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.
 - a. Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.
 - 8. Wipe surfaces of mechanical and electrical equipment and similar equipment.
 - 9. Clean strainers.
 - 10. Leave Project clean and ready for occupancy.
- D. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.

- E. Construction Waste Disposal: Comply with waste-disposal requirements in Section 01 5000 "Temporary Facilities and Controls."

3.2 PROTECTION AND REPAIR OF THE WORK

- A. Provide final protection, maintain conditions that ensure that Work and existing construction are without damage or deterioration, and complete repair and restoration operations before requesting inspection for determination of Substantial Completion.

END OF SECTION 01 7700

SECTION 01 7823 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
 - 1. Operation and maintenance documentation directory manuals.
 - 2. Emergency manuals.
 - 3. Systems and equipment operation manuals.
 - 4. Systems and equipment maintenance manuals.
 - 5. Product maintenance manuals.
 - 6. Project Inspection reports
- B. Where operation and maintenance documentation includes information on installations by more than one factory-authorized service representative, assemble and coordinate information furnished by representatives and prepare manuals.

1.2 DEFINITIONS

- A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.
- B. Subsystem: A portion of a system with characteristics similar to a system.

1.3 CLOSEOUT SUBMITTALS

- A. Submit operation and maintenance manuals indicated. Provide content for each manual as specified in individual Specification Sections, and as reviewed and approved at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.
 - 1. Architect and Construction Manager will comment on whether content of operation and maintenance submittals is acceptable.
 - 2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.
- B. Format: Submit operation and maintenance manuals in the following format:
 - 1. Submit by uploading to web-based project software site. Enable reviewer comments on draft submittals.
 - 2. Submit one digital copy, through Construction Manager, for review by the design team.
 - 3. Once reviewed and approved, submit one digital copy and one hard copy of the final documents.
- C. Initial Manual Submittal: Submit draft copy of each manual at least 30 days before commencing demonstration and training. Architect and Construction Manager will comment on whether general scope and content of manual are acceptable.
- D. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training. Architect, through Construction Manager, will return copy with comments.
 - 1. Correct or revise each manual to comply with Architect's and Construction Manager's comments. Submit copies of each corrected manual within 15 days of receipt of Architect's and Construction Manager's comments and prior to commencing demonstration and training.

- E. Comply with Section 01 7700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

1.4 FORMAT OF OPERATION AND MAINTENANCE MANUALS

- A. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.
 - 1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
 - 2. File Names and Bookmarks: Bookmark individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.
- B. Manuals, Paper Copy: Submit manuals in the form of hard-copy, bound and labeled volumes.
 - 1. Binders: Heavy-duty, three-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
 - a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
 - b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, subject matter of contents, and indicate Specification Section number on bottom of spine. Indicate volume number for multiple-volume sets.
 - 2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
 - 3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment. Enclose title pages and directories in clear plastic sleeves.
 - 4. Supplementary Text: Prepared on 8-1/2-by-11-inch white bond paper.
 - 5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
 - a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
 - b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

1.5 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

- A. Organization of Manuals: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
 - 1. Title page.
 - 2. Table of contents.
 - 3. Manual contents.
- B. Title Page: Include the following information:
 - 1. Subject matter included in manual.
 - 2. Name and address of Project.
 - 3. Name and address of Owner.
 - 4. Date of submittal.
 - 5. Name and contact information for Contractor.

6. Name and contact information for Construction Manager.
 7. Name and contact information for Architect.
 8. Name and contact information for Commissioning Authority.
 9. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
 10. Cross-reference to related systems in other operation and maintenance manuals.
- C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.
- D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.
- E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY MANUAL

- A. Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals. List items and their location to facilitate ready access to desired information. Include the following:
1. Organization: Include a section in the directory for each of the following:
 - a. List of documents.
 - b. List of systems.
 - c. Table of contents, coordinated with the Project Manual.
 2. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.
 3. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.
 4. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.

3.2 EMERGENCY MANUALS

- A. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.
1. Include emergency information that must be immediately available during emergency situations to protect life and property and to minimize disruptions to building occupants
- B. Content: Organize manual into a separate section for each of the following:
1. Type of emergency.
 2. Emergency instructions.
 3. Emergency procedures.

- C. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:
1. Fire.
 2. Flood.
 3. Gas leak.
 4. Water leak.
 5. Power failure.
 6. Water outage.
 7. System, subsystem, or equipment failure.
 8. Chemical release or spill.
- D. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.
- E. Emergency Procedures: Include the following, as applicable:
1. Instructions on stopping.
 2. Shutdown instructions for each type of emergency.
 3. Operating instructions for conditions outside normal operating limits.
 4. Required sequences for electric or electronic systems.
 5. Special operating instructions and procedures.

3.3 SYSTEMS AND EQUIPMENT OPERATION MANUALS

- A. Manual: Assemble a complete set of data indicating operation of each system, subsystem, and piece of equipment not part of a system. Include information required for daily operation and management, operating standards, and routine and special operating procedures. Include information needed for daily operation and management of systems and equipment.
1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
 2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.
- B. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
 2. Performance and design criteria if Contractor has delegated design responsibility.
 3. Operating standards.
 4. Operating procedures.
 5. Operating logs.
 6. Wiring diagrams.
 7. Control diagrams.
 8. Piped system diagrams.
 9. Precautions against improper use.
 10. License requirements including inspection and renewal dates.
- C. Descriptions: Include the following:
1. Product name and model number. Use designations for products indicated on Contract Documents.
 2. Manufacturer's name.
 3. Equipment identification with serial number of each component.
 4. Equipment function.
 5. Operating characteristics.
 6. Limiting conditions.
 7. Performance curves.

8. Engineering data and tests.
 9. Complete nomenclature and number of replacement parts.
- D. Operating Procedures: Include the following, as applicable:
1. Startup procedures.
 2. Equipment or system break-in procedures.
 3. Routine and normal operating instructions.
 4. Regulation and control procedures.
 5. Instructions on stopping.
 6. Normal shutdown instructions.
 7. Seasonal and weekend operating instructions.
 8. Required sequences for electric or electronic systems.
 9. Special operating instructions and procedures.
- E. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.
- F. Piped Systems: Diagram piping as installed, and identify color coding where required for identification.

3.4 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

- A. Systems and Equipment Maintenance Manuals: Assemble a complete set of data indicating maintenance of each system, subsystem, and piece of equipment not part of a system. Include manufacturers' maintenance documentation, preventive maintenance procedures and frequency, repair procedures, wiring and systems diagrams, lists of spare parts, and warranty information.
1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
 2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.
- B. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranties and bonds as described below.
- C. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.
- D. Manufacturers' Maintenance Documentation: Include the following information for each component part or piece of equipment:
1. Standard maintenance instructions and bulletins; include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
 - a. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.
 2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
 3. Identification and nomenclature of parts and components.
 4. List of items recommended to be stocked as spare parts.
- E. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
1. Test and inspection instructions.
 2. Troubleshooting guide.

3. Precautions against improper maintenance.
 4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 5. Aligning, adjusting, and checking instructions.
 6. Demonstration and training video recording, if available.
- F. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
 2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.
- G. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.
- H. Maintenance Service Contracts (if required): Include copies of maintenance agreements with name and telephone number of service agent.
- I. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
1. Include procedures to follow and required notifications for warranty claims.
- J. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.
1. Do not use original project record documents as part of maintenance manuals.

3.5 PRODUCT MAINTENANCE MANUALS

- A. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
- B. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.
- C. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.
- D. Product Information: Include the following, as applicable:
1. Product name and model number.
 2. Manufacturer's name.
 3. Color, pattern, and texture.
 4. Material and chemical composition.
 5. Reordering information for specially manufactured products.

- E. Maintenance Procedures: Include manufacturer's written recommendations and the following:
 - 1. Inspection procedures.
 - 2. Types of cleaning agents to be used and methods of cleaning.
 - 3. List of cleaning agents and methods of cleaning detrimental to product.
 - 4. Schedule for routine cleaning and maintenance.
 - 5. Repair instructions.
- F. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.
- G. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
 - 1. Include procedures to follow and required notifications for warranty claims.

END OF SECTION 01 7823

SECTION 01 7839 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for Project Record Documents, including the following:
 - 1. Record Drawings.
 - a. Record specifications.
 - b. Record Product Data.
 - c. Miscellaneous record submittals.

1.2 CLOSEOUT SUBMITTALS

- A. Record Drawings: Comply with the following:
 - 1. Number of Copies: Submit copies of Record Drawings as follows:
 - a. Initial Submittal:
 - 1) Submit PDF electronic files of scanned record prints and one set(s) of file prints.
 - 2) Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.
 - b. Final Submittal:
 - 1) Submit PDF electronic files of scanned record prints and three set(s) of file prints.
 - 2) Print each drawing, whether or not changes and additional information were recorded.
- B. Record Specifications: Submit annotated PDF electronic files and paper copies of Project's Specifications, including addenda and Contract modifications.
- C. Record Product Data: Submit annotated PDF electronic files and directories and three paper copies of each submittal.
 - 1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 RECORD DRAWINGS

- A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.
 - 1. Preparation: Mark record prints to show the actual installation, where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer,

subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.

- a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
 - b. Accurately record information in an acceptable drawing technique.
 - c. Record data as soon as possible after obtaining it.
 - d. Record and check the markup before enclosing concealed installations.
 - e. Cross-reference record prints to corresponding photographic documentation.
 - f. Mark the Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. If Shop Drawings are marked, show cross-reference on the Contract Drawings.
2. Content: Types of items requiring marking include, but are not limited to, the following:
- a. Dimensional changes to Drawings.
 - b. Revisions to details shown on Drawings.
 - c. Depths of foundations.
 - d. Locations and depths of underground utilities.
 - e. Revisions to routing of piping and conduits.
 - f. Revisions to electrical circuitry.
 - g. Actual equipment locations.
 - h. Duct size and routing.
 - i. Locations of concealed internal utilities.
 - j. Changes made by Change Order or Construction Change Directive.
 - k. Changes made following Architect's written orders.
 - l. Details not on the original Contract Drawings.
 - m. Architect's RFI responses.
 - n. Supplemental, Clarification, and Field Sketches issued during the Project
 - o. Field records for variable and concealed conditions.
 - p. Record information on the Work that is shown only schematically.
3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
4. Mark record prints with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
5. Mark important additional information that was either shown schematically or omitted from original Drawings.
6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
- B. Record Drawings: Immediately before inspection for Certificate of Substantial Completion, review marked-up Record Prints with Architect and Construction Manager. When authorized, assemble one full set of corrected Record Contract Drawings and Shop Drawings for submission to the Owner.
1. Incorporate changes and additional information previously marked on Record Prints. Erase, redraw, and add details and notations where applicable.
 2. Refer instances of uncertainty to Architect for resolution.
- C. Record Electronic Files: Upon completion of the Record Drawings, scan the full set of Record Drawings into a PDF format and forward to Architect, through Construction Manager, via web-based project software. Properly label with project name, number, date, and title "Final Record Drawings."
- D. Format: Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
1. Record Prints: Organize record prints into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
 2. Format: Annotated PDF electronic file with comment function enabled.

3. Identification: As follows:
 - a. Project name.
 - b. Date.
 - c. Designation "PROJECT RECORD DRAWINGS."
 - d. Name of Architect and Construction Manager.
 - e. Name of Contractor.

3.2 RECORD SPECIFICATIONS

- A. Preparation: Mark Specifications to indicate the actual product installation, where installation varies from that indicated in Specifications, addenda, and Contract modifications.
 1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
 3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
 4. Note related Change Orders, Record Product Data, and Record Drawings where applicable.
- B. Format: Submit record specifications as annotated PDF electronic file and paper copies.

3.3 RECORD PRODUCT DATA

- A. Recording: Maintain one copy of each submittal during the construction period for Project Record Document purposes. Post changes and revisions to Project Record Documents as they occur; do not wait until end of Project.
- B. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.
 1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
 3. Note related Change Orders, Record Specifications, and Record Drawings where applicable.
- C. Format: Submit Record Product Data as annotated PDF electronic file and paper copies.
 1. Include Record Product Data directory organized by Specification Section number and title, electronically linked to each item of Record Product Data.

3.4 MISCELLANEOUS RECORD SUBMITTALS

- A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.
- B. Format: Submit miscellaneous record submittals as PDF electronic file and paper copies.
 1. Include miscellaneous record submittals directory organized by Specification Section number and title, electronically linked to each item of miscellaneous record submittals.

3.5 RECORDING AND MAINTENANCE

A. Recording:

1. Maintain one copy of each submittal during the construction period for Project Record Document purposes.
2. Post changes and modifications to Project Record Documents as they occur; do not wait until the end of Project.

B. Maintenance of Record Documents and Samples:

1. Store Record Documents and Samples in the field office apart from the Contract Documents used for construction.
2. Do not use Project Record Documents for construction purposes.
3. Maintain Record Documents in good order and in a clean, dry, legible condition, protected from deterioration and loss.
4. Provide access to Project Record Documents for Architect's and Construction Manager's reference during normal working hours.

END OF SECTION 01 7839

SECTION 01 7900 - DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:
 - 1. Demonstration of operation of systems, subsystems, and equipment.
 - 2. Training in operation and maintenance of systems, subsystems, and equipment.
 - 3. Demonstration and training video recordings.
- B. Related Sections include the following:
 - 1. Division 01 Section "Operation and Maintenance Data" for manuals required as teaching and training materials.

1.2 INFORMATIONAL SUBMITTALS

- A. Instruction Program: Submit an electronic copy of the outline for instructional program for demonstration and training, including a list of training modules and a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.
 - 1. Indicate proposed training modules using manufacturer-produced demonstration and training video recordings for systems, equipment, and products in lieu of video recording of live instructional module.
- B. Qualification Data: For facilitator, instructor, and factory-authorized representative.
- C. Attendance Record: For each training module, submit list of participants and length of instruction time.
- D. List of training modules and duration of each.
- E. Evaluations: For each participant and for each training module, submit results and documentation of performance based test.

1.3 CLOSEOUT SUBMITTALS

- A. Demonstration and Training Recordings (in approved format): Submit two copies within seven days of end of each training module.
 - 1. Identification: On each copy, provide an applied label with the following information:
 - a. Name of Project and Architect's Project Number.
 - b. Name and address of videographer.
 - c. Name of Architect.
 - d. Name of Construction Manager.
 - e. Name of Contractor.
 - f. Name of training module(s).
 - g. Date of video recording.
 - h. Systems or operations on the recording.
 - 2. At completion of training, submit complete training manual(s) for Owner's use prepared and bound in format matching operation and maintenance manuals or in PDF electronic file format on flash drive.

1.4 QUALITY ASSURANCE

- A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.
- B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Division 01 Section "Quality Requirements," experienced in operation and maintenance procedures and training.
- C. Pre-instruction Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." Review methods and procedures related to demonstration and training including, but not limited to, the following:
 - 1. Review items of Work that require demonstration and training.
 - 2. Review instructional procedures, including videography requirements.
 - 3. Inspect and discuss locations and other facilities required for instruction.
 - 4. Identify who will be instructed, and their availability.
 - 5. Establish instruction schedule.
 - 6. Review and verify availability of instructional materials, instructors' personnel, audiovisual equipment, and facilities needed to avoid delays.
 - 7. Review required content of instruction.
 - 8. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.
 - 9. Inspect and discuss locations and other facilities required for instruction.
 - 10. Review and finalize instruction schedule and verify availability of educational materials, instructors' personnel, audiovisual equipment, and facilities needed to avoid delays.
 - 11. Review required content of instruction.
 - 12. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.

1.5 COORDINATION

- A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations and to ensure availability of Owner's personnel.
- B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.
- C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals.
- D. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Architect and Construction Manager.
- E. It is recognized that training systems that include equipment installed in this phase of Work but made operational in subsequent phases will necessitate training and demonstration in conjunction with completion of subsequent construction phases.

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

- A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections, and as follows
1. Fire-detection and alarm systems.
 2. Fire-extinguishing systems.
 3. Access control system and devices.
 4. Site access gate automation and control system
 5. Emergency responder radio coverage system
 6. Video surveillance system.
 7. Heat generation, including pumps and water distribution piping.
 8. Refrigeration systems, including pumps and distribution piping.
 9. HVAC systems, including air-handling equipment air distribution systems and terminal equipment and devices.
 10. Humidification system
 11. HVAC instrumentation and controls.
 12. Plumbing pump equipment, instrumentation, and controls.
 13. Electrical distribution, including panelboards and surge suppression devices.
 14. Emergency generator system
 15. Lighting equipment and controls.
 16. Fire alarm system upgrade.
 17. Emergency responder radio coverage system.
 18. Paging, clock, and classroom voice amplification system.
 19. Telephone and data cabling system.
 20. Video surveillance system.
 21. Cellular distributed antenna system.
 22. Vehicle lift systems.
- B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following as applicable to the system, equipment, or component:
1. Basis of System Design, Operational Requirements, and Criteria: Include the following:
 - a. System, subsystem, and equipment descriptions.
 - b. Performance and design criteria if Contractor is delegated design responsibility.
 - c. Operating standards.
 - d. Regulatory requirements.
 - e. Equipment function.
 - f. Operating characteristics.
 - g. Limiting conditions.
 - h. Performance curves.
 2. Documentation: Review the following items in detail:
 - a. Emergency manuals.
 - b. Operations manuals.
 - c. Maintenance manuals.
 - d. Project record documents.
 - e. Identification systems.
 - f. Warranties and bonds.
 - g. Maintenance service agreements and similar continuing commitments.

3. Emergencies: Include the following, as applicable:
 - a. Instructions on meaning of warnings, trouble indications, and error messages.
 - b. Instructions on stopping.
 - c. Shutdown instructions for each type of emergency.
 - d. Operating instructions for conditions outside of normal operating limits.
 - e. Sequences for electric or electronic systems.
 - f. Special operating instructions and procedures.
4. Operations: Include the following, as applicable:
 - a. Startup procedures.
 - b. Equipment or system break-in procedures.
 - c. Routine and normal operating instructions.
 - d. Regulation and control procedures.
 - e. Control sequences.
 - f. Safety procedures.
 - g. Instructions on stopping.
 - h. Normal shutdown instructions.
 - i. Operating procedures for emergencies.
 - j. Operating procedures for system, subsystem, or equipment failure.
 - k. Seasonal and weekend operating instructions.
 - l. Required sequences for electric or electronic systems.
 - m. Special operating instructions and procedures.
5. Adjustments: Include the following:
 - a. Alignments.
 - b. Checking adjustments.
 - c. Noise and vibration adjustments.
 - d. Economy and efficiency adjustments.
6. Troubleshooting: Include the following:
 - a. Diagnostic instructions.
 - b. Test and inspection procedures.
7. Maintenance: Include the following:
 - a. Inspection procedures and schedule.
 - b. Types of cleaning agents to be used and methods of cleaning.
 - c. List of cleaning agents and methods of cleaning detrimental to product.
 - d. Procedures for routine cleaning
 - e. Procedures for preventive maintenance.
 - f. Procedures for routine maintenance.
 - g. Instruction on use of special tools.
8. Repairs: Include the following:
 - a. Diagnosis instructions.
 - b. Repair instructions.
 - c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 - d. Instructions for identifying parts and components.
 - e. Review of spare parts needed for operation and maintenance.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Division 01 Section "Operations and Maintenance Data."
- B. Set up instructional equipment at instruction location.

3.2 INSTRUCTION

- A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.
- B. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
 - 1. Owner, through Construction Manager, will furnish Contractor with names and positions of participants for each training session.
 - 2. Construction Manager will coordinate between Owner and Contractor for number of participants, instruction times, and locations.
- C. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.
 - 1. Schedule training with Owner, through Construction Manager, with at least seven days' advance notice.
 - 2. One training session to be provided for each type of system, subsystem or equipment used on Project.
- D. Training Location and Reference Material: Conduct training on-site in the completed and fully operational facility using the actual equipment in-place. Conduct training using final operation and maintenance data submittals.
- E. Cleanup: Collect used and leftover educational materials and give to Owner. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

3.3 DEMONSTRATION AND TRAINING VIDEO RECORDINGS

- A. General: Using a high resolution cell phone or similar device, record demonstration and training video recordings. Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.
 - 1. At beginning of each training module, record each chart containing learning objective and lesson outline.
 - 2. Provide video file to Construction Manager after each training.
- B. Video: Provide minimum 640 x 480 video resolution converted to format file type acceptable to Owner, on electronic media.
 - 1. Electronic Media: Read-only format compact disc acceptable to Owner, with commercial-grade graphic label.
 - 2. File Hierarchy: Organize folder structure and file locations according to project manual table of contents. Provide complete screen-based menu.
 - 3. File Names: Utilize file names based upon name of equipment generally described in video segment, as identified in Project specifications.

4. Contractor and Installer Contact File: Using appropriate software, create a file for inclusion on the Equipment Demonstration and Training video that describes the following for each subcontractor involved on the Project, arranged according to Project table of contents:
 - a. Name of Contractor.
 - b. Name of installer, if different than Contractor.
 - c. Business address for Contractor and for installer.
 - d. Business phone number for Contractor and for installer.
 - e. Point of contact for Contractor and for installer.
 - f. E-mail address for Contractor and for installer.
 - g. Name of subcontractor/Installer.
 - h. Business address.
 - i. Business phone number.
 - j. Point of contact.
 - k. E-mail address.
- C. Recording: Mount camera on tripod before starting recording, unless otherwise necessary to adequately cover area of demonstration and training. Display continuous running time.
- D. Light Levels: Verify light levels are adequate to properly light equipment. Verify equipment markings are clearly visible prior to recording.
 1. Furnish additional portable lighting as required.
- E. Narration: Describe scenes on video recording by audio narration by microphone while video recording is recorded. Include description of items being viewed.
- F. Preproduced Video Recordings: Provide video recordings used as a component of training modules in same format as recordings of live training.

END OF SECTION 01 7900

SECTION 02 4113 - SITE DEMOLITION

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Removal of existing above- and below-ground structures.
 - 2. Disconnecting and removing utility services and other identified structures where indicated on the drawings. These include, but are not limited to, water lines, overhead and underground electric telephone and cable lines, gas lines, irrigation lines, sanitary sewers, and storm sewers.
 - 3. Coordination with local municipality and the public utility companies on existing utility services identified to be removed, existing utilities to remain, or existing utilities to be relocated.
- B. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- C. All Contractors, Subcontractors, Vendors, and the like shall be required to familiarize themselves with said provisions.

1.02 DEFINITIONS

- A. Not used.

1.03 RELATED DRAWINGS, DOCUMENTS AND SECTIONS

- A. Civil Drawing Package prepared by Civil & Environmental Consultants, Inc. (CEC) and all updates.
- B. Geotechnical Report and all updates.
- C. Approved Erosion and Sediment Control Plan prepared by CEC.
- D. Section 31 2300 – Excavation, Backfilling, and Compaction.
- E. Section 31 2500 – Erosion and Sediment Control.
- F. Section 32 1000 – Aggregate Materials.
- G. Section 32 1300 – Site Work Concrete Construction.

1.04 REFERENCES

- A. Commonwealth of Pennsylvania Department of Environmental Protection (PADEP) Erosion and Sediment Control Manual, latest edition.
- B. Commonwealth of Pennsylvania Department of Transportation (PennDOT) Specifications Publication 408, latest edition.
- C. Public utility company codes and regulations.

1.05 INFORMATIONAL SUBMITTALS

- A. Submit construction progress schedules and description of utility removal.
- B. Identify dates when utilities will be temporarily unavailable to the adjacent properties.
- C. Where demolition debris is deposited, obtain written permits and releases from the property owners and/or other authorities having applicable jurisdiction and releases absolving the Owner of responsibility in connection with the disposal.
- D. Submit weigh slips to the Owner from the disposal facility used for the ultimate disposal of the demolition waste to certify the proper disposal. Slips must identify the project the waste was generated from, the name and address of the disposal facility, and the type of waste deposited.

1.06 REGULATORY REQUIREMENTS

- A. Obtain required approvals/permits from the appropriate authorities for material disposal off-site.
- B. Obtain required approvals/permits from the appropriate authorities for site work construction activities prior to demolition.
- C. Conform to any utility company requirements when site demolition work activities affect utility service.
- D. Do not close or obstruct emergency entrances, roadways, fire lanes, sidewalks, or hydrants without approval from the Owner or his representative.
- E. It shall be the Contractor's responsibility to contact utility companies prior to any construction, as the locations of utilities shown on the plans are approximate and possibly incomplete. Contractors shall call 1-800-242-1776 (PA One-Call) a minimum of three and no more than ten working days prior to the start of work.
- F. The Contractor shall comply at all times with applicable Federal, State, and local laws, provisions, and policies governing safety and health, including the Federal Construction Safety Act (Public Law 91-54), Federal Register, Chapter XVII, Part 1926 of Title 29 Code of Federal Regulations, Occupational Safety and Health Regulations for Construction, and subsequent publications updating these regulations.
- G. Comply with the requirements of the landfills, which agree to accept and dispose of the demolition debris removed.
- H. Comply with the Federal, State, County, and local requirements for the transporting of waste material.
- I. Conform to applicable regulatory procedures when discovering hazardous or contaminated materials.

1.07 COORDINATION

- A. Route vehicular and pedestrian traffic away from work at all times during demolition activities.
- B. Provide for safe pedestrian ingress and egress from site at all times during construction.
- C. Coordinate and obtain final approval for utility demolition and removal with the affected utility companies.
- D. If at any time the utilities to remain are scheduled to be out of service, temporary utility connections shall be made to maintain service. Temporary facilities shall remain in effect until all outside construction activities have been completed.

- E. Coordinate with property owner of all above ground structures to be razed.
- F. Install required erosion and sediment pollution control devices in accordance with Section 31 2500 prior to initiating demolition activities.

1.08 PROJECT RECORD DOCUMENTS

- A. Accurately record actual location of remaining or relocated utilities by horizontal dimensions, elevations or inverts, and slope gradients.

PART 2 - PRODUCTS

2.01 FILL MATERIALS

- A. Backfill Material: As specified in Section 31 2300.
- B. Aggregate Materials: As specified in Section 32 1000.
- C. Grout for Abandoned Structures: A sand-cement mixture proportioned to result in a 28-day compressive strength of 2,000 pounds per square inch (PSI).

PART 3 - EXECUTION

3.01 EXAMINATION

- A. The Contractor shall verify all dimensions, elevations, slopes, coordinates, etc. shown on the drawings.
- B. Verify that all site utilities to be removed are identified and their removal has been approved by the public utility company's representative and the Owner or his representative.
- C. Verify that all structures and other site features to be removed are identified and their removal has been approved by the Owner or his representative.
- D. Verify that all items to be salvaged by the Owner are to be delivered to the Owner.
- E. Notify the Owner or his representative after identifying any existing utilities that are not shown on the drawings.

3.02 PREPARATION

- A. Protect existing landscaping materials, building appurtenances, structures, and utilities, which are not to be removed.
- B. Prevent movement or settlement of adjacent structures. Provide bracing and shoring as required.
- C. Protect benchmarks and existing structures from damage or displacement.
- D. Prior to the commencement of demolition activities, make necessary arrangements with the proper utility authorities for the disconnection and/or relocation of designated utilities within demolition areas.

3.03 DEMOLITION REQUIREMENTS

- A. Conduct demolition to minimize interference with adjacent facilities, utilities, and structures. Promptly repair damage to adjacent facilities, utilities, and structures caused by demolition activities immediately at no additional cost to owner.
- B. Cease operations immediately if adjacent structures appear to be in danger. Notify authority having jurisdiction. Do not resume operations until the danger has been identified and resolved.
- C. Conduct operations with minimum interference to public or private accesses. Maintain all emergency entrances, roadways, fire lanes, sidewalks, or hydrants at all times.
- D. Ensure the safe passage of persons around all demolition areas.
- E. Deposit demolition debris in accordance with the codes and regulations of the jurisdictional authority. Assume responsibility for any rejections, damages, or financial penalties imposed by the off-site Solid Waste Landfill, due to non-conformity to their specifications or requirements for waste disposal.

3.04 DEMOLITION

- A. Disconnect and remove designated utilities within demolition areas.
- B. Remove all concrete slabs on grade and foundation walls and footings, fences, gates, and post foundations within the limits of construction when specified on construction plans.
- C. Remove salvageable materials in a manner to prevent damage.
- D. Remove paved areas which are identified for removal. Pavement removal shall consist of removing the wearing and binder courses or concrete and reinforcement and the base course. Process existing concrete onsite for use as structural fill.
- E. Where existing pavement is to be terminated, the Contractor shall line cut the existing pavement with approved pneumatic, saw cutting or mechanical cutting tools so that there will be a vertical butting surface at the end of the existing pavement. Line cutting shall be along neat, straight and even lines, and shall be performed in such a manner so as not to damage the adjacent pavement, which is to remain. The Owner or his representative shall approve the acceptability of the line cutting device and the method of operation. Finish the ends of the remaining pavement by removing any projections. Protect the ends of the pavement by backfilling the voids in front of the pavement using approved backfill material. Carefully place the backfill material in maximum 6-inch thick loose lifts. The backfill shall be compacted by means of a mechanical or hand tamper to a point of non-movement beneath the compacting equipment.
- F. Backfill areas excavated as a result of demolition, in accordance with Sections 31 2300.
- G. Remove demolished materials from site unless noted otherwise. Do not burn or bury materials on site.
- H. Structures identified to be abandoned in place and grouted shall be grouted with a sand-cement mixture proportioned to result in a 28-day compressive strength of 2,000 PSI. The grout is intended to firmly solidify the abandoned structure that traverses the limits of work. After mixing, the grout shall be of a consistency such that it will freely follow by gravity into voids. All Portland cement used in the grout mix shall satisfy the material requirements for Portland cement in the Section 32 1313.
- I. The removal of minor obstructions shall be anticipated and accomplished even though not shown or specifically mentioned. Major obstructions encountered shall immediately be identified to the Owner. The Owner or his representative shall make a determination for proceeding with the work of the major obstruction encountered. Any work performed by the Contractor before the Owner or his representative has made a determination will be made at the Contractor's own risk and at no additional cost to the Owner. The removed materials shall be disposed of in an

approved waste site or other location as directed by the Owner or his representative. The quantity of each major obstruction that is removed to accommodate the proposed construction shall be measured by the Owner or his representative prior to or during the removal.

J. Leave site in clean condition.

END OF SECTION 02 4113

SECTION 03 3000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.
 - 1. Footings.
 - 2. Slabs-on-grade and elevated slabs.
 - 3. Moisture Vapor Reducing Admixture (MVRA).
 - 4. Hardener and seal coats for vehicle bay floors.
- B. Related Requirements:
 - 1. Section 31 2000 "Earth Moving" for drainage fill under slabs-on-grade.
 - 2. Section 32 1313 "Concrete Paving" for concrete pavement and walks.
- C. Coordination:
 - 1. Unless other satisfactory agreements are specifically entered into by contractors concerned, all miscellaneous iron and steel, sleeves, anchors, etc., required by work of any Prime Contractor shall be furnished and installed by such Prime Contractor with the cooperation of the General Contractor.
 - 2. Coordinate locations and elevations of floor drains in slabs, accounting for slopes to drain and finish flooring thickness.
 - 3. Verify compatibility between proposed concrete mixes, additives, admixtures, and coatings with proposed floor finishes and adhesives.

1.2 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash, slag cement, and other pozzolans; materials subject to compliance with requirements.
- B. W/C Ratio: The ratio by weight of water to cementitious materials.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
 - a. Contractor's superintendent.
 - b. Independent testing agency responsible for concrete design mixtures.
 - c. Ready-mix concrete manufacturer.
 - d. Concrete Subcontractor.
 - e. Agency responsible for field quality control and special inspections.
 - f. Primary admixture manufacturers.
 - 2. Review special inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold- and hot-weather concreting procedures, curing procedures, vapor-retarder

- installation, anchor rod and anchorage device installation tolerances, steel reinforcement installation, methods for achieving specified floor and slab flatness and levelness concrete repair procedures, and concrete protection.
3. Review relative cost and availability of specified ASTM Types I and II portland cements, and the impacts of instead using Type 1L Portland-lime cement on the following:
 - a. Surface finishing
 - b. Use of specified admixtures
 - c. Use of specified liquid floor treatments.
 - d. Use of curing methods to achieve specified performance
 - e. Modification of design mixtures to achieve specified performance
 - f. Project scheduling and sequencing.
 4. Floor finishes:
 - a. Discuss and coordinate the substrate requirements of specified applied finish flooring products.
 - b. Discuss and coordinate the requirements of specified exposed concrete flooring.
 5. Underslab barrier membrane:
 - a. Review correct procedures and sequence for effective installation and performance of vapor retarder system.
 - b. Review observation and authentication procedures for installation of underslab vapor retarder to document proper installation prior to concrete slab installation.
 6. Floor Drains:
 - a. Discuss and coordinate locations and elevations of drains in slabs-on-grade and elevated slabs.
 - b. Discuss and coordinate extent and degree of sloping floor surfaces at floor drains and trench drains.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Design Mixtures: Provide a design mix complying with ACI requirements for each concrete mixture, with back-up test data complying with ACI requirements for each mix design. Submit alternate design mixtures when characteristics of available materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
 1. Each mix design shall indicate 7- and 28-day concrete compressive strengths, cement content, air content, water-cement ratio, amount of fine and coarse aggregates, and admixtures.
 2. Indicate amounts of mixing water to be withheld for later addition at Project site, if any.
 3. Laboratory test reports for concrete mix design with the following data:
 - a. Method used to determine the proposed mix design per ACI 301, Article 4.2.3.
 - b. Gradation and quantity of fine and coarse aggregates.
 - c. Proportions of all ingredients including all admixtures added either at the time of batching or at the job site.
 - d. Water/cement ratio and water/cementitious ratio.
 - e. Slump - ASTM C143.
 - f. Certification and test results of the total water-soluble chloride ion content of the design mix - FHWA RD-77 or AASHTO T 260-84.
 - g. Air content of freshly mixed concrete by the pressure method, ASTM C231.
 - h. Unit weight of concrete - ASTM C138.
 - i. Strength at 7 and 28 days - ASTM C39, Document strength on basis of previous field experience or trial mixtures per ACI 301 Article 4.2.3. Submit strength test records, mix design materials, conditions, and proportions for concrete used for record of tests, standard calculation, and determination of required average compressive strength.

- C. Steel Reinforcement Shop Drawings: Placing Drawings that detail fabrication, bending, and placement, prepared according to ACI 315, "Details and Detailing of Concrete Reinforcement."
 - 1. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.
 - 2. Include special reinforcement required for openings through concrete structures.
 - 3. Provide ACI Class B lap splice for all lapped reinforcement bars, unless otherwise indicated.
- D. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.
 - 1. Location of construction joints is subject to approval of the Architect.
- E. Floor Drain Layouts: Indicate proposed extent and degree of slopes to floor drains and trench drains, and final finish elevations of floor drains.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer, manufacturer, testing agency.
- B. Welding certificates.
- C. Material Certificates: For each of the following, signed by manufacturers:
 - 1. Cementitious materials.
 - 2. Admixtures.
 - 3. Form materials and form-release agents.
 - 4. Steel reinforcement and accessories.
 - 5. Fiber reinforcement.
 - 6. Curing materials.
 - 7. Floor and slab treatments.
 - 8. Bonding agents.
 - 9. Adhesives.
 - 10. Vapor retarders.
 - 11. Semi-rigid joint filler.
 - 12. Joint-filler strips.
 - 13. Repair materials.
- D. Material Test Reports: For the following, from a qualified testing agency:
 - 1. Aggregates: Include service record data indicating absence of deleterious expansion of concrete due to alkali aggregate reactivity.
- E. Floor surface flatness and levelness measurements indicating compliance with specified tolerances.
- F. Field quality-control reports.
- G. Minutes of preinstallation conference.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.
- B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94 requirements for production facilities and equipment.
 - 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- C. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, each aggregate from one source, and each admixture from the same manufacturer.
- D. Testing Agency Qualifications: An independent agency, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
 - 1. Personnel conducting field tests shall be qualified as ACI Concrete Field-Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
 - 2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician, Grade I. Testing agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician, Grade II.
- E. Special Inspector Qualifications: A qualified person employed or retained by an approved agency that has the recommended experience and certifications as summarized in Appendix C of the current International Code Council (ICC) Special Inspection Manual.
- F. Welding Qualifications: Qualify procedures and personnel according to AWS D1.4.
- G. Mockups: Cast concrete slab-on-grade and formed-surface panels to demonstrate typical joints, surface finish, texture, tolerances, floor treatments, and standard of workmanship.
 - 1. Build panel approximately 200 sq. ft. for slab-on-grade and 100 sq. ft. for formed surface in the location indicated or, if not indicated, as directed by Architect.
 - 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
 - 3. Notify Architect seven days in advance of dates and times when mockups will be constructed.
 - 4. Obtain Architect's approval of mockups before starting construction.
 - 5. If Architect determines that mockups do not meet requirements, demolish and remove them from the site and cast another until the mockup is approved.
 - 6. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.

1.7 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on concrete mixtures.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage. Avoid damaging coatings on steel reinforcement.

1.9 FIELD CONDITIONS

- A. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
 2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
 3. 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 as follows:
1. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 2. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
 3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

1.10 WARRANTY

- A. Moisture Vapor Reduction Admixture (MVRA):
1. MVRA must be installed according to, and in compliance with, the manufacturer's published data sheet to include, but not limited to:
 - a. Dosing instructions.
 - b. Onsite representation requirements.
 - c. Use of an ASTM E 1745 vapor retarder installed following ASTM E 1643 and ASTM F710 guidelines; slabs on deck do not require a vapor retarder.
 2. Manufacturer's Warranty: To include:
 - a. Term: Life of the concrete.
 - b. Repair and/or removal of failed flooring or roofing.
 - c. Placement of a topical moisture remediation system.
 - d. Replacement of flooring/roofing materials like original installed to include material and labor.
 3. Adhesion Warranty: MVRA Manufacturer shall provide an adhesion warranty to match the term of the adhesive and/or primer manufacturer's material defect warranty upon MVRA manufacturer's acceptance of field bond test.

PART 2 - PRODUCTS

2.1 CAST-IN-PLACE CONCRETE, GENERAL

- A. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
1. ACI CP-1, "Technician Workbook for ACI Certification of Concrete Field Testing Technician – Grade I."
 2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
 3. ACI 211.1, "Standard Practice for Selecting Proportions for Normal, heavyweight, and Mass Concrete."
 4. ACI 301, "Standard Specifications for Structural Concrete."
 5. ACI 304R, "Guide for Measuring, Mixing, Transporting and Placing Concrete."

6. ACI 305R, "Hot Weather Concreting."
7. ACI 306R, "Cold Weather Concreting."
8. ACI 315, "Details and Detailing of Concrete Reinforcement."
9. ACI 318, "Building Code Requirements for Structural Concrete and Commentary."

2.2 FORM-FACING MATERIALS

- A. Smooth-Formed Finished Concrete: Form-facing panels that provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
 1. Plywood, metal, or other approved panel materials.
 2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:
 - a. High-density overlay, Class 1 or better.
 - b. Medium-density overlay, Class 1 or better; mill-release agent-treated and edge sealed.
 - c. Structural 1, B-B or better; mill-oiled and edge sealed.
 - d. B-B (Concrete Form), Class 1 or better; mill-oiled and edge sealed.
 3. Overlaid Finnish birch plywood.
- B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.
- C. Forms for Cylindrical Columns, Pedestals, and Supports: Metal, glass-fiber-reinforced plastic, paper, or fiber tubes that produce surfaces with gradual or abrupt irregularities not exceeding specified formwork surface class. Provide units with sufficient wall thickness to resist plastic concrete loads without detrimental deformation.
- D. Void Forms: Biodegradable paper surface, treated for moisture resistance, structurally sufficient to support weight of plastic concrete and other superimposed loads.
- E. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4-inch, minimum.
- F. Form-Release Agent: Commercially formulated form-release agent that does not bond with, stain, or adversely affect concrete surfaces and does not impair subsequent treatments of concrete surfaces.
 1. Formulate form-release agent with rust inhibitor for steel form-facing materials.
- G. Form Ties: Factory-fabricated, removable, or snap-off glass-fiber-reinforced plastic or metal form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
 1. Furnish units that leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.
 2. Furnish ties that, when removed, leave holes no larger than 1 inch in diameter in concrete surface.
 3. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

2.3 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615, Grade 60, deformed.
- B. Epoxy-Coated Reinforcing Bars: ASTM A 615, Grade 60, deformed bars, ASTM A 775, epoxy coated, with less than 2 percent damaged coating in each 12-inch bar length.
- C. Plain-Steel Wire: ASTM A 1064, as drawn.
- D. Plain-Steel Welded-Wire Reinforcement: ASTM A 1064, plain, fabricated from as-drawn steel wire into flat sheets.

2.4 REINFORCEMENT ACCESSORIES

- A. Joint Dowel Bars: ASTM A 615, Grade 60, plain-steel bars, cut true to length with ends square and free of burrs.
- B. Epoxy Repair Coating: Liquid, two-part, epoxy repair coating; compatible with epoxy coating on reinforcement and complying with ASTM A 775.
- C. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete or fiber-reinforced concrete of greater compressive strength than concrete, and as follows:
 - 1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected or CRSI Class 2 stainless-steel bar supports.
 - 2. For epoxy-coated reinforcement, use epoxy-coated or other dielectric-polymer-coated wire bar supports.
 - 3. For slabs on ground, use supports with sand plates or horizontal runners where base material will not support chair legs.

2.5 CONCRETE MATERIALS

- A. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.
- B. Cementitious Materials:
 - 1. Portland Cement: ASTM C 150, Type I/II, gray.
 - 2. Fly Ash: ASTM C 618, Class F or C.
 - 3. Slag Cement: ASTM C 989, Grade 100 or 120.
- C. Blended Hydraulic Cement:
 - 1. ASTM C 595, Type IS, portland blast-furnace slag cement.
 - 2. ASTM C 595, Type IL, portland lime cement.
- D. Normal-Weight Aggregates: ASTM C 33, Class 4S coarse aggregate or better, graded. Provide aggregates from a single source with documented service record data of at least 10 years' satisfactory service in similar applications and service conditions using similar aggregates and cementitious materials.
 - 1. Maximum Coarse-Aggregate Size: 1 inch nominal.
 - 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- E. Admixtures, General: Admixture manufacturer shall confirm compatibility and effectiveness with lime cement, if used.
- F. Air-Entraining Admixture: ASTM C 260.
- G. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and 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. Air-Entraining Admixture: ASTM C 260
 - 2. Water-Reducing Admixture: ASTM C 494, Type A.
 - 3. Retarding Admixture: ASTM C 494, Type B.
 - 4. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.
 - 5. High-Range, Water-Reducing Admixture: ASTM C 494, Type F.

6. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494, Type G.
7. Plasticizing and Retarding Admixture: ASTM C 1017, Type II.

H. Moisture Vapor Reduction Admixture (MVRA):

1. Basis-of-Design Product: Subject to compliance with requirements, provide Vapor Lock 20/20 Concrete Admixture by Specialty Products Group, or comparable accepted product.
 - a. Subject to compliance with requirements, substitutions may be considered. Failure to provide a product that meets or exceeds the MVRA warranty requirements of Part I and the MVRA field quality control requirements of Part 3 will result in all subsequent testing and slab remediation costs being borne by the ready-mix supplier.
2. Description: Concrete moisture vapor reduction admixture shall be non-toxic, liquid admixture, specifically designed to have a natural chemical reaction with pre-existing elements inside the concrete to eliminate the route of moisture vapor emission through the slab by restricting the integral capillary system. Chemical reaction shall form a permanent barrier (capillary break) that is integral to the concrete, insoluble, and irremovable.
3. Application: Except as otherwise indicated, provide MVRA concrete for all interior slab-on-grade, elevated slab-on-deck, and elevated formed slabs. Do not include MVRA in roof slabs.

I. Water: ASTM C 94 and potable.

2.6 FIBER REINFORCEMENT

- A. Synthetic Fiber for Slabs-On-Grade: Fibrillated polypropylene fibers engineered and designed for use in concrete, complying with ASTM C 1116, Type III, 1/2- to 1-1/2-inches long.
- B. Available Products: Subject to compliance with requirements, provide products identified on Drawings, or comparable products, subject to Architect approval, by one of the following:
 1. Axim Concrete Technologies.
 2. Synthetic Industries.
 3. Forta Corporation.
 4. W. R. Grace & Co., Construction Products Div.

2.7 VAPOR RETARDERS

- A. Sheet Vapor Retarder: ASTM E 1745, Class A 15 mils. Include manufacturer's recommended adhesive or pressure-sensitive tape.
- B. Vapor Barrier shall comply with the following qualities:
 1. Permeance of less than 0.01 Perms per ASTM F 1249 or ASTM E 96.
 2. Maintain permeance of less than 0.01 Perms after mandatory conditioning tests per ASTM E 154 Sections 8, 11, 12, and 13.
 3. Non-woven.
- C. Products: Subject to compliance with requirements, provide one of the following:
 1. Raven Industries, Inc; Vapor Block 15.
 2. Stego Industries, LLC; Stego Wrap Vapor Barrier (15-Mil).
 3. W.R. Meadows, Inc; Perminator 15 mil.

2.8 CURING MATERIALS

- A. Application: Coordinate requirements of applied flooring finishes and select curing method compatible with floor finish manufacturer's instructions, subject to Architect approval.
- 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 C 171, polyethylene film or white burlap-polyethylene sheet.
- D. Water: Potable.
- E. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
 - 1. BASF Corp. - Construction Chemicals; Confilm.
 - 2. ChemMasters; Spray-Film.
 - 3. Dayton Superior; AquaFilm J74RTU.
 - 4. Euclid Chemical Company; Eucobar.
 - 5. Laticrete International, Inc.; L&M E-Con.
 - 6. W.R. Meadows, Inc; EVAPRE.
 - 7. Sika Corporation, Inc.; Sika Film.
 - 8. SpecChem, LLC; Spec Film.
- F. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.
 - 1. BASF Corp. - Construction Chemicals; MasterKure CC 180 WB.
 - 2. ChemMasters, Inc; Safe-Cure Clear DR.
 - 3. Euclid Chemical Company; Kurez DR VOX.
 - 4. Laticrete International, Inc.; L&M Cure R.
 - 5. W.R. Meadows, Inc; 1100-Clear Series.
 - 6. Dayton Superior Corporation; Clear Cure VOC J7WB
 - 7. SpecChem, LLC; SpecRez.

2.9 LIQUID FLOOR TREATMENTS

- A. Penetrating Liquid Floor Treatment: Clear, chemically reactive, waterborne solution of inorganic silicate or silicate materials and proprietary components; odorless; colorless; that penetrates, hardens, and densifies concrete surfaces.
 - 1. VOC Content: Liquid floor treatments shall have a VOC content of 200 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - 2. HARDENED CONCRETE FLOORS: For exposed concrete floor areas indicated to be hardened on Drawings (except as otherwise shown or specified): Clear, chemically reactive, waterborne solution of inorganic materials and proprietary components; odorless; colorless; that penetrates, hardens, and densifies concrete surfaces.
 - a. L&M Seal-Hard by Laticrete.
 - b. Ashford Formula by Cure-Crete, Inc.
 - c. Euco Diamond Hard by Euclid Chemicals, Inc.
 - 3. MECHANICAL ROOM FLOORS: Penetrating Liquid Floor Treatment for Mechanical Room Floor Slabs:
 - a. SLX100 Water and Oil Repellent; ProSoCo, Inc.
 - b. PetroTex oil and water repellent; L&M Construction Chemicals.
 - c. Eucoguard Vox.
 - d. Liqui-Hard; W.R. Meadows
 - e. Baracade 244; Euclid Chemical Compa

4. SEALED FLOORS (HRD-1): Penetrating Liquid Floor Treatment for all other floor areas indicated to be sealed on drawings:
 - a. Chem-Trete BSM 40 by HULS America.
 - b. Iso-Flex 618 by the Harry S. Peterson Company.
 - c. Enviroseal 40 by Hydrozo, Inc.
- B. CURE AND SEAL (HRD-2): System consisting of proprietary curing and sealing compound with a separate application of primer coating system:
 1. ASTM C1315-95 and C309 Type 1 Class A & B, non-yellowing curing and sealing compound formulated with methyl meth-acrylate copolymers to chemically bond to concrete for abrasion-resistant, UV-resistant, oil and grease stain resistant continuous seal coat.
 - a. 1113 30% by Imco Technologies Inc.
 2. 100 percent solids, two-part chemical and abrasion resistant coating system.
 - a. 710 Im-Kote Primer / 735 Im-Kote Finish Coat by Imco Technologies Inc.

2.10 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.
- B. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, aromatic polyurea with a Type A shore durometer hardness range of 90 to 95 according to ASTM D 2240.
- C. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.
- D. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements, and as follows:
 1. Types I and II, nonload bearing, f1or bonding hardened or freshly mixed concrete to hardened concrete.
- E. Reglets: Fabricate reglets of not less than 0.022-inch-thick, galvanized-steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.

2.11 REPAIR MATERIALS

- A. Patching Mortar: As described in Part 3 requirements.
- B. Underlayment/ Overlayment: Hydraulic-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.
 1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
 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.
 - a. Provide aggregate when recommended in writing by underlayment manufacturer for underlayment thickness required.
 4. Water: Potable and at a temperature of not more than 70 deg F.
 5. Compressive Strength:
 - a. Repair Underlayment (for use as substrate for floor covering): Not less than 4100 psi at 28 days when tested according to ASTM C 109/C 109M.

- b. Repair Overlayment (for use as repair material for floor areas remaining as exposed finished concrete): Not less than 5700 psi at 28 days when tested according to ASTM C 109/C 109M.
 - 1) Use overlayment products where new or existing concrete slab is cut, drilled, trenched or otherwise damaged and patched, whether scheduled or unscheduled, in areas scheduled for exposed finished concrete (e.g. stained, sealed, hardened or polished).
- 6. Prepare substrate in accordance with manufacturer's instructions.
 - a. Concrete:
 - 1) Prior to proceeding, to ASTM F710 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring. All concrete subfloors must be sound, solid, clean, and free of all oil, grease, dirt, curing compounds and any substance that might act as a bond breaker before priming. Mechanically clean if necessary, using shot blasting or other. Acid etching and the use of sweeping compounds and solvents are not acceptable.
 - 2) Substrates shall be inspected in accordance with ASTM F2170 and corrected for moisture or any other conditions that could affect the performance of the underlayment or the finished floor covering.
 - b. Crack and Joint Preparation:
 - 1) Moving Joints and Moving Cracks: Honor all expansion, isolation joints and moving cracks up through the underlayment.
 - 2) Saw Cuts, Dormant Control Joints, and Dormant Cracks: Fill all dormant control joints and dormant cracks with Low Viscosity Rigid Polyurethane Crack & Joint Repair or Self-Drying, Cement-Based Finish Underlayment as recommended by the manufacturer.
- 7. At Contractor's option, overlayment products may be used to achieve slab surface flatness and levelness criteria, in lieu of additional deck concrete, to compensate for structure and deck deflection.

C. Repair Topping

- 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Mastertop 112 Topping; Master Builders.
 - b. Quikrete Self-Leveling Floor Resurfacer Fast-Set; Quikrete.
 - c. Ultratop; Mapei.
- 2. Application: Resurfacing of slab traffic surface.

2.12 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, according to ACI 301.
 - 1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures. Trial batch and field experience tests shall have been performed within 12 months of submittal date.
 - 2. Do not use the same testing agency for field quality control testing.
- B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
 - 1. Lime Cement: 25 percent. Do not combine Lime Cement with any other non-portland cement material.
 - 2. Fly Ash: 25 percent.
 - 3. Combined Fly Ash and Pozzolan: 25 percent.
 - 4. Ground Granulated Blast-Furnace Slag: 50 percent.
 - 5. Silica Fume: 10 percent.

6. Combined Fly Ash, Pozzolans, and Silica Fume: 35 percent with fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.
 7. Combined Fly Ash or Pozzolan, Ground Granulated Blast-Furnace Slag, and Silica Fume: 50 percent portland cement minimum, with fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.
 8. Do not use Fly Ash or Pozzolans, Slag Cement, Lime Cement, or Silica Fume in concrete to receive a polished finish.
- C. Limit water-soluble, chloride-ion content in hardened concrete to 0.06 percent by weight of cement.
- D. Synthetic Fiber: Uniformly disperse in concrete mix at manufacturer's recommended rate, but not less than indicated on structural Drawings.
- E. Air Content of Indoor Concrete: Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content of 0 to 2 percent, unless otherwise indicated.
1. Do not air entrain interior trowel-finished concrete slabs-on-grade and suspended slabs, including light-weight concrete.
 2. Do not allow entrapped air content to exceed 3 percent.
- F. Air Content of Concrete Exposed to Freezing and/or De-icing Chemicals: Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content as follows within a tolerance of plus 1 or minus 1.5 percent, unless otherwise indicated:
1. Air Content: 6 percent for 1" (25 mm) nominal maximum aggregate size.
 2. Air Content: 6 percent for 3/4" (19 mm) nominal maximum aggregate size.
- G. Admixtures: Use admixtures according to manufacturer's written instructions. Admixture manufacturer shall confirm compatibility with lime cement, if used.
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.
 3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a w/c ratio below 0.50.
 4. Use accelerating admixture in concrete slabs placed at ambient temperatures below 50 deg. F.
 5. Use corrosion-inhibiting admixture in concrete mixtures where indicated.

2.13 CONCRETE MIXTURES FOR BUILDING ELEMENTS

- A. Foundation Piers, Walls, and Footings: Proportion normal-weight concrete mixture 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, or 8 inches for concrete with verified slump of 2 to 4 inches before adding high-range water-reducing admixture or plasticizing admixture plus or minus 1 inch.
 4. Air Content: Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content of 6 percent with a tolerance of plus 1 or minus 1.5 percent.
- B. Exterior and Other Concrete Exposed to Weather: Proportion normal-weight concrete mix as follows:
1. Minimum Compressive Strength: 5000 psi (air entrained) at 28 days.
 2. Minimum Cementitious Materials Content: 610 lb./cu. yd.
 3. Maximum Water-Cementitious Materials Ratio: 0.40.
 4. Slump Limit: 4 inches plus or minus 1 inch, or 8 inches for concrete with verified slump of 2 to 4 inches before adding high-range water-reducing admixture or plasticizing admixture.

5. Air Content: Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content of 6 percent with a tolerance of plus 1 or minus 1.5 percent.
- C. Interior Slabs-on-Grade and Slabs on Metal Deck: Proportion normal-weight concrete mix as follows:
1. Minimum Compressive Strength: 4000 psi at 28 days
 2. Minimum Cementitious Materials Content: 540 lb./cu. yd.
 3. Maximum Water-Cementitious Materials Ratio: 0.42.
 4. Slump Limit: 4 inches plus or minus 1 inch, or 8 inches for concrete with verified slump of 2 to 4 inches before adding high-range water-reducing admixture or plasticizing admixture.
 5. For Floor Slabs Only, Moisture Vapor Reduction Admixture (MVRA): For mix designs ranging from 0.42 to 0.52 w/cm, dose at 14 ounces per 100 pounds of total cementitious materials. Remove an equal amount of water from the mix. Add separately from other admixtures at the tail end of the load. Mix designs below 0.42 and above 0.52 may require adjustment.
 6. Do not use Fly Ash or Pozzolans, Slag Cement, or Silica Fume in concrete to receive a polished finish.

2.14 FABRICATING REINFORCEMENT

- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.15 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 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.
- B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94. Mix concrete materials in appropriate drum-type batch machine mixer.
1. For mixer capacity of 1 cu. yd. or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.
 2. For mixer capacity larger than 1 cu. yd., increase mixing time by 15 seconds for each additional 1 cu. yd.
 3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixture time, quantity, and amount of water added. Record approximate location of final deposit in structure.

PART 3 - EXECUTION

3.1 FORMWORK INSTALLATION

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Earth cuts may be used as forms for footing vertical surfaces, if sides are sharp and true, and not exposed in finished structure.
- C. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

- D. Limit concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:
1. Class A, 1/8 inch for smooth-formed finished surfaces.
 2. Class C, 1/2 inch for rough-formed finished surfaces.
- E. Construct forms tight enough to prevent loss of concrete mortar.
- F. Construct forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast-concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
1. Install keyways, reglets, recesses, and the like, for easy removal.
 2. Do not use rust-stained steel form-facing material.
- G. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.
- H. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- I. Chamfer exterior corners and edges of permanently exposed concrete.
- J. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.
- K. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- L. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- M. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.
1. Coat steel forms with a non-staining, rust-preventative material. Rust-stained steel formwork is not acceptable.
- N. Do not allow excess form-coating material to accumulate in forms or contact in-place concrete surfaces against which fresh concrete will be placed.
- O. Removing And Reusing Forms:
1. Formwork for footings, walls, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F (10 deg C) for 24 hours after placing concrete, if concrete is hard enough to not be damaged by form-removal operations and curing and protection operations are maintained.
 - a. Leave formwork for beam soffits, joists, slabs, and other structural elements that supports weight of concrete in place until concrete has achieved 75 percent of its 28-day design compressive strength. At cantilevers, 100% of its 28-day design compressive strength must be achieved.
 - b. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.
 2. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.

3. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

3.2 EMBEDDED ITEM INSTALLATION

- 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. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC 303.
 2. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
 3. Install dovetail anchor slots in concrete structures as indicated.
 4. No aluminum conduit shall be installed in concrete.
 5. No sleeves, holes, or inserts shall be placed in or within 2'-0" of columns or beams without approval of the structural engineer.

3.3 VAPOR-RETARDER INSTALLATION

- A. Granular Course: Place vapor retarder on granular fill or fine-graded granular material, moisten and compact with mechanical equipment to elevation tolerances of plus 0 inch or minus 3/4 inch.
 1. Thickness of granular fill (including fine-graded) shall be 5 inch minimum unless noted more in the geotechnical report.
 2. Place and compact a 1-inch-thick layer of fine-graded granular material over granular fill.
- B. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions.
 1. Lap joints 6 inches and seal with manufacturer's recommended tape.
 2. Turn edges of membrane up at slab perimeters, foundation walls, piers and other penetrations to provide continuous barrier against vapor penetration at edges.
 3. Patch penetrations and annular spaces per manufacturer's instructions.
 4. Protect membrane from contact with steel slab reinforcing, support chairs and bolsters.
 5. Prior to placement of concrete, remove standing water from membrane.
 6. During placement of reinforcing or concrete, exercise recommended precautions punctures or damage to membrane. Immediately patch damaged areas per manufacturer's instructions.
- C. Application: Provide vapor retarder under new slabs-on grade.
- D. Verification: Do not cover membrane with concrete without Construction Manager's written authentication of proper installation in compliance with specified requirements.

3.4 STEEL REINFORCEMENT INSTALLATION

- A. General: 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.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that reduce bond to concrete.

- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.
 - 1. Weld reinforcing bars according to AWS D1.4, where indicated.
- D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- E. Install welded-wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.
- F. Epoxy-Coated Reinforcement: Repair cut and damaged epoxy coatings with epoxy repair coating according to ASTM D 3963. Use epoxy-coated steel wire ties to fasten epoxy-coated steel reinforcement.
- G. Where horizontal reinforcement is in top 3 inches of all concrete exposed to freeze-thaw conditions, use epoxy-coated bars.

3.5 SLAB THICKNESS

- A. Design slab thicknesses are minimum. Allow for depressions, finish material thicknesses, and deflection of steel frame and decking.

3.6 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
 - 1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
 - 2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.
 - 3. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
 - 4. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
 - 5. Space vertical joints in walls at 30'-0". Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
 - 6. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- 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 to a radius of 1/8 inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool 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 does not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
- D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated.
2. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface where joint sealants, specified in Section 079200 "Joint Sealants," are indicated.
3. Install joint-filler strips in lengths long as practicable. Where more than one length is required, lace or clip sections together.

3.7 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections are completed.
- B. No concrete shall be placed except when Architect's representative (or independent testing laboratory) is present unless this requirement is specifically waived by the Architect. Give adequate notice to the Architect, the testing laboratory, and all contractors affected before placing concrete.
- C. General: Comply with ACI 304, "Guide for Measuring, Mixing, Transporting, and Placing Concrete," and as specified. Concrete delivery tickets shall show:
 1. Batch number
 2. Mix by number with cement content in pounds and maximum size aggregate
 3. Admixtures
 4. Air content
 5. Slump
 6. Time of loading
 7. Temperature of concrete for mass concrete elements
- D. Discharge concrete within 1-1/2 hours after water has been added to the cement unless a longer time has been authorized by the Architect/Engineer. During hot weather or other conditions contributing to a quick stiffening of the concrete, the Architect/Engineer may require discharge in less than 1-1/2 hours. If loss of slump occurs, HRWR may be re-dosed at the site as long as a "flash set" has not occurred. Re-dosage procedures must be discussed and approved by the Engineer and the manufacturer at the Pre-Concrete Conference.
- E. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.
- F. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.
 1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
- G. 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. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
 1. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.
 2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
 3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.
- H. 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. Add additional concrete during placement operations to provide slab surfaces at correct, finished floor, and top of slab elevations indicated to account for framing members, including cambered and non-cambered members, deflecting below top of steel elevations indicated.
 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. Do not further disturb slab surfaces before starting finishing operations.
- I. Place interior slabs on grade that will later receive floor coverings only after floor level or roof above has been placed. Also, protect the slab from any moisture infiltration until building is complete.
- J. Pumping Concrete: Grout used to prime a pump shall not be placed in the forms in any concrete exposed to view in the final structure.
- K. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
1. When average high and low temperature is expected to fall below 40 deg F (4.4 deg C) for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
 2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
- L. Hot-Weather Placement: Comply with ACI 301 and as follows:
1. Maintain concrete temperature below 90 deg F (32 deg C) at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 2. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
 3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

3.8 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
1. Apply to concrete surfaces not exposed to public view.
- 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 defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
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 Insert locations.
- C. Rubbed Finish: Apply the following to smooth-formed-finished as-cast concrete where indicated:
1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.

2. Grout-Cleaned Finish: Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes. Mix 1-part portland cement to 1-1/2 parts fine sand with a 1:1 mixture of bonding admixture and water. Add white portland cement in amounts determined by trial patches, so color of dry grout matches adjacent surfaces. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap and keep surface damp by fog spray for at least 36 hours.
 3. Cork-Floated Finish: Wet concrete surfaces and apply a stiff grout. Mix 1-part portland cement and 1-part fine sand with a 1:1 mixture of bonding agent and water. Add white portland cement in amounts determined by trial patches, so color of dry grout matches adjacent surfaces. Compress grout into voids by grinding surface. In a swirling motion, finish surface with a cork float.
- 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.

3.9 FINISHING FLOORS AND SLABS

- A. General: Comply with ACI 302.1R recommendations for screeding, re-straightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 1/4 inch in one direction.
1. Apply scratch finish to surfaces to receive concrete floor toppings or to receive mortar setting beds for bonded cementitious floor finishes.
- C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power-driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and re-straightening until surface is left with a uniform, smooth, granular texture.
1. Apply float finish to surfaces to receive trowel finish and to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing, or sand-bed terrazzo.
- D. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
1. Apply a 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.
 2. Finish surfaces to the following tolerances, according to ASTM E 1155, for a randomly trafficked floor surface:
 - a. For carpeted slabs: Specified overall values of flatness, SOF(F) 25; and of levelness, SOF(L) 20; with minimum local values of flatness, MLF(F) 17; and of levelness, MLF(L) 15.
 - b. For polished slabs: Specified overall values of flatness, SOF(F) 45; and of levelness, SOF(L) 35; with minimum local values of flatness, MLF(F) 30; and of levelness, MLF(L) 24.
 - c. For all other slabs: Specified overall values of flatness, SOF(F) 35; and of levelness, SOF(L) 25; with minimum local values of flatness, MLF(F) 24; and of levelness, MLF(L) 17.
 3. SOF(L) and MLF(L) levelness tolerances shall not apply to cambered or inclined surfaces.
 4. Finish and measure surface, so gap at any point between concrete surface and an unleveled, freestanding, 10-ft.- long straightedge resting on two high spots and placed anywhere on the surface does not exceed 3/16 inch.
- E. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces where ceramic or quarry tile is to be installed by either thickset or thinset method. While concrete is still plastic, slightly scarify surface with a fine broom.
1. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.

- F. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and elsewhere as indicated.
 - 1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

3.10 MISCELLANEOUS CONCRETE ITEM INSTALLATION

- A. Filling In: Fill in holes and openings left in concrete structures after work of other trades is in place unless otherwise indicated. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.
- B. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items. Cast-in inserts and accessories as shown on Drawings. Screed, tamp, and trowel-finish concrete surfaces.
- C. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.
- D. Equipment Bases and Foundations:
 - 1. Coordinate sizes and locations of concrete bases with actual equipment provided.
 - 2. Construct concrete bases 4 inches high unless otherwise indicated and extend base not less than 6 inches in each direction beyond the maximum dimensions of supported equipment unless otherwise indicated or unless required for seismic anchor support.
 - 3. Minimum Compressive Strength: 4000 psi at 28 days.
 - 4. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of concrete base.
 - 5. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete substrate.
 - 6. Prior to pouring concrete, place, and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 7. Cast anchor-bolt insert into bases. Install anchor bolts to elevations required for proper attachment to supported equipment.

3.11 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb./sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for remainder of curing period.
- D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.
- E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
 - 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.

- b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
 - d. Moist-cure interior and exterior concrete to be exposed to de-icing salts.
- 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
 - a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
 - b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
 - c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies does not interfere with bonding of floor covering used on Project.
 - d. Use moisture-retaining covers to cure all MVRA concrete.
- 3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
 - a. 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 will not interfere with bonding of floor covering used on Project.

3.12 LIQUID FLOOR TREATMENT APPLICATION

- A. Penetrating Liquid Floor Treatment: Prepare, apply, and finish penetrating liquid floor treatment according to manufacturer's written instructions.
 - 1. Remove curing compounds, sealers, oil, dirt, laitance, and other contaminants and complete surface repairs.
 - 2. Do not apply to concrete that is less than 28 days' old.
 - 3. Apply liquid until surface is saturated, scrubbing into surface until a gel forms; rewet; and repeat brooming or scrubbing. Rinse with water; remove excess material until surface is dry. Apply a second coat in a similar manner if surface is rough or porous.
- B. Sealing and Protective Coats: Uniformly apply a continuous sealing coat of curing and sealing compound to hardened concrete by power spray or roller according to manufacturer's written instructions.

3.13 JOINT FILLING

- A. Prepare, clean, and install joint filler according to manufacturer's written instructions.
 - 1. Defer joint filling until concrete has aged at least one month. Do not fill joints until construction traffic has permanently ceased.
- B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joints clean and dry.
- C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.14 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.
- B. Patching Mortar: Mix dry pack patching mortar, consisting of 1-part portland cement to 2-1/2 parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.
- C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
 - 1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension to solid concrete. Limit cut depth to 3/4 inch. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
 - 2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar matches surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
 - 3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.
- D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
 - 1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
 - 2. After concrete has cured at least 14 days, correct high areas by grinding.
 - 3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
 - 4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
 - 5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
 - 6. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete, except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
 - 7. Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.
- E. Perform structural repairs of concrete, subject to 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. Special Inspections and field quality control testing: Owner will engage a special inspector and qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.
 - 1. Refer to drawings for testing and special inspection requirements.
 - 2. Prepare and submit reports within 7 days of completing tests and inspections. Distribute reports to Architect, Engineer, Owner, Construction Manager, and Contractor. Clearly indicate non-compliance on reports.
- B. Testing of Slabs Containing MVRA:
 - 1. The moisture vapor reduction admixture (MVRA) manufacturer will perform all moisture testing in accordance with this specification and will issue project specific warranties prior to installation of any slab finishes; no further field slab moisture nor pH testing shall be required.
 - a. Failure to provide a product that meets or exceeds these requirements will result in all subsequent testing and slab remediation costs being borne by the contractor.
 - 2. A representative or agent of the moisture vapor reduction admixture (MVRA) manufacturer must be present at the jobsite during placement of all MVRA treated concrete. Do not proceed without this representative being present.
 - 3. Field testing technician shall, at the expense of the MVRA Manufacturer, procure at least one 4-inch cylinder from every day of placement of MVRA dosed concrete for the purpose of subsequent hydraulic conductivity/coefficient of permeability testing.
 - 4. All cylinders shall be independently lab tested in accordance with ASTM D 5084 at the expense of the MVRA manufacturer.
 - 5. Test results must conform to specified limits.
 - a. Should any cylinder from any day of placement deliver results in excess of 6.0 E-08 cm/sec, the concrete moisture vapor reduction admixture manufacturer shall procure, at their expense, a core (or cores) from that day of placement. This core (cores) shall be sent to an independent laboratory for hydraulic conductivity (coefficient or permeability) per ASTM D 5084.
 - b. Should any core deliver results in excess of 6.0 E-08 cm/sec per ASTM D 5084, the concrete moisture vapor reduction admixture manufacturer shall provide, at their expense, a topical moisture mitigation system for all areas not meeting the stated limit.
 - 6. Proceeding with placement of concrete dosed with the MVRA without the required representation will result in the contractor bearing the cost to core and ship appropriate material for testing per ASTM D 5084.
- C. Non-Compliant Work:
 - 1. The contractor shall remove and replace all non-compliant work, or, at the contractor's expense, perform additional testing to verify compliance. Contractor shall submit results of additional testing to Architect, Engineer, and Owner (or owner's representative) for review and approval.

3.16 PROTECTION OF LIQUID FLOOR TREATMENTS

- A. 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.

END OF SECTION 03 3000

Mix Design Submittal Form

A copy of this form shall be completed for each type of concrete listed in the specification. Mix designs not submitted on this form will not be reviewed.

Part 1

CONCRETE SUPPLIER INFORMATION

Contact Person: _____

Telephone Number: _____

Company Name: _____

Address: _____

Main Plant Location: _____

Miles from Project Site: _____

PROJECT INFORMATION

Project Name: _____

Address: _____

General Contractor: _____

Concrete Type: _____

Specification Section Reference: _____

Intended Use: _____

Part 2

DETERMINE REQUIRED COMPRESSIVE STRENGTH (select one method)

- ☐ If field test data is available:

If a group of at least 15 consecutive compressive strength tests meeting the requirements of ACI 301-10 4.2.3.2 are available, calculate the standard deviation and required average compressive strength from ACI 301-10 Table 4.2.3.3.a

Number of Tests: _____

Standard Deviation: _____

K Factor: _____

f'_{cr} : _____

Recorded Field Test Data		
Test	Date	f'_c
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		
26		
27		
28		
29		
30		

- ☐ If field test data is not available:

If no field compressive strength tests are available, select required average compressive strength from ACI 301-10 Table 4.2.3.3.b

f'_{cr} : _____

Part 3

DOCUMENTATION OF AVERAGE COMPRESSIVE STRENGTH

Two methods of determining expected compressive strength are acceptable including Field Test Data Method and Trial Mix Method. Select **one** method and provide the data required as described.

Field Test Data Method:

Provide design Materials, Types, Specific Gravity, Weight and Volume for the concrete being tested. Utilize the following table. Mix #2 is not required when ten or more consecutive strength tests for one mixture are available. See ACI 301-10 4.2.3.4.a for additional information and requirements.

Materials	Type/Source		Specific Gravity		Weight (lbs.)		Absolute Volume (cu. ft.)	
	#1	#2	#1	#2	#1	#2	#1	#2
Mix								
Cement								
Fly Ash								
Microsilica								
Coarse Aggregate								
Fine Aggregate								
Water								
Air								
Other								
TOTAL							27.0 cu. ft.	

Mix #1, Water/Cement Ratio:

Mix #2, Water/Cement Ratio:

- ☐ If at least 10 strength tests represent one mixture, calculate average compressive strength and verify it is greater than required compressive strength.

Average Compressive
Strength (f_c): _____

Required Compressive
Strength (f_{cr}): _____

- ☐ If at least 10 strength tests represent two mixtures, calculate average compressive strength for each mixture and plot as a function of water/cement ratio. Using the required compressive strength from Part 2, determine the corresponding water/cement ratio.

Required Compressive
Strength (f_c): _____

Water/Cement Ratio
From Plot: _____

Attach copy of average compressive strength vs. water cement ratio.

Establish mixture proportions based upon the required water cementitious ratio. Use the table below to show the actual mixture used on the project. (If one trial mix was used the mixture will match Mix #1)

Field Test Data					
Mix #1	Date	f_c	Mix #2*	Date	f_c
1			1		
2			2		
3			3		
4			4		
5			5		
6			6		
7			7		
8			8		
9			9		
10			10		
11			11		
12			12		
13			13		
14			14		
15			15		
16			16		
17			17		
18			18		
19			19		
20			20		
21			21		
22			22		
23			23		
24			24		
25			25		
26			26		
27			27		
28			28		
29			29		
30			30		
Average	-		Average	-	

Materials	Type/Source	Specific Gravity	Weight (lbs.)	Absolute Volume (cu. ft.)
Cement				
Fly Ash				
Microsilica				
Coarse Aggregate				
Fine Aggregate				
Water				
Air				
Other				
TOTAL				27.0 cu. ft.

Trial Mixture Method:

Provide three design mixtures including: Materials, Types, Specific Gravity, Weight and Volume for the concrete being tested. See ACI 301-10 for additional information and requirements.

Materials	Type/Source			Specific Gravity			Weight (lbs.)			Absolute Volume (cu. ft.)		
	#1	#2	#3	#1	#2	#3	#1	#2	#3	#1	#2	#3
Trial Mixture												
Cement												
Fly Ash												
Microsilica												
Coarse Aggregate												
Fine Aggregate												
Water												
Air												
Other												
Total										27.0 cu. ft.		

Mix #1, Water/Cement Ratio: _____

Mix #2, Water/Cement Ratio: _____

Mix #3, Water/Cement Ratio: _____

Provide compressive test results from above mixtures.

Trial Mix Test Data								
Mix #1	Date	f _c	Mix #2	Date	f _c	Mix #3	Date	f _c
1			1			1		
2			2			2		
3			3			3		
Average	-		Average	-		Average	-	

Plot average compressive strength versus water cement ratio and determine the proper water-cementitious material ratio to meet the required compressive strength from Part 2.

Required Compressive Strength (f_{cr}): _____

Water/Cementitious Materials Ratio: _____

Establish the mixture proportions based upon the required water cementitious ratio. Use the table below to summarize mixture proportions used on the project.

Materials	Type/Source	Specific Gravity	Weight (lbs.)	Absolute Volume (cu. ft.)
Cement				
Fly Ash				
Microsilica				
Coarse Aggregate				
Fine Aggregate				
Water				
Air				
Other				
TOTAL				27.0 cu. ft.

Additional Requirements/Information:

Please provide the following attachments: (Initial if attached)

Coarse Aggregate Gradation Report	_____
Fine Aggregate Gradation Report	_____
Concrete Compressive Strength Data	_____
Admixture Compatibility Certification Letter	_____
Trial Mixture strength vs. water/cement ratio plots	_____

SECTION 03 4900 - GLASS-FIBER-REINFORCED CONCRETE (GFRC)

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes glass-fiber-reinforced concrete (GFRC) column covers, frames, anchors, and connection hardware.
- B. Related Sections:
 - 1. Division 09 Section "Glass-Fiber Reinforced Plaster Fabrications" for interior column cover fabrications.

1.02 DEFINITIONS

- A. Design Reference Sample: Sample of approved GFRC color, finish, and texture; preapproved by Architect.

1.03 SUBMITTALS

- A. Product Data: For each type of product indicated. Include GFRC design mixes.
- B. Shop Drawings: Show fabrication and installation details for GFRC units including the following:
 - 1. Structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 - 2. Unit elevations, sections, and dimensions.
 - 3. Thickness of facing mix, GFRC backing, and bonding pads for typical units.
 - 4. Finishes.
 - 5. Joint and connection details.
 - 6. Erection details.
 - 7. Location and details of connection hardware attached to structure.
 - 8. Size, location, and details of flex, gravity, and seismic anchors for typical units.
 - 9. Other items sprayed into units.
 - 10. Erection sequence for special conditions.
 - 11. Relationship to adjacent materials.
 - 12. Description of loose, cast-in, and field hardware.
- C. Samples: Representative of finished exposed face of GFRC showing the full range of colors and textures specified, 12 by 12 inches and of actual thickness.
- D. Qualification Data: For qualified GFRC manufacturer, including proof of current Precast/Prestressed Concrete Institute (PCI) or Architectural Precast Association (APA) Plant Certification.
- E. Welding certificates.
- F. Steel Sheet Certification: For steel sheet used in cold-formed steel unit framing.
- G. Mill Certificates: For structural-steel shapes and hollow structural sections used in unit framing.
- H. Source Quality-Control Program: For GFRC manufacturer.

- I. Source Quality-Control Test Reports: For GFRC, inserts, and anchors.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer that participates in PCI's Plant Certification Program and is designated a PCI-Certified Plant for Group G - Glass Fiber Reinforced Concrete or that participates in APA's Plant Certification Program and is certified for GFRC production.
 - 1. Manufacturer's responsibility includes fabricating GFRC units and providing professional engineering services needed to assume engineering responsibility for GFRC units.
 - 2. Engineering responsibility includes preparation of Shop Drawings and comprehensive engineering analysis, based on GFRC production test values, by a qualified professional engineer experienced in GFRC design.
- B. Steel Sheet Certifications: Obtain mill certificates signed by manufacturers of steel sheet, or test reports from a qualified testing agency, indicating that steel sheet used in cold-formed metal unit framing complies with requirements including uncoated steel thickness, yield strength, tensile strength, total elongation, chemical requirements, and galvanized-coating thickness.
- C. Mill Certificates: Obtain certified mill test reports from manufacturer of structural-steel shapes and hollow structural sections used in unit framing indicating compliance of these products with requirements.
- D. Source Limitations: Obtain GFRC units from single source from single manufacturer.
- E. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel," and AWS D1.3, "Structural Welding Code - Sheet Steel."
- F. PCI Manuals: Comply with requirements and recommendations in the following PCI manuals unless more stringent requirements are indicated:
 - 1. PCI MNL 128, "Recommended Practice for Glass Fiber Reinforced Concrete Panels."
 - 2. PCI MNL 130, "Manual for Quality Control for Plants and Production of Glass Fiber Reinforced Concrete Products."
- G. AISI Specifications: Comply with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."
- H. AISC Specifications: Comply with ANSI/AISC 360, "Specification for Structural Steel Buildings."
- I. Mockups: Build mockups to demonstrate aesthetic effects and set quality standards for fabrication and installation.
 - 1. Build mockup of typical wall area as shown on Drawings separately from building.
 - 2. In addition to GFRC units, mockups include architectural precast concrete unit masonry aluminum windows joint sealants metal flashings and copings.
- J. Preinstallation Conference: Conduct conference at Project site.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Handle and transport GFRC units to avoid damage.
 - 1. Place nonstaining resilient spacers between units.
 - 2. Support units on nonstaining material during shipment.
 - 3. Protect units from dirt and damage during handling and transport.

- B. Store GFRC units to protect from contact with soil, staining, and physical damage.
 - 1. Store units with nonstaining resilient supports in same positions as when transported.
 - 2. Store units on firm, level, and smooth surfaces.
 - 3. Place stored units so identification marks are clearly visible.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. General: Match, to Architect's satisfaction, appearance, quality, and tolerances of existing exterior column covers at South Fayette Intermediate School.
- B. Structural Performance: GFRC units, anchors, and connections, shall withstand design loads indicated on Drawings, as well as the effects of thermal- and moisture-induced volume changes, according to load factors and combinations established in PCI MNL 128, "Recommended Practice for Glass Fiber Reinforced Concrete Panels."
 - 1. Deflection Limits: Design to withstand design loads without lateral deflections greater than 1/240 of wall span.
 - 2. Thermal Movements: Provide for thermal movements resulting from annual ambient temperature changes of 100 deg F.
 - 3. Design to accommodate deflections and other building movements.

2.02 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Basis of Design: Products matching current South Fayette Intermediate School construction by Custom Castings Northeast, Inc, 814 375-5220; www.customcastings.net
 - 1) Refer to Custom Castings Job No 45149, May 2025
 - 2. CastWorks by Armstrong World Industries, Inc; armstrongceilings.com/castworks
 - 3. ARC Limited, 412 749-1223; www.arcgfrc.com
 - 4. Formglas Products Ltd., 416.635.8030, www.formglas.com

2.03 MOLD MATERIALS

- A. Molds: Rigid, dimensionally stable, nonabsorptive material, warp and buckle free, that will provide continuous and true GFRC surfaces; nonreactive with GFRC and capable of producing required finish surfaces.
 - 1. Mold-Release Agent: Commercially produced liquid-release agent that will not bond with, stain, or adversely affect GFRC surfaces and will not impair subsequent surface or joint treatments of GFRC.

2.04 GFRC MATERIALS

- A. Portland Cement: ASTM C 150; Type I, II, or III.
 - 1. For surfaces exposed to view in finished structure, use gray or white of same type, brand, and source throughout GFRC production.
 - 2. Metakaolin: ASTM C 618, Class N.

- B. Glass Fibers: Alkali resistant, with a minimum zirconia content of 16 percent, 1 to 2 inches long, specifically produced for use in GFRC, and complying with PCI MNL 130.
- C. Sand: Washed and dried silica, complying with composition requirements in ASTM C 144; passing No. 20 sieve with a maximum of 2 percent passing No. 100 sieve.
- D. Facing Aggregate: ASTM C 33, except for gradation, and PCI MNL 130, 1/4-inch maximum size.
 - 1. Aggregates: Selected, hard, and durable; free of material that reacts with cement or causes staining; to match sample.
- E. Coloring Admixture: ASTM C 979, synthetic mineral-oxide pigments or colored water-reducing admixtures, temperature stable, nonfading, and alkali resistant.
- F. Water: Potable; free from deleterious material that may affect color stability, setting, or strength of GFRC and complying with chemical limits of PCI MNL 130.
- G. Polymer-Curing Admixture: Acrylic thermoplastic copolymer dispersion complying with PCI MNL 130.
- H. Air-Entraining Admixture: ASTM C 260, containing not more than 0.1 percent chloride ions.
- I. Chemical Admixtures: ASTM C 494, containing not more than 0.1 percent chloride ions.

2.05 ANCHORS, CONNECTORS, AND MISCELLANEOUS MATERIALS

- A. Carbon-Steel Shapes and Plates: ASTM A 36. Finish steel shapes and plates less than 3/16 inch thick as follows:
- B. Carbon-Steel Bars: ASTM A 108, AISI Grade 1018. Finish steel bars less than 3/16 inch thick as follows:
- C. Carbon-Steel Finishes:
 - 1. Finish, exterior applications: Zinc coated by hot-dip process according to ASTM A 123, after fabrication, or ASTM A 153, as applicable.
 - 2. Finish, interior applications: Shop primed with MPI#79 on surfaces prepared to comply with SSPC-SP 2, "Hand Tool Cleaning," or better.
- D. Malleable-Iron Castings: ASTM A 47, Grade 32510.
- E. Carbon-Steel Castings: ASTM A 27, Grade 60-30.
- F. Bolts: ASTM A 307 or ASTM A 325.
 - 1. Finish: Zinc coated by electrodeposition according to ASTM B 633, SC 3.

2.06 GFRC MIXES

- A. Backing Mix: Proportion backing mix of portland cement, glass fibers, sand, and admixtures to comply with design requirements. Provide nominal glass-fiber content of not less than 5 percent by weight of total mix.
- B. Face Mix: Proportion face mix of portland cement, sand, facing aggregates, and admixtures to comply with design requirements.
- C. Mist Coat: Portland cement, sand slurry, and admixtures; of same proportions as backing mix without glass fibers.

- D. Polymer-Curing Admixture: 6 to 7 percent by weight of polymer-curing admixture solids to dry portland cement.
- E. Air Content (exterior applications): 8 to 10 percent; ASTM C 185.
- F. Coloring Admixture: Not to exceed 10 percent of cement weight.

2.07 MOLD FABRICATION

- A. Construct molds that will result in finished GFRC complying with profiles, dimensions, and tolerances indicated, without damaging GFRC during stripping. Construct molds to prevent water leakage and loss of cement paste.
 - 1. Coat contact surfaces of molds with form-release agent.
- B. Place form liners accurately to provide finished surface texture indicated. Provide solid backing and supports to maintain stability of liners during GFRC application. Coat form liner with form-release agent.

2.08 GFRC FABRICATION

- A. Proportioning and Mixing: For backing mix, meter sand/cement slurry and glass fibers to spray head at rates to achieve design mix proportions and glass-fiber content according to PCI MNL 130 procedures.
- B. Spray Application: Comply with general procedures as follows:
 - 1. Spray or place face mix in thickness indicated on Shop Drawings.
 - 2. Proceed with spraying backing mix before face mix or mist coat has set, using procedures that produce a uniform thickness and even distribution of glass fibers and matrix.
 - 3. Consolidate backing mix by rolling or other technique to achieve complete encapsulation of glass fibers and compaction.
 - 4. Measure thickness with a pin gage or other acceptable method at least once for each 5 sq. ft. of unit surface. Take not less than six measurements per unit.
- C. Hand form and consolidate intricate details, incorporate formers or infill materials, and over spray before material reaches initial set to ensure complete bonding.
- D. Build up homogeneous GFRC bonding pads over anchor feet, maintaining a minimum thickness of 1/2 inch over tops of anchor feet, before initial set of GFRC backing.
- E. Inserts and Embedments: Build up homogeneous GFRC bosses or bonding pads over inserts and embedments to provide sufficient anchorage and embedment to comply with design requirements.
- F. Curing: Employ initial curing method that will ensure sufficient strength for removing units from mold. Comply with PCI MNL 130 procedures.
- G. Unit Identification: Mark each GFRC unit to correspond with identification mark on Shop Drawings. Mark each unit with its casting date.

2.09 FABRICATION TOLERANCES

- A. Manufacturing Tolerances: Manufacture GFRC units so each finished unit complies with PCI MNL 130 for dimension, position, and tolerances.

- B. Manufacturing Tolerances: Manufacture GFRC units so each finished unit complies with the following dimensional tolerances. For dimensional tolerances not listed below, comply with PCI MNL 130.
1. Overall Height and Width of Units, Measured at the Face Adjacent to Mold: As follows:
 - a. 10 feet or less, plus or minus 1/8 inch.
 - b. More than 10 feet, plus or minus 1/8 inch per 10 feet; 1/4 inch maximum.
 2. Edge Return Thickness: Plus 1/2 inch, minus 0 inch.
 3. Architectural Facing Thickness: Plus 1/8 inch, minus 0 inch.
 4. Backing Thickness: Plus 1/4 inch, minus 0 inch.
 5. Unit Depth from Face of Skin to Back of Unit Frame or Integral Rib: Plus 3/8 inch, minus 1/4 inch.
 6. Angular Variation of Plane of Side Mold: Plus or minus 1/32 inch per 3 inches of depth or plus or minus 1/16 inch total, whichever is greater.
 7. Variation from Square or Designated Skew (Difference in Length of Two Diagonal Measurements): Plus or minus 1/8 inch per 72 inches or plus or minus 1/4 inch total, whichever is greater.
 8. Local Smoothness: 1/4 inch per 10 feet.
 9. Bowing: Not to exceed L/240 unless unit meets erection tolerances using connection adjustments.
 10. Maximum Permissible Warpage of One Corner out of the Plane of the Other Three: 1/16 inch per 12 inches of distance from nearest adjacent corner.
- C. Position Tolerances: Measured from datum line locations, as indicated on Shop Drawings.
1. Inserts: Plus or minus 1/2 inch.
 2. Special Handling Devices: Plus or minus 3 inches.
 3. Location of Bearing Devices: Plus or minus 1/4 inch.
 4. Blockouts: Plus or minus 3/8 inch.

2.10 FINISHES

- A. Finish exposed-face surfaces of GFRC as follows to match approved design reference sample and mockup. Unit faces shall be free of joint marks, grain, or other obvious defects.
1. As-Cast-Surface Finish: Provide monolithic surface, free of sand streaks, honeycombs, visible glass fibers, and excessive air voids, with uniform color and texture.
 2. Factory-apply 3 coats of manufacturer's recommended clear finish.

2.11 SOURCE QUALITY CONTROL

- A. Quality-Control Testing: Establish and maintain a quality-control program for manufacturing GFRC units according to PCI MNL 130.
1. Test materials and inspect production techniques.
 2. Quality-control program shall monitor glass-fiber content, spray rate, unit weight, product physical properties, anchor pull-off and shear strength, and curing period and conditions.
 3. Prepare test specimens and test according to ASTM C 1228, PCI MNL 130, and PCI MNL 128 procedures.
 4. Test GFRC inserts and anchors according to ASTM C 1230 to validate design values.
 5. Produce test boards at a rate not less than one per work shift per operator for each spray machine and for each mix design.
 - a. For each test board, determine glass-fiber content according to ASTM C 1229, and flexural yield and ultimate strength according to ASTM C 947.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine structure and conditions for compliance with requirements for installation tolerances, true and level bearing surfaces, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 ERECTION

- A. Install clips, hangers, and other accessories required for connecting GFRC units to supporting members and backup materials.
- B. Lift GFRC units and install without damage.
- C. Install GFRC units level, plumb, square, and in alignment. Provide temporary supports and bracing as required to maintain position, stability, and alignment of units until permanent connections are completed.
 - 1. Maintain horizontal and vertical joint alignment and uniform joint width.
 - 2. Remove projecting hoisting devices.
- D. Connect GFRC units in position by bolting or welding, or both, as indicated on Shop Drawings. Remove temporary shims, wedges, and spacers as soon as possible after connecting is completed.
- E. Welding: Comply with applicable AWS D1.1 and AWS D1.3 requirements for welding, appearance, quality of welds, and methods used in correcting welding work.
 - 1. Protect GFRC units from damage by field welding or cutting operations, and provide noncombustible shields as required.
- F. Filling and sealing joints: Comply with requirements of Division 07 Section "Joint Sealants"
 - 1. Provide sanded caulk to match and blend with color and texture of GFRC finish.

3.03 ERECTION TOLERANCES

- A. Erect GFRC units to comply with the following noncumulative tolerances:
 - 1. Plan Location from Building Grid Datum: Plus or minus 3/8 inch.
 - 2. Top Elevation from Nominal Top Elevation: As follows:
 - a. Exposed Individual Unit: Plus or minus 1/8 inch.
 - b. Nonexposed Individual Unit: Plus or minus 1/4 inch.
 - c. Exposed Unit Relative to Adjacent Unit: 1/8 inch.
 - d. Nonexposed Unit Relative to Adjacent Unit: 1/4 inch.
 - 3. Support Elevation from Nominal Elevation: As follows:
 - a. Maximum Low: 3/8 inch.
 - b. Maximum High: 1/8 inch.
 - 4. Plumb in Any 10 Feet of Element Height: 1/4 inch.
 - 5. Face Width of Joint: As follows (governs over joint taper):
 - a. Unit Dimension 20 Feet or Less: Plus or minus 1/8 inch.

6. Maximum Joint Taper: 1/4 inch.
7. Differential Bowing, as Erected, between Adjacent Members of Same Design: 1/4 inch.

3.04 REPAIRS

- A. Repairs will be permitted provided structural adequacy of GFRC unit and appearance are not impaired, as approved by Architect.
- B. Mix patching materials and repair GFRC so cured patches blend with color, texture, and uniformity of adjacent exposed surfaces.
- C. Prepare and repair accessible damaged galvanized coatings with galvanizing repair paint according to ASTM A 780.
- D. Wire brush, clean, and paint accessible weld areas on prime-painted components with same type of shop primer.
- E. Remove and replace damaged GFRC units when repairs do not comply with requirements.

3.05 CLEANING AND PROTECTION

- A. Perform cleaning procedures, if necessary, according to GFRC manufacturer's written instructions. Clean soiled GFRC surfaces with detergent and water, using soft fiber brushes and sponges, and rinse with clean water. Prevent damage to GFRC surfaces and staining of adjacent materials.

END OF SECTION 03 4900

SECTION 04 2000 - UNIT MASONRY

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes unit masonry assemblies consisting of the following:
 - 1. Concrete masonry units (CMUs).
 - 2. Face Brick
 - 3. Decorative ground-faced concrete masonry
 - 4. Cast stone sills, trim.
 - 5. Mortar and grout
 - 6. Reinforcing steel
 - 7. Masonry joint reinforcement.
 - 8. Ties and anchors.
 - 9. Embedded flashing.
 - 10. Miscellaneous masonry accessories.
 - 11. Elastomeric joint expansion and seal.
- B. Related Sections include the following:
 - 1. Division 03 Section "Cast-In-Place Concrete" for foundation support of masonry units.
 - 2. Division 05 Section "Cold-Formed Metal Framing" and Division 06 Section "Sheathing" for steel-framed masonry backup assemblies and wall sheathing.
 - 3. Division 07 Section "Thermal Insulation" for cavity wall insulation.
 - 4. Division 07 Section "Air Barriers" for continuity of air barrier system.
 - 5. Division 07 Section "Elastomeric Joint Sealants" for sealing control and expansion joints in unit masonry.
- C. Products installed, but not furnished, under this Section include the following:
 - 1. Steel lintels and shelf angles for unit masonry, furnished under Division 05 Section "Metal Fabrications."
 - 2. Cavity wall insulation, furnished under Division 07 Section "Thermal Insulation"
 - 3. Manufactured reglets in masonry joints for metal flashing, furnished under Division 07 Section "Roof Specialties"

1.02 DEFINITIONS

- A. Cast Stone: Architectural precast concrete building units intended to simulate natural cut stone.
 - 1. Dry Cast Concrete Products: Manufactured from zero-slump concrete.
 - 2. Machine Casting Method: Vibratory compaction by machine of earth-moist, zero-slump concrete against rigid mold until concrete is densely compacted.
 - 3. Vibrant Dry Hand Tamp Casting Method: Vibratory compaction by hand tamp of earth-moist, zero-slump concrete against rigid mold until concrete is densely compacted.

1.03 ACTION SUBMITTALS

- A. Qualification Data:
 - 1. For cast stone manufacturer.
 - 2. For installers.

- B. Product Data: For each type of product indicated.
1. Cast Stone: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
 2. Concrete Masonry Units: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
 3. Brick: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
 4. Stone Accessories: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- C. Letter from each masonry manufacturer stating which masonry cleaners may be used without harm on the Project brick or bricks.
- D. Shop Drawings: For the following:
1. Wall Joints: For all masonry construction, provide wall elevations showing masonry control joints.
 - a. Coordinate location and frequency of control joints with the typical structural and architectural details and all wall openings and penetrations required by all Prime Contracts.
 2. Reinforcing Steel: Detail placement of masonry vertical and horizontal reinforcing bars. Comply with ACI 315, "Details and Detailing of Concrete Reinforcement."
 3. Fabricated and Site-Formed Flashing: Detail corner units, end-dam units, and other special applications, including interface with existing construction.
 4. Air Barrier Continuity: Indicate types and locations of air barrier transition accessories, including interface with existing construction.
 5. Thermal Continuity: Indicate types and locations of thermal barrier transition accessories, including interface with existing construction.
 6. Cast Stone:
 - a. Stone sizes and shapes
 - b. Fabrication and installation details, including interface with existing construction.
 - c. Anchor and insert types.
 - d. Setting sequence
 - e. Dimensions, details of reinforcement and anchorages if any.
 - f. Indication of finished faces.
 - g. Building elevations showing layout of units and locations of joints and anchors.
- E. Samples for Selection: Exposed masonry products, showing available range of colors, variations, surface finish.
- F. Samples for Verification: For each type, texture and color of the following:
1. Face brick, in the form of straps of five or more bricks.
 2. Decorative concrete masonry face units, in the form of straps of five or more units
 3. Special shapes.
 4. Stone Accessories
 5. Cavity drainage and weeps/vents.
 6. Mortar and grout materials
 7. Accessories embedded in masonry, including ties and flashing.

1.04 INFORMATIONAL SUBMITTALS

- A. List of Materials Used in Constructing Mockups Panels: List generic product names together with manufacturers, manufacturers' product names, model numbers, lot numbers, batch numbers, source of supply, and other information as required to identify materials used. Include mix proportions for mortar and grout and source of aggregates.
 - 1. Submittal is for information only. Neither receipt of list nor approval of mockup constitutes approval of deviations from the Contract Documents unless such deviations are specifically brought to the attention of Architect and approved in writing.
- B. Material Certificates: Include statements of material properties indicating compliance with requirements including compliance with standards and type designations within standards. Provide for each type and size of the following:
 - 1. Masonry units: For masonry units used in structural masonry, include data and calculations establishing average net-area compressive strength of units.
 - a. For bricks, include size-variation data verifying that actual range of sizes falls within specified tolerances.
 - b. For exposed brick, include material test report for efflorescence according to ASTM C 67.
 - c. For masonry units used in structural masonry, include data and calculations establishing average net-area compressive strength of units.
 - d. For cast stone, include size-variation data verifying that actual range of sizes falls within specified tolerances.
 - 2. Cementitious materials. Include brand, type, and name of manufacturer.
 - 3. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
 - 4. Grout mixes. Include description of type and proportions of ingredients.
 - 5. Reinforcing bars.
 - 6. Joint reinforcement.
 - 7. Anchors, ties, and metal accessories.
- C. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.
- D. 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 Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.
- E. Cold-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with cold-weather requirements.

1.05 QUALITY ASSURANCE

- A. Masonry Standard: Comply with ACI 530.1/ASCE 6/TMS 602 unless modified by requirements in the Contract Documents.
- B. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, through one source from a single manufacturer for each product required.
- C. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from a single manufacturer for each cementitious component and from one source or producer for each aggregate.

- D. Source Limitations for Cast Stone: Obtain units through one source from a single manufacturer.
1. Cast Stone Manufacturer Qualifications: A qualified manufacturer of units similar to those indicated for this Project for a minimum of 5 years, with sufficient production capacity to manufacture required units.
 2. Source Quality Control: Employ an independent testing agency to sample and test cast stone units according to ASTM C 1364. Include one test for resistance to freezing and thawing, unless field performance of similar units is accepted for establishing freeze-thaw resistance..
 3. Employ or engage a stone engraver who can demonstrate five years of documented successful performance in performing stone sign engraving work of similar scope to Work of this project.
- E. Welding: 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."
- F. Coordination:
1. Coordinate installation of inserts that are to be embedded in masonry, flashing reglets, and similar items to be used by masonry installer for anchoring, supporting, and flashing of assemblies.
 - a. Include ties and accessories for anchorage to steel framing, cold-formed framing, new concrete backup, and existing concrete backup.
 - b. Furnish setting drawings, templates, and directions for installing such items and deliver to Project site in time for preinstallation conference.
 2. Time delivery and installation of components to avoid extended on-site storage and to coordinate with adjacent work.
- G. Preconstruction Testing Service:
1. Testing Agency Qualifications: An independent agency qualified according to ASTM C 1093 or ASTM E 329 for testing indicated herein and on Drawing S000, as documented according to ASTM E 548.
 2. Owner will engage a qualified independent testing agency to perform preconstruction testing indicated below. Retesting of materials that fail to meet specified requirements shall be done at Contractor's expense.
 - a. Clay Masonry Unit Test: For each type of unit required, per ASTM C 67.
 - b. Concrete Masonry Unit Test: For each type of unit required, per ASTM C 140.
 - c. Mortar Test (Property Specification): For each mix required, per ASTM C 780.
 - d. Grout Test (Compressive Strength): For each mix required, per ASTM C 1019.
- H. Fire-Resistance Ratings: Where indicated, provide materials and construction identical to those of assemblies with fire-resistance ratings determined per ASTM E 119 by a testing and inspecting agency, by equivalent concrete masonry thickness, or by other means, as acceptable to authorities having jurisdiction.
- I. Sample Panels: Build sample panels to verify selections made under sample submittals and to demonstrate aesthetic effects. Comply with requirements in Division 01 Section "Quality Requirements" for mockups.
1. Build representative sample panels for each typical exterior wall and interior decorative unit wall condition in sizes approximately 60 inches long by 48 inches high by full thickness, laid out in z-configuration to show inside and outside corner construction.
 - a. Submit mockup designs for approval prior to construction.
 - b. Sample panels shall contain masonry veneer and other cladding of all colors and shapes specified, with each type of specified backup.
 - c. Include inside corner, outside corner, typical penetration and typical window/door opening and glass-block panel.

- d. Include through-wall and penetration flashing. Allow openings to show cavity flashing dams, transitions and termination.
 - e. Include air barrier assemblies and transitions.
- 2. Clean one-half of exposed faces of panels with masonry cleaner indicated.
- 3. Protect approved sample panels from the elements with weather-resistant membrane.
- 4. Approval of sample panels is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; aesthetic qualities of workmanship, craftsmanship; and other material and construction qualities specifically approved by Architect in writing.
 - a. Approval of sample panels does not constitute approval of deviations from the Contract Documents contained in sample panels unless such deviations are specifically approved by Architect in writing.
- J. Preinstallation Conference: Conduct conference at Project site specifically to review the construction requirements and aesthetics of the Work. Conduct conference to comply with requirements in Division 01 Section "Project Management and Coordination."
 - 1. Minimum Attendance: General Contractor, Mason subcontractor, Cast stone fabricator, Stone carving subcontractor; Steel erector, Roof truss erector, Air Barrier installer, others at General Contractor's and Construction Manager's discretion whose work requires coordination with the Work performed under this Section, Architect, Construction Manager.
 - a. Owner's representative and Owner's Special Inspector will attend at Owner's discretion.
 - 2. Review scheduling, location, and details for mock-up construction.
 - 3. Review masonry wall requirements including forecast weather conditions, materials, coordination and sequencing requirements, thermal and air barrier installation, special details, reinforcing and embedments, sheet and flexible flashings, cavity drainage and venting, installation procedures, testing and inspection procedures, and protection and repairs.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Coordinate delivery unit masonry work to minimize the need for on-site storage and to avoid delaying the Work.
- B. Mark stone units, on surface that will be concealed after installation, with designations used on Shop Drawings to identify individual stone units.
- C. 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.
- D. Store cementitious and cast materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- E. Units shall be delivered to the jobsite on covered banded wood skids or pallets with cardboard between layers. Store pallets in single stacks on level ground and cover with nonstaining, waterproof covering (e.g., tarpaulins) to protect the blocks from inclement weather. Arrange to distribute weight evenly and to prevent damage to units. Ventilate under covers to prevent condensation. Handle blocks carefully to avoid breakage and damage to the finished surfaces.
- F. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
- G. Deliver preblended, dry mortar mix in moisture-resistant containers designed for lifting and emptying into dispensing silo. Store preblended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in a metal dispensing silo with weatherproof cover.
- H. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.07 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 and hold cover securely in place.
- B. Protection of Work: Cover walls each day after installation to keep open walls protected and dry. After units are installed they should be protected from damage by other trades performing operations that can stain or otherwise damage the finished surfaces by covering walls with plastic. Corners should be protected from damage after installation by covering them with plywood.
- C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
 2. Protect sills, ledges, and projections from mortar droppings.
 3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
 4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.
- D. 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 the cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602 and as follows.
- E. Cold-Weather Construction: When ambient temperature is within limits indicated, use the following procedures:
1. 40 to 32 deg F: Heat mixing water or sand to produce mortar temperatures between 40 and 120 deg F.
 2. 32 to 25 deg F: Heat mixing water and sand to produce mortar temperatures between 40 and 120 deg F. Heat grout materials to produce grout temperatures between 40 and 120 deg F. Maintain mortar and grout above freezing until used in masonry.
 3. 25 to 20 deg F: Heat mixing water and sand to produce mortar temperatures between 40 and 120 deg F. Heat grout materials to produce grout temperatures between 40 and 120 deg F. Maintain mortar and grout above freezing until used in masonry. Heat masonry units to 40 deg F if grouting. Use heat on both sides of walls under construction.
 4. 20 deg F and Below: Heat mixing water and sand to produce mortar temperatures between 40 and 120 deg F. Heat grout materials to produce grout temperatures between 40 and 120 deg F. Maintain mortar and grout above freezing until used in masonry. Heat masonry units to 40 deg F. Provide enclosures and use heat on both sides of walls under construction to maintain temperatures above 32 deg F within the enclosures.
- F. Cold-Weather Protection: When the mean daily temperature is within the limits indicated, provide the following protection:
1. 40 to 25 deg F: Cover masonry with a weather-resistant membrane for 48 hours after construction.
 2. 25 to 20 deg F: Cover masonry with insulating blankets or provide enclosure and heat for 48 hours after construction to prevent freezing. Install wind breaks when wind velocity exceeds 15 mi./h.
 3. 20 deg F and Below: Provide enclosure and heat to maintain temperatures above 32 deg F within the enclosure for 48 hours after construction.
- G. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and above and will remain so until masonry has dried out, but not less than 7 days after completion of cleaning.

- H. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602. Protect unit masonry work when temperature and humidity conditions produce excessive evaporation of water from mortar and grout. Provide artificial shade and wind breaks and use cooled materials as required.
1. When ambient temperature exceeds 100 deg F, or 90 deg F with a wind velocity greater than 8 mph, do not spread mortar beds more than 48 inches ahead of masonry. Set masonry units within one minute of spreading mortar.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. Net-Area Compressive Strength:
1. Provide structural unit masonry that develops net-area compressive strength of f_m equal to 2,000 psi min. at 28 days.
 2. Determine net-area compressive strength (f_m) of masonry from average net-area compressive strengths of masonry units and mortar types (unit-strength method) according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.
- B. Thermal Movements: Provide assemblies that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing displacement of units, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculation 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.
- C. Horizontal Building Movement (Interstory Drift): Allow for maximum horizontal building movement equal to quotient resulting from dividing floor-to-floor height at any floor by 400.
- D. Shrinkage and Creep: Allow for progressive vertical shortening of building frame equal to 1/8 inch in 10 feet.
- E. Cast Stone:
1. Design stone anchors and backup structure to withstand loads indicated without exceeding allowable working stresses established by the following:
 - a. For Structural Steel: AISC S335, "Specification for Structural Steel Buildings Allowable Stress Design and Plastic Design with Commentary."
 - b. For Cold-Formed Steel: AISI SG-973, Part V, "Specification for the Design of Cold-Formed Steel Structural Members."
 - c. For Cast-in-Place and Postinstalled Fasteners in Concrete: One-fourth of tested capacity when installed in concrete with compressive strength indicated.
 - d. For Post-Installed Fasteners in Masonry: One-tenth of tested capacity when installed in masonry units indicated.
 2. Provisions for Fabrication and Erection Tolerances: Allow for fabrication and erection tolerances of building's structural system.
 3. Control of Corrosion and Staining: Prevent galvanic and other forms of corrosion as well as staining by isolating metals and other materials from direct contact with incompatible materials. Use materials that do not stain exposed surfaces of stone and joint materials.

2.02 MASONRY UNITS, GENERAL

- A. Masonry Standard: Comply with TMS 602/ACI 530.1/ASCE 6, except as modified by requirements in the Contract Documents.
- B. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to exceed tolerances and to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not use units where such defects, including dimensions that vary from specified dimensions by more than stated tolerances, will be exposed in the completed Work or will impair the quality of completed masonry.
- C. Fire-Resistance Ratings: Comply with requirements for fire-resistance-rated assembly designs indicated.

2.03 APPROVAL OF MASONRY VENEER PRODUCTS:

- A. Sample Panels in conformance with Part 1 Article Quality Assurance" and as follows:
 - 1. Prior to Bidding: Prior to 8 working days prior to date scheduled for opening of bids, bidder to meet at site with Architect and Construction Manager, by prior appointment, to present samples showing blends, textures and range available, including proposed range of proposed mortar blends, demonstrating capability of product to satisfy the design intent.
 - a. Submit formal request to schedule site meeting no later than 3 calendar days prior to requested meeting time.
 - b. Include formal request for product approval, with appropriate documentation required by Section 01 2500.
 - c. Acceptance of products will be by Addendum to Bidding Documents.
 - 2. After award of Contract: Requests for substitution will be decided subject to Architect's review of additional representative mock-up incorporating proposed substitute products, constructed in accordance to requirements for Sample Panels in Article 1.05 above.
 - a. Comply with requirements of Construction Schedule, allowing time for Architect's action on substitution request, and lead time for suppliers' production and delivery. No extension of time will be granted.
 - b. Required sample panels shall include range with mortar to match the scheduled finish. Sample panels shall be constructed at the site for comparison and evaluation.
 - c. Upon approval by Architect and Construction Manager, for cold-weather construction, sample panels may be constructed off-site and delivered to Project site for review.
 - d. Owner reserves the right to require, or to waive, a Change Order reducing the Contract Sum, or Contract Time, or both, in conformance with Section 01 2500.

2.04 CONCRETE MASONRY UNITS (CMUs)

- A. Shapes: Provide shapes as indicated on the drawings and as follows:
- B. Concrete Masonry Units: ASTM C 90 and as follows:
 - 1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength as indicated on Structural Drawings.
 - 2. Weight Classification: normal weight.
 - 3. Size: Manufactured to dimensions 3/8 inch less than nominal dimensions.
 - 4. Exposed Faces: Manufacturer's standard color and texture, unless otherwise indicated.

- C. Concrete Building Brick: ASTM C 55 and as follows:
1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 3500 psi.
 2. Weight Classification: normal weight.
 3. Size: Manufactured to dimensions 3/8 inch less than nominal dimensions.
 4. Exposed Faces: Manufacturer's standard color and texture, unless otherwise indicated.

2.05 DECORATIVE CMU

- A. Ground-Face Concrete Masonry Units: ASTM C 90 Type 1 moisture controlled.
1. Provide units with minimum face shell thickness of 2 inches, and minimum average net-area compressive strength of matching standard gray units
 2. Density Classification: Normal weight, minimum density 110 lbs per cu ft.
 3. All exposed faces shall be honed to a depth sufficient to uniformly expose the aggregates
 4. Manufacture units with Dry Block water-repellant admixture in proportion recommend by manufacturer.
 5. Size: As indicated in Drawings. Provide corner, end, jamb units and other shapes required for conditions shown.
 6. Color: Provide units made with integrally colored concrete matrix and special aggregate matching approved sample. Provide factory-applied clear satin gloss acrylic on exposed faces.
 - a. Size, color and finish of Ground Face CMU as scheduled on Drawings, subject to Architect approval.

2.06 BRICK

- A. General: Provide shapes as indicated on the Drawings and as follows:
1. For ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces, provide units without cores or frogs and with exposed surfaces finished.
 2. Provide special shapes for applications where stretcher units cannot accommodate special conditions, including those at corners, movement joints, bond beams, sashes, relief/ shelf angles, 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. Substitutions subject to compliance with specified requirements and matching approved samples to Architect's satisfaction.
- C. Face Brick: ASTM C 216, Grade MW or SW, Type FBS.
1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 4400 psi.
 2. Initial Rate of Absorption: Less than 30 g/30 sq. in. per minute when tested per ASTM C 67.
 3. Efflorescence: Provide brick that has been tested according to ASTM C 67 and is rated "not effloresced."
 4. Surface Coating: Brick with colors or textures produced by application of coatings shall withstand 50 cycles of freezing and thawing per ASTM C 67 with no observable difference in the applied finish when viewed from 10 feet.
 5. Application: Use where brick is exposed, unless otherwise indicated.
 6. Acceptable Manufacturers and products: Subject to compliance with requirements and Architect's approval, in accordance with this Paragraph.
 - a. Face Brick Size, Texture and Finish: Before installation, the approved blends proposed for use shall be submitted for verification in sample panels, and final acceptance shall be by the Owner and Architect.

7. Face Brick: Basis of Design, size, texture and finish as scheduled on Drawings.

2.07 CAST STONE UNITS

- A. Acceptable manufacturers, subject to compliance with specified requirements:
 1. Arriscraft International; www.arriscraft.com
 2. Concrete Fabricators Inc, Wheeling WV; 304.277.4720.
 3. Custom Cast Stone, Inc; 888.776.9960
 4. Edwards Cast Stone Company, 800-992-9323; www.edwardscaststone.com
 5. RockCast, Division of Reading Rock, Inc; www.rockcast.com
- B. Custom Cast Stone Units: Comply with ASTM C 1364 and applicable recommendations of the Cast Stone Institute Technical Manual (Current Edition).
 1. Casting Method: Vibrate dry hand tamp.
 2. Profiles: As indicated on Architectural Drawings and approved by Architect . If available standard shapes are not satisfactory, provide custom shape as indicated on drawings.
 3. Sizes: Height, pitch, and depth as indicated in single length as required for each location indicated.
 4. Texture and Color: Smooth fine-grained texture and color as selected by Architect from manufacturer's full range of standard colors. Submit available colors to Architect for final selection.
- C. Materials:
 1. Portland Cement: ASTM C 150, Type I or III, containing not more than 0.60 percent total alkali when tested according to ASTM C 114.
 2. Coarse Aggregates: Granite, quartz, or limestone complying with ASTM C 33; gradation as needed to produce required textures and colors as needed to produce required cast stone colors.
 3. Fine Aggregates: Natural sand or crushed stone complying with ASTM C 33, gradation as needed to produce required textures and colors as needed to produce required cast stone colors.
 4. Color Pigment: ASTM C 979, synthetic mineral-oxide pigments or colored water-reducing admixtures; color stable, free of carbon black, nonfading, and resistant to lime and other alkalis.
 5. Admixtures: Do not use admixtures unless specified or approved in writing by Architect.
 6. Reinforcement: Deformed steel bars complying with ASTM A 615/A 615M. Use galvanized reinforcement when covered with less than 1-1/2 inches of cast stone material.
 - a. Galvanized Coating: ASTM A 767/A 767M.
 7. Embedded Anchors and Other Inserts: Fabricated from stainless steel complying with ASTM A 240/A 240M, ASTM A 276, or ASTM A 666, Type 304 .
- D. Cast Stone Profiles: As indicated on Drawings, or as otherwise needed to satisfy the requirements of the masonry wall construction. Observe the Cast Stone Institute Value Engineering suggestions as appropriate.
 1. Follow jointing pattern where shown.
 2. Fabricate units to suit in-place wall dimensions. Minimize field cutting.
 3. Provide units with finished face on exposed surfaces. Do not expose sawn edges.
 4. Provide sill units in longest practicable lengths, sized to fit the masonry opening without vertical joints, or minimizing vertical joints spaced evenly along the length of the sill. Allow for head joint or control joint thicknesses. Where masonry mullions divide window units over a continuous sill, locate head joints at masonry mullions.
 5. Provide copings in even modular lengths, minimum nominal 48-inch module or as otherwise approved. In any case, limit length to 15 times the cross sectional thickness.

6. In addition to profiles shown, provide shapes to accommodate inside and outside corners, returns, and unusual conditions.
 7. Coping corners may be mitered or fabricated as corner returns, at fabricator's discretion.
- E. Accessories:
1. Embedded Anchors and Other Inserts: Type and size indicated or recommended by manufacturer for specific application, fabricated from stainless steel complying with ASTM A 240, ASTM A 276, or ASTM A 666, Type 304.
 2. Dowels: Round stainless-steel bars complying with ASTM A 276, Type 304, and 1/2-inch diameter.
 3. Acidic Cleaner: Manufacturer's standard-strength, general-purpose cleaner designed for removing mortar/grout stains, efflorescence, and other construction stains from new masonry surfaces without discoloring or damaging masonry surfaces; expressly approved for intended use by cast stone manufacturer and expressly approved by cleaner manufacturer for use on cast stone and adjacent masonry materials.
 - a. Diedrich Technologies, Inc.
 - b. EaCo Chem, Inc.
 - c. ProSoCo, Inc.
- F. Fabricate pre-cast units resistant to freezing and thawing as determined by laboratory testing according to ASTM C 666, Procedure A, as modified by ASTM C 1364, and are made from cast stone that has a history of successful resistance to freezing and thawing.
- G. Fabricate units with sharp arris and details accurately reproduced with indicated texture on all exposed surfaces, unless otherwise indicated.
1. Slope exposed horizontal surfaces 1:12 min to direct water away from face of wall or toward roof side of parapet.
 2. Provide raised fillets at backs of sills and at ends indicated to be built into jambs.
 3. Provide drips on projecting elements, whether or not shown.
- H. Fabrication Tolerances:
1. Variation in Cross Section: Do not vary from indicated dimensions by more than 1/8 inch.
 2. Variation in Length: Do not vary from indicated dimensions by more than 1/360 of the length of unit or 1/8 inch, whichever is greater, but in no case by more than 1/4 inch.
 3. Warp, Bow, and Twist: Not to exceed 1/360 of the length of unit or 1/8 inch, whichever is greater.
 4. Location of Grooves, False Joints, Holes, Anchorages, and Similar Features: Do not vary from indicated position by more than 1/8 inch on formed surfaces of units and 3/8 inch on unformed surfaces.
- I. Acid etch units after curing to remove cement film from surfaces to be exposed to view.

2.08 STONE ACCESSORIES

- A. Provide installation accessories as recommended by manufacturer for specific application.
- B. Setting Shims: Strips of resilient plastic or vulcanized neoprene, Type A Shore durometer hardness of 50 to 70, nonstaining to stone, of thickness needed to prevent point loading of stone on anchors and of depths to suit anchors without intruding into required depths of pointing materials.
1. Application: Stone supported on shelf angles
- C. Setting Buttons: Resilient plastic buttons, nonstaining to stone, sized to suit joint thicknesses and bed depths of stone units without intruding into required depths of pointing materials.
1. Application: Stone supported set on mortar bed, supported by masonry below.

- D. Sealants for Joints in Stone Masonry: Manufacturer's standard chemically curing, elastomeric sealants of base polymer and characteristics indicated below that comply with applicable requirements in Division 07 Section "Elastomeric Joint Sealants" and do not stain stone.
1. Single-component, nonsag, urethane sealant; Class 25, Use M (masonry).
 - a. Sika Corporation, Inc.; Sikaflex - 1a.
 - b. Sonneborn, Division of ChemRex; NP 1.
 - c. Sonneborn, Division of ChemRex; Ultra.
 - d. Tremco, Sealant/Waterproofing Division; Vulkem 116.
 2. Verify suitability of sealant below before retaining. Some silicone sealants may stain stone, especially light-colored porous stone.
 3. Colors: Provide color as selected by Architect from manufacturer's full range.

2.09 MORTAR AND GROUT MATERIALS

- A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction.
1. Free alkali must not be more than 0.60 percent calculated as percentage of Na₂O plus 0.658 times percentage of K₂O. Refer to ASTM C 33 for suitable criteria of deleterious activity.
 2. Air-Entraining Portland cements are not permitted.
 3. Portland Cement for Mortar Used with Pre-Cast Stone: ASTM C 150, Type I or III, containing not more than 0.60 percent total alkali when tested according to ASTM C 114.
- B. Mortar Colors (if used):
1. Infill, patch, point, and tooth brickwork in existing construction, using salvaged brick:
 - a. Provide custom blend of mortar color and aggregate to match existing mortar color and texture, subject to Architect's approval. Use only pigments with a record of satisfactory performance in masonry mortars in matching existing in-place mortar.
 2. New construction: Provide colors for each face brick type as selected by Architect from approved Manufacturer's full range of at least 30 colors.
- C. Hydrated Lime: ASTM C 207, Type S.
- D. Portland Cement-Lime Mix: Packaged blend of portland cement complying with ASTM C 150, Type I or Type III, and hydrated lime complying with ASTM C 207, Type S.
- E. 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.
- F. Aggregate for Grout: ASTM C 404.
- G. Water: Potable.
- H. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C 494/C 494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.
1. Euclid Chemical Company (The); Accelguard 80.
 2. Grace Construction Products, a unit of W. R. Grace & Co. - Conn.; Morset.
 3. Sonneborn, Div. of ChemRex; Trimix-NCA.

- I. Water-Repellent Admixture: Liquid water-repellent mortar admixture intended for use with face brick or for exterior concrete form masonry units, containing integral water repellent by same manufacturer.
 - 1. Addiment Incorporated; Mortar Tite.
 - 2. Grace Construction Products, a unit of W. R. Grace & Co. - Conn.; Dry-Block Mortar Admixture.
 - 3. Master Builders, Inc.; Color Cure Mortar Admix or Rheomix Rheopel.

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. Use water-repellant admixture as recommended by grout manufacturer.
 - 2. Do not use calcium chloride in mortar or grout.
 - 3. Limit cementitious materials in mortar to portland cement and lime.
 - 4. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.
- B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.
- C. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification. Provide the following types of mortar for applications stated unless another type is indicated.
 - 1. For masonry below grade or in contact with earth, use Type S or M.
 - 2. For cast stone columns, use Type S.
 - 3. For reinforced masonry, use Type S or M.
 - 4. For mortar parge coats, use Type S.
 - 5. For exterior, above-grade, load-bearing and non-load-bearing walls and parapet walls; for interior load-bearing walls; and for other applications where another type is not indicated, use Type S.
 - 6. For interior non-load-bearing partitions, use Type S.
- D. Grout for Unit Masonry: Comply with ASTM C 476 – 3,000 psi min..
 - 1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with Table 1.19.1 in ACI 530.1/ASCE 6/TMS 602 for dimensions of grout spaces and pour height.
 - 2. Provide grout with a slump of 8 to 11 inches as measured according to ASTM C 143.
 - 3. Provide grout with compressive strength to develop specified design f'm, but not less than 3,000 psi. Determine strength per ASTM C 1019.
 - 4. High lift grouting: Conform to masonry wall construction outlined in NCMA TEK 3-2A. Grout should be 1/2 inch maximum size large aggregate conforming to ASTM C 476 and NCMA TEK 9-4A.
- E. Pigmented Mortar (if used): Use colored cement product or select and proportion pigments with other ingredients to produce color required. Do not add pigments to colored cement products.
- F. Colored-Aggregate Mortar (if used): Produce required mortar color by using colored aggregates and natural color or white cement as necessary to produce required mortar color.
- G. Epoxy Pointing Mortar: Mix epoxy pointing mortar to comply with mortar manufacturer's written instructions.

2.11 REINFORCEMENT

- A. Uncoated Steel Reinforcing Bars: ASTM A 615.
- B. Masonry Joint Reinforcement, General: ASTM A 951.
 - 1. Interior Walls: Mill-galvanized, carbon steel.
 - 2. Exterior Walls: Hot-dip galvanized, carbon steel.
 - 3. Wire Size for Side Rods and Cross Rods: W1.7 or 0.148-inch diameter.
 - 4. Spacing of Cross Rods, Tabs, and Cross Ties: Not more than 16 inches o.c.
 - 5. Provide in lengths of not less than 10 feet, with prefabricated corner and tee units.
- C. Masonry Joint Reinforcement for Single-Wythe Masonry: Either ladder or truss type with single pair of side rods.
- D. Masonry Joint Reinforcement for Multiwythe Masonry: Ladder type with one side rod at each face shell of hollow masonry units more than 4 inches wide.
- E. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells with loops for holding reinforcing bars in proper locations within cells. Units are formed from 0.142-inch steel wire, hot-dip galvanized after fabrication. Provide units with either two loops or four loops as needed for number of bars indicated.

2.12 TIES AND ANCHORS

- A. Materials: Provide ties and anchors specified in subsequent paragraphs that are made from materials that comply with eight subparagraphs below, unless otherwise indicated.
 - 1. Mill-Galvanized, Carbon-Steel Wire: For interior walls only, ASTM A 82; with ASTM A 641, Class 1 coating.
 - 2. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82; with ASTM A 153, Class B-2 coating.
 - 3. Steel Sheet, Galvanized after Fabrication: ASTM A 1008 Commercial Steel, hot-dip galvanized after fabrication to comply with ASTM A 153.
- B. Wire Ties, General: Unless otherwise indicated, use round wire and size ties to extend at least halfway through veneer but with at least 5/8-inch cover on outside face. Outer ends of wires are bent 90 degrees and extend 2 inches parallel to face of veneer.
- C. Anchor Section: Sheet metal plate, with screw holes top and bottom and with raised, rib-stiffened strap stamped into center to provide slot between strap and plate for connection of Wire tie, of overall size and thickness indicated below:
 - 1. Size: Plate and strap size: 1-1/4-inch wide for plate, 5/8-inch for strap x lengths indicated below. Slot clearance formed between face of plate and back of strap at maximum rib projection: 1/32" + diameter of wire tie.
 - 2. Plate and Strap Lengths: 5-inch and 3-5/8-inch, with both sides of plate stiffened by ribs.
 - 3. Thickness: 0.0747-inch (14 gauge)
- D. Partition Top anchors: 0.097-inch-thick metal plate with 3/8-inch-diameter metal rod 6 inches long welded to plate and with closed-end plastic tube fitted over rod that allows rod to move in and out of tube. Fabricate from steel, hot-dip galvanized after fabrication.
- E. Rigid Anchors: Fabricate from steel bars 1-1/2 inches wide by 1/4 inch thick by 24 inches long, with ends turned up 2 inches or with cross pins, unless otherwise indicated.
 - 1. Corrosion Protection: Hot-dip galvanized to comply with ASTM A 153/A 153M.
- F. Cast Stone Anchors: Fabricate dowels, clips, cramps, and other stone anchors from stainless steel.

- G. Anchor Bolts: Headed steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers; hot-dip galvanized to comply with ASTM A 153/A 153M, Class C; of dimensions indicated.
- H. Column and Beam Anchors: For anchoring CMU to structural columns and beams: Hot dipped galvanized steel of type, length and strength needed to secure masonry to steel if not indicated on Drawings.
- I. Postinstalled Anchors: Provide chemical or torque-controlled expansion anchors, with capability to sustain, without failure, a load equal to six times the load imposed when installed in solid or grouted unit masonry and equal to four times the load imposed when installed in concrete, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.
 - 1. Corrosion Protection: Stainless-steel components complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2 for bolts and nuts; ASTM A 666 or ASTM A 276, Type 304 or 316, for anchors.

2.13 EMBEDDED FLASHING MATERIALS

- A. Metal Flashing: Provide metal flashing, where flashing is exposed or partly exposed and where indicated, complying with SMACNA's "Architectural Sheet Metal Manual" and as follows:
 - 1. Stainless-Steel Sheet: ASTM A 240, Type 304, 0.016 inch thick, dead-soft, fully annealed stainless-steel sheet of minimum uncoated thickness indicated.
 - 2. Metal Drip Edges: Fabricate from stainless steel. Extend at least 3 inches into wall and 1/2 inch out from wall, with outer edge bent down 30 degrees and hemmed. Provide these drip edges with the use of both Flexible Flashing options listed below.
 - 3. Metal Flashing Terminations (sealant stop): Fabricate from stainless steel. Extend at least 3 inches into wall and out to exterior face of wall. At exterior face of wall, bend metal back on itself for 3/4 inch and down into joint 3/8 inch to form a stop for retaining sealant backer rod.
- B. Flexible Flashing: For flashing not exposed to the exterior, use one of the following, unless otherwise indicated:
 - 1. Copper-Laminated Flashing: 5-oz./sq. ft. copper sheet bonded with asphalt between 2 layers of glass-fiber cloth.
 - a. Advanced Building Products Inc.; Copper Fabric Flashing.
 - b. Phoenix Building Products; Type FCC-Fabric Covered Copper.
 - c. Sandell Manufacturing Co., Inc.; Copper Fabric Flashing.
 - d. York Manufacturing, Inc.; Multi-Flash 500.
 - e. Hohmann & Barnard, Inc; C-Fab Flashing
 - 2. Stainless Steel Fabric Flashing: Composite, flashing product consisting of 2-mil of Type 304 stainless steel sheet, bonded to a layer of polymeric fabric, to produce an overall thickness of 40-mil.
 - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Hohmann & Barnard, Inc.
 - 2) Wire-Bond.
 - 3) York Manufacturing, Inc.
 - 4) PROSOCO, Inc.
 - 5) Or equal, subject to Architect approval
 - 3. Provide compatible installation accessories provided or approved by manufacturer.

- C. Except as otherwise allowed, provide prefabricated inside and outside corner shapes, steps and elevation changes, end dams, and other special conditions required to maintain continuity in water barrier, in both metal flashing and flexible flashing. Site forming and fabrication of flashing will be acceptable only with prior written permission.
 - 1. Submit detailed shop drawings indicating location and configuration of special flashing condition, whether shop-fabricated or field-formed.
- D. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

2.14 MISCELLANEOUS MASONRY ACCESSORIES

- A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene or urethane.
- B. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D 2000, Designation M2AA-805 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.
- C. Thermal Break/ Bearing Pads: 1/2-inch 90-durometer continuous neoprene strips for installation between steel bearing member (girder, beam, shelf, relief angle) and masonry veneer wythe, where steel is exposed to indoor exposure and masonry wythe has outdoor exposure.
- D. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).
- E. Weep/Vent Products: Use 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. Advanced Building Products Inc.; Mortar Maze weep vent.
 - b. Dayton Superior Corporation, Dur-O-Wal Division; Cell Vents.
 - c. Heckmann Building Products Inc.; No. 85 Cell Vent.
 - d. Hohmann & Barnard, Inc.; Quadro-Vent.
 - e. Wire-Bond; Cell Vent.
 - 2. Mesh Weep/Vent: Free-draining mesh; made from polyethylene strands, full height and width of head joint and depth 1/8 inch less than depth of outer wythe; in color selected by Architect from manufacturer's standard.
 - a. Archovations; CalClear Weep Vents.
 - b. Mortar Net USA, Ltd.; Mortar Net Weep Vents.
 - c. Sandell Manufacturing Co., Inc.;
- F. Cavity Drainage Material: Free-draining mesh, made from polymer strands that will not degrade within the wall cavity. Use manufacturer's standard thickness, allowing no more than 3/8 inch gap between drainage material and exterior wythe. Provide one of the following:
 - 1. Strips, not less than 1-1/2 inches thick and 10 inches wide, with dimpled surface designed to catch mortar droppings and prevent weep holes from being clogged with mortar.
 - 2. Sheets or strips full depth of cavity and installed to full height of cavity.

3. Products:
 - a. Advanced Building Products Inc.; Mortar Break II.
 - b. Dayton Superior Corporation, Dur-O-Wal Division; Polytite MortarStop.
 - c. Mortar Net USA, Ltd.; Mortar Net.
 - d. CavClear Archovations, Inc; CavClear Masonry Mat
 - e. Sandell Manufacturing Co., Inc.; Mortar Web.

- G. Metal Termination Bars: Manufacturer's standard, predrilled stainless-steel or aluminum bars, approximately 1 by 1/8 inch thick; with anchors.

- H. Sealant Materials: Provide chemically curing, elastomeric sealant of base polymer and characteristics indicated below that comply with applicable requirements in Division 07 Section "Joint Sealants."
 1. Single-component, nonsag urethane sealant.
 2. Colors: Provide colors of exposed sealants to match colors of work adjoining installed sealant unless otherwise indicated.

- I. Joint-Sealant Backing:
 1. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin) or Type B (bicellular material with a surface skin), and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
 2. 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 where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.15 CAVITY-WALL INSULATION

- A. Provide the following products, as further described in Division 07 Section "Thermal Insulation." Coordinate all affected components of cavity-wall assemblies, as well as adjacent, abutting and penetrating construction, with selected insulation product. Include coordination and preinstallation meetings with other Prime Contractors, and review shop drawings of other affected Prime Contracts.

- B. Extruded-Polystyrene Board Insulation: ASTM C 578, Type IV, density 1.6 lb/cu.ft. minimum with compressive resistance 25 psi per ASTM D 1621, as specified in Section 07 2100.
 1. Thermal Resistance: 5-year aged minimum R-value of 5.7 per inch.
 2. Water Absorption: Maximum 0.1 percent by volume as per ASTM C 272.
 - a. Rigid styrene foam (XPS/EPS) cavity insulations will not be acceptable.
 3. Application: For grouted cavity below through-wall flashing.

- C. Foil-Faced Glass-Fiber-Reinforced Polyisocyanurate Foam Insulation, as specified in 07 2100
 1. Thickness: 3-inches unless noted otherwise
 2. Application: For air cavity at Exterior Wall Types A and B, and continuous insulation at Wall Type C

- D. Adhesive: Type recommended by insulation board manufacturer for application indicated, and compatible with air barrier membrane.

2.16 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. Diedrich Technologies, Inc.; 202 New Masonry Detergent
 2. EaCo Chem, Inc.
 3. ProSoCo, Inc.; Sure Klean No 600 Detergent

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
1. Verify that foundations are within tolerances specified.
 2. Verify that reinforcing dowels are properly placed.
- B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping connections.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 TOLERANCES

- A. Comply with construction tolerances in ACI 530.1/ASCE 6/TMS 602 and with the following:
1. 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.
 2. For masonry faces intended as substrates for thinset ceramic tile finishes, comply with dimensional tolerance requirements of finish manufacturer, ANSI A108 and the Tile Council of North America.
- B. 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.
- C. 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.
- D. 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 head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch or minus 1/4 inch. Fill to minimum of 85% with mortar.
 3. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch.

3.03 INSTALLATION, GENERAL

- A. Thickness: Build cavity and composite walls and other masonry construction to full thickness shown. Build single-wythe walls to actual widths of masonry units, using units of widths indicated.
- B. Build chases and recesses to accommodate items specified in this and other Sections.
- C. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to opening.
- D. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.
- E. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.
1. Mix units from several pallets or cubes as they are placed.
- F. 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.
- G. Locate control joints where shown on Drawings and not more than 25 feet apart with a length-to-height ratio of masonry panels not greater than 1-1/2 to 1.

3.04 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 and bond pattern indicated on Drawings; 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 or bonded by lapping not less than 2 inches. 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 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 units 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. Fill space between steel frames and masonry solidly with mortar, unless otherwise indicated.
- G. 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.
- H. Install compressible filler in joint between top of partition and underside of structure above. At fire-rated partitions, treat joint between top of partition and underside of structure above to comply with Division 07 Section "Fire-Resistive Joint Systems."
- I. Build non-load-bearing interior partitions full height of story to underside of solid floor or roof structure above, unless otherwise indicated.
 - 1. Install compressible filler in joint between top of partition and underside of structure above.
 - 2. Fasten partition top anchors to structure above and build into top of partition. Grout cells of CMUs solidly around plastic tubes of anchors and push tubes down into grout to provide 1/2-inch clearance between end of anchor rod and end of tube. Space anchors 48 inches o.c., unless otherwise indicated.
 - 3. At fire-rated partitions, treat joint between top of partition and underside of structure above to comply with Division 07 Section "Firestopping."

3.05 MORTAR BEDDING AND JOINTING

- A. Lay concrete masonry units as follows:
 - 1. With face shells fully bedded in mortar and with head joints of depth equal to bed joints.
 - 2. With webs fully bedded in mortar in all courses of piers, columns, and pilasters.
 - 3. With webs fully bedded in mortar in grouted masonry, including starting course on footings.
 - 4. With entire units, including areas under cells, fully bedded in mortar at starting course on footings where cells are not grouted.
- B. Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.
- C. Set cast-stone 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.
- D. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness, unless otherwise indicated.
- E. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint), unless otherwise indicated.

3.06 SETTING CAST STONE IN MORTAR

- A. Set cast stone as indicated on Drawings. Set units accurately in locations indicated with edges and faces aligned according to established relationships and indicated tolerances.
 - 1. Set stone to comply with requirements indicated on Drawings.
 - 2. Install supports, fasteners, and other attachments indicated or necessary to secure stone masonry in place.
 - 3. Set stone accurately in locations indicated with edges and faces aligned according to established relationships and indicated tolerances.
- B. Set cast stone supported on clip or continuous angles on resilient setting shims. Use material of thickness required to maintain uniform joint widths. Hold shims back from face of cast stone a distance at least equal to width of joint.
- C. Perform necessary field cutting and trimming as stone is set.
 - 1. Use power saws to cut stone that is fabricated with saw-cut surfaces. Cut lines straight and true, with edges eased slightly to prevent snipping.
- D. Sort stone before it is placed in wall to remove stone that does not comply with requirements relating to aesthetic effects, physical properties, or fabrication, or that is otherwise unsuitable for intended use.
- E. Arrange stones in patterns shown or otherwise indicated, with uniform course heights and uniform joint widths.
 - 1. Lay out to minimize cut pieces less than half panel length.
 - 2. Band Courses: Except at control and expansion joints, stagger head joints in adjacent courses as indicated.
 - 3. Sills: Locate head joints at brick mullions. Avoid joints under window unit.
 - 4. Copings: Provide uniform modular length units. Avoid units shorter than 30 inches long.
- F. Arrange stones with color and size variations uniformly dispersed for an evenly blended appearance.
- G. Maintain uniform joint widths except for variations, subject to approval, due to different stone sizes and where minor variations are required to maintain bond alignment if any.
 - 1. If not indicated, set units with joints 1/4 to 3/8 inch wide.
- H. Wet joint surfaces thoroughly before applying mortar or setting in mortar.
- I. Set units in full bed of mortar with full head joints, unless otherwise indicated.
 - 1. Build anchors and ties into mortar joints as units are set.
 - 2. Fill dowel holes and anchor slots with mortar.
 - 3. Fill collar joints solid as units are set.
 - 4. Build concealed flashing into mortar joints as units are set.
 - 5. Set units in full bed of mortar with full head joints, unless otherwise indicated.
 - a. Rake and prepare head joints in coping and other units with exposed horizontal surfaces to receive sealant.
 - b. Keep expansion joints, control joints and vertical joints between dissimilar masonry types open to receive sealant or joint accessory.
 - c. Keep horizontal joints at shelf angles open to receive sealant.
- J. Install embedded flashing and weep holes at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated.

- K. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness, unless otherwise indicated.
- L. Provide expansion, control, and pressure-relieving joints of widths and at locations indicated. Keep joints free of mortar and other rigid materials.
 - 1. Form open joint of width not less than 3/8 inch but not more than 1/2 inch.
 - 2. Provide isolation joints between stone and dissimilar building materials. Seal isolation joints in accordance with Division 07 Section "Joint Sealants."
- M. Prepare joints indicated to receive sealant and apply sealant of type and at locations indicated to comply with applicable requirements in Division 07 Section "Elastomeric Joint Sealants."
 - 1. Prime stone surfaces to receive sealant and install compressible backer rod or bond break tape in joints before applying sealant, unless otherwise indicated.

3.07 SETTING ANCHORED STONE

- A. Set cast stone coping (cap) as indicated on Drawings. Set units accurately in locations indicated with edges and faces aligned according to established relationships and indicated tolerances.
 - 1. Install anchors, supports, fasteners, and other attachments indicated or necessary to secure units in place.
 - 2. Shim and adjust anchors, supports, and accessories to set cast stone in locations indicated with uniform joints.
- B. Fill anchor holes with sealant.
 - 1. Where dowel holes occur at pressure-relieving joints, provide compressible material at ends of dowels.
- C. Set cast stone supported on clip or continuous angles on resilient setting shims. Use material of thickness required to maintain uniform joint widths. Hold shims back from face of cast stone a distance at least equal to width of joint.
- D. Keep joints free of mortar and other rigid materials. Remove temporary shims and spacers from joints after anchors and supports are secured in place and cast stone units are anchored. Do not begin sealant installation until temporary shims and spacers are removed.
 - 1. Form open joint of width indicated, but not less than 3/8 inch.
- E. Prepare joints and apply sealant of type and at locations indicated to comply with applicable requirements in Division 07 Section "Elastomeric Joint Sealants."
 - 1. Prime cast stone surfaces to receive sealant and install compressible backer rod in joints before applying sealant, unless otherwise indicated.

3.08 POINTING WITH SEALANT

- A. Provide sealant in the following masonry joints, and as otherwise indicated on Drawings:
 - 1. Horizontal pressure relieving joints at shelf angles
 - 2. Under metal drip edge and metal flashing termination.
 - 3. Vertical joints between dissimilar materials.
 - 4. Skyward facing joints.

- B. Except as otherwise specified, set units with full head joints, and rake to depth recommended by sealant manufacturer.
 - 1. Keep raked and open joints dry and free of mortar and debris.
 - 2. Clean and prepare joint surfaces according to Division 07 Section "Joint Sealants."
- C. Prime joint surfaces unless sealant manufacturer recommends against priming. Do not allow primer to spill or migrate onto adjoining surfaces.
- D. Fill sealant joints with specified joint sealant according to Division 07 Section "Elastomeric Joint Sealants" and the following:
 - 1. Install bond-breaker tape to surface beneath sealant.
 - a. Install cylindrical sealant backing beneath sealant where approved, in locations without solid backup to suitable depth, or at joint between dissimilar materials.
 - 2. Install sealant using only proven installation techniques that will ensure that sealant will be deposited in a uniform, continuous ribbon, without gaps or air pockets, and with complete wetting of the joint bond surfaces equally on both sides. Fill joint flush with surrounding and matching the contour of adjoining mortar joints.
 - 3. Install sealant as recommended by sealant manufacturer but within the following general limitations, measured at the center (thin) section of the bead:
 - a. Fill joints to a depth equal to joint width, but not more than 1/2 inch deep or less than 1/4 inch deep.
 - 4. Do not allow sealant to overflow or spill onto adjoining surfaces, or to migrate into the voids of adjoining surfaces, particularly rough textures. Remove excess and spillage of sealant promptly as the work progresses. Clean adjoining surfaces by the means necessary to eliminate evidence of spillage, without damage to adjoining surfaces or finishes, as demonstrated in an approved mockup.
- E. Cure sealant according to Division 07 Section "Joint Sealants."

3.09 COMPOSITE MASONRY

- A. Bond wythes of composite masonry together using the following method:
 - 1. Masonry Joint Reinforcement: Installed in horizontal mortar joints.
 - a. Where bed joints of both wythes align, use ladder-type reinforcement extending across both wythes.
 - b. Where bed joints of wythes do not align, use adjustable (two-piece) type reinforcement with continuous horizontal wire in facing wythe attached to ties.
- B. Collar Joints: Solidly fill collar joints by parging face of first wythe that is laid and shoving units of other wythe into place.
- C. Corners: Provide interlocking masonry unit bond in each wythe and course at corners, unless otherwise indicated.
 - 1. Provide continuity with masonry joint reinforcement at corners by using prefabricated L-shaped units as well as masonry bonding.
- D. Intersecting and Abutting Walls: Unless vertical expansion or control joints are shown at juncture, bond walls together as follows:
 - 1. Provide continuity with masonry joint reinforcement by using prefabricated T-shaped units.

3.10 STEEL REINFORCEMENT

- A. Placing Reinforcement: Comply with requirements of prevailing building code.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover of not less than 1/2 inch.
- D. Place reinforcement prior to concrete fill placement.
- E. Splice lap reinforcement not less than 48 bar diameters, or use approved mechanical lap accessory. Maintain not less than one reinforcement bar diameter between vertical reinforcement installations.

3.11 GROUT FILL PLACEMENT

- A. Filling of Concrete Cavity: Use concrete fill indicated on structural drawings, or if not so indicated, as specified in Division 03, Section "Cast-In-Place Concrete." Do not place concrete fill until entire height of masonry to be grouted has attained sufficient strength to resist grout pressure.
 - 1. Before placement of concrete fill verify that reinforcing bars are correctly positioned with proper lap and alignment, and that the cavity is free from debris, obstructions, and excessive mortar droppings that would create voids in the concrete pour.
 - 2. Solidly fill cavity with concrete in lifts not to exceed 5 feet in height, with not more than two lifts (10ft) placed in one operation. Stop concrete pour 1-1/2 inch below top of cavity to form key for the next concrete fill operation.
 - 3. If necessary, consolidate concrete immediately after placement of each lift by mechanical vibration to eliminate voids in concrete mass, using a "pencil" vibrator with a diameter of 1 inch or less. Do not vibrate more than 6-feet in depth into any concrete lift.
 - 4. Do not install piping, conduit, sleeves, or other non-structural embedments in reinforced grouted cells. Comply with requirements of MSJC Building Code Requirements and Specification for Masonry Structures.

3.12 MASONRY JOINT REINFORCEMENT

- A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches.
 - 1. Space reinforcement not more than 16 inches o.c.
 - 2. Space reinforcement not more than 8 inches o.c. in foundation walls and parapet walls.
 - 3. Provide reinforcement not more than 8 inches above and below wall openings and extending 12 inches beyond openings, in addition to continuous reinforcement.
- B. Interrupt joint reinforcement at control and expansion joints, unless otherwise indicated.
- C. If rigid anchors are not used to bond walls at intersections, provide continuity at wall intersections and corners by using prefabricated T-shaped and L-shaped units.
- D. Cut and bend reinforcing units as directed by manufacturer for continuity at corners, returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

3.13 ANCHORING MASONRY VENEERS

- A. Anchor masonry veneers to backup wall framing with masonry-veneer anchors to comply with the following requirements:
 - 1. Fasten screw-attached anchors through sheathing to wall framing, or to concrete backup, with metal fasteners of type indicated or otherwise approved. Use two fasteners unless anchor design only uses one fastener.
 - 2. Embed tie sections in masonry joints. Provide not less than 2 inches of air space between back of masonry veneer and face of sheathing.
 - 3. Locate anchor sections to allow maximum vertical differential movement of ties up and down.
 - 4. Space anchors as indicated, but not more than 16 inches o.c. vertically and 16 inches o.c. horizontally, with not less than 1 anchor for each 2 sq. ft. of wall area. Install additional anchors within 12 inches of openings and at intervals, not exceeding 8 inches, around perimeter.
- B. Provide seismic masonry-veneer reinforcing wire and anchors at cast stone veneer.
- C. Coordinate and sequence installation to comply with Division 07 Section "Air Barriers."

3.14 CONTROL AND EXPANSION JOINTS

- A. General: Install control and expansion joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.
 - 1. Locate joints as indicated on Drawings. Joints in veneer wythe and backup wythe need not align where indicated otherwise.
- B. Form control joints in concrete masonry using one of the following methods:
 - 1. Fit bond-breaker strips into hollow contour in ends of concrete masonry units on one side of control joint. Fill resultant core with grout and rake out joints in exposed faces for application of sealant.
 - 2. Install preformed control-joint gaskets designed to fit standard sash block.
 - 3. Install temporary foam-plastic filler in head joints and remove filler when unit masonry is complete for application of sealant.
- C. Form expansion joints in face veneers as follows:
 - 1. Provide neoprene compression seals equal to MM Systems Series VCS, model VCS-225 in standard color to match adjacent work.
- D. Provide horizontal, pressure-relieving joints by inserting a compressible filler of width required for installing sealant and backer rod specified in Division 07 Section "Joint Sealants," but not less than 3/8 inch.
 - 1. Locate horizontal, pressure-relieving joints beneath shelf angles supporting masonry.

3.15 LINTELS

- A. Install steel lintels where indicated. Paint prior to installation. Prepare surfaces and finish as indicated in Division 09 Section "Painting". Touch up painted finish after insulation.
- B. Provide minimum bearing of 8 inches at each jamb, unless otherwise indicated.
- C. Coordinate and incorporate flashing, control joints, cavity drainage, weeps, and accessories related to lintels.

3.16 FLASHING, WEEP HOLES, CAVITY DRAINAGE, AND VENTS

- A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated. Install vents at shelf angles, ledges, and other obstructions to upward flow of air in cavities, and where indicated.
- B. Install flashing as follows, unless otherwise indicated:
 - 1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.
 - 2. At lintels and shelf angles, extend flashing a minimum of 6 inches into masonry at each end. At heads and sills, extend flashing 6 inches at ends and turn up not less than 2 inches to form end dams.
 - 3. Metal Drip Edges: Install beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch back from outside face of wall and adhere flexible flashing to top of metal drip edge.
 - a. Application: Base of wall at grade and at locations not visible from pedestrian level, as approved by Architect.
 - 4. Metal Flashing Terminations: Install beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch back from outside face of wall and adhere flexible flashing to top of metal flashing termination. Seal per Division 07 Section "Joint Sealants".
 - a. Application: All exposed flashing where Metal Drip Edge is not used, unless indicated otherwise.
 - 5. Metal Reglet/ Counterflash Receiver: Install as masonry face wythe of wall is built.
 - a. As part of flexible thru-wall flashing assembly:
 - 1) Install tight against front face of face wythe in bed of elastomeric sealant.
 - 2) Provide minimum 2-inch side laps or splice pieces with minimum 2-inch cover on each side, and bed with elastomeric sealant.
 - 3) Install flexible flashing as specified above for Metal Drip Edge and Metal Flashing Terminations.
 - b. For embedment in face wythe only, separately from thru-wall flashing:
 - 1) Install Fry Reglet MA, or equivalent approved product, true and tight in accordance with manufacturer's written recommendations for specific application.
 - 2) Install fabricated corners, steps and end dams to ensure a mechanically secure, tight and uninterrupted barrier against water penetration.
 - 3) Do not install above cavity flashing.
 - c. As part of metal thru-wall fabrication:
 - 1) Install true and tight in accordance with manufacturer's recommendations for specific application.
 - 2) Install with a thin bed of mortar below and above. Install fabricated corners, steps and end dams to ensure a mechanically secure, tight and uninterrupted barrier against water penetration.
- C. Install reglets and nailers for flashing and other related construction where they are shown to be built into masonry.
- D. Install weep holes in head joints in exterior wythes of first course of masonry immediately above embedded flashing and as follows:
 - 1. Use specified weep/vent products to form weep holes.
 - 2. Space weep holes formed from wicking material 16 inches o.c.

- E. Place cavity drainage material in cavities to comply with configuration requirements for cavity drainage material in Part 2 "Miscellaneous Masonry Accessories" Article., and as follows:
 - 1. Verify that airspace width is no more than 3/8 inch greater than drainage mat thickness. Stagger end joints in adjacent rows. Butt adjacent pieces to moderate contact. Fit to perimeter construction and penetrations without voids.
- F. Install vents in head joints in exterior wythes at spacing indicated. Use specified weep/vent products to form vents.
 - 1. Close cavities off vertically and horizontally with blocking in manner indicated. Install through-wall flashing and weep holes above horizontal blocking.

3.17 REINFORCED UNIT MASONRY INSTALLATION

- A. Placing Reinforcement: Comply with requirements in ACI 530.1/ASCE 6/TMS 602.
- B. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.
 - 1. Comply with requirements in ACI 530.1/ASCE 6/TMS 602 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
 - 2. Limit height of vertical grout pours to not more than 60 inches.

3.18 FIELD QUALITY CONTROL

- A. Testing and Inspection: Owner will engage a qualified independent testing and inspecting agency to perform field tests and special inspections as required by authority having jurisdiction and as indicated below, and to prepare test reports:
 - 1. Coordinate work schedule with required testing and inspection operations.
 - 2. Allow testers and inspectors access to scaffolding and work areas, as needed to perform investigations.
 - 3. Place grout only after inspectors have verified compliance of grout spaces and grades, sizes, and locations of reinforcement.
- B. Retesting of materials failing to comply with specified requirements shall be done at Contractor's expense.
- C. Correct deficiencies in the Work that test reports and inspections indicate does not comply with the Contract Documents.
- D. Testing Frequency: One set of tests for each 5000 sq. ft. of wall area or portion thereof.
 - 1. Concrete Masonry Unit Test: For each type of unit provided, per ASTM C 140.
 - 2. Clay Masonry Unit Test: For each type; Two sets of unit provided, tests per ASTM C 67 addition per floor.
 - 3. Mortar Test (Property Specification): For each mix provided, per ASTM C 780. Test mortar for mortar air content and compressive strength.
 - 4. Grout Test (Compressive Strength): For each mix provided, per ASTM C 1019.
 - 5. Prism Test: For each type of construction provided, per ASTM C 1314 at 28 days.
 - 6. Anchors: For type, size and location, including anchorage of masonry to structural members, frames or other construction, per ACI 530 and ASCE 5.

3.19 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, approved samples and mockups, or otherwise in noncompliance with requirements. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.
 - 1. Replace units in a manner that results in assembly matching approved Samples, complying with other requirements, and showing no evidence of replacement.
- B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.
- C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
- D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
 - 1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
 - 2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
 - 3. Protect adjacent non-masonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
 - 4. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable to type of stain on exposed surfaces.

3.20 MASONRY WASTE DISPOSAL

- A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.
- B. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soil-contaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed.
 - 1. Crush masonry waste to less than 4 inches in each dimension.
 - 2. Mix masonry waste with at least two parts of specified fill material for each part of masonry waste. Fill material is specified in Division 02 Section "Earth Moving."
 - 3. Do not dispose of masonry waste as fill within 18 inches of finished grade.
- C. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above, and other masonry waste, and legally dispose of off-site.

END OF SECTION 04 2000

SECTION 05 1200 - STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Structural steel.
 - 2. Shear stud connectors.
 - 3. Shrinkage-resistant grout.

1.2 DEFINITIONS

- A. Structural Steel: Elements of the structural frame indicated on Drawings and as described in ANSI/AISC 303.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

- A. Product Data:
 - 1. Structural-steel materials.
 - 2. High-strength, bolt-nut-washer assemblies.
 - 3. Shear stud connectors.
 - 4. Anchor rods.
 - 5. Threaded rods.
 - 6. Shop primer.
 - 7. Galvanized-steel primer.
 - 8. Etching cleaner.
 - 9. Galvanized repair paint.
 - 10. Shrinkage-resistant grout.
- B. Shop Drawings: Show fabrication of structural-steel components.
- C. Delegated Design Submittal: For structural-steel connections indicated on Drawings to comply with design loads, include analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

- A. Welding certificates.
- B. Mill test reports for structural-steel materials, including chemical and physical properties.
- C. Source quality-control reports.
- D. Field quality-control reports.

1.6 QUALITY ASSURANCE

- A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category BU or is accredited by the IAS Fabricator Inspection Program for Structural Steel (Acceptance Criteria 172).
- B. Installer Qualifications: A qualified Installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector, Category ACSE.
- C. Welding Qualifications: Qualify procedures and personnel in accordance with AWS D1.1/D1.1M.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Comply with applicable provisions of the following specifications and documents:
 - 1. ANSI/AISC 303.
 - 2. ANSI/AISC 360.
 - 3. RCSC's "Specification for Structural Joints Using High-Strength Bolts."
- B. Connection Design Information:
 - 1. Design connections in accordance with ANSI/AISC 303 by fabricator's qualified professional engineer.
 - a. Use Allowable Stress Design; data are given at service-load level.
- C. Construction: Shear wall system.

2.2 STRUCTURAL-STEEL MATERIALS

- A. W-Shapes: ASTM A992/A992M.
- B. Channels, Angles: ASTM A36/A36M.
- C. Plate and Bar: ASTM A36/A36M.
- D. Cold-Formed Hollow Structural Sections: ASTM A500/A500M, Grade C structural tubing.
- E. Steel Pipe: ASTM A53/A53M, Type E or Type S, Grade B.
- F. Welding Electrodes: Comply with AWS requirements.

2.3 BOLTS AND CONNECTORS

- A. High-Strength A325 Bolts, Nuts, and Washers: ASTM F3125/F3125M, Grade A325, Type 1, heavy-hex steel structural bolts; ASTM A563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F436/F436M, Type 1, hardened carbon-steel washers; all with plain finish.
 - 1. Direct-Tension Indicators: ASTM F959/F959M, Type 325-1, compressible-washer type with plain finish.

- B. Zinc-Coated High-Strength A325 Bolts, Nuts, and Washers: ASTM F3125/F3125M, Grade A325, Type 1, heavy-hex steel structural bolts; ASTM A563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F436/F436M, Type 1, hardened carbon-steel washers.
 - 1. Finish: Hot-dip or mechanically deposited zinc coating.
 - 2. Direct-Tension Indicators: ASTM F959/F959M, Type 325-1, compressible-washer type with mechanically deposited zinc coating finish.
- C. Shear Stud Connectors: ASTM A108, AISI C-1015 through C-1020, headed-stud type, cold-finished carbon steel; AWS D1.1/D1.1M, Type B.

2.4 RODS

- A. Unheaded Anchor Rods: ASTM F1554, Grade 55, weldable.
 - 1. Configuration: Straight.
 - 2. Finish: Plain.

2.5 PRIMER

- A. Steel Primer:
 - 1. Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer complying with MPI#79 and compatible with topcoat.

2.6 SHRINKAGE-RESISTANT GROUT

- A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C1107/C1107M, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

2.7 FABRICATION

- A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate in accordance with ANSI/AISC 303 and to ANSI/AISC 360.
- B. Shear Stud Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Weld using automatic end welding of headed-stud shear connectors in accordance with AWS D1.1/D1.1M and manufacturer's written instructions.

2.8 SHOP CONNECTIONS

- A. High-Strength Bolts: Shop install high-strength bolts in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts" for type of bolt and type of joint specified.
 - 1. Joint Type: Snug tightened.
- B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

2.9 GALVANIZING

- A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel in accordance with ASTM A123/A123M.
 - 1. Fill vent and drain holes that are exposed in the finished Work unless they function as weep holes, by plugging with zinc solder and filing off smooth.

2.10 SHOP PRIMING

- A. Shop prime steel surfaces, except the following:
 - 1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
 - 2. Surfaces to be field welded.
 - 3. Surfaces of high-strength bolted, slip-critical connections.
 - 4. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
 - 5. Galvanized surfaces.
- B. Surface Preparation of Steel: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces in accordance with the following specifications and standards:
 - 1. SSPC-SP 2.
- C. Priming: Immediately after surface preparation, apply primer in accordance with manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

2.11 SOURCE QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform shop tests and inspections.
 - 1. Allow testing agency access to places where structural-steel work is being fabricated or produced to perform tests and inspections.
 - 2. Bolted Connections: Inspect shop-bolted connections in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts."
 - 3. Welded Connections: Visually inspect shop-welded connections in accordance with AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
 - a. Liquid Penetrant Inspection: ASTM E165/E165M.
 - b. Magnetic Particle Inspection: ASTM E709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
 - c. Ultrasonic Inspection: ASTM E164.
 - d. Radiographic Inspection: ASTM E94/E94M.
 - 4. In addition to visual inspection, test and inspect shop-welded shear stud connectors in accordance with requirements in AWS D1.1/D1.1M.
 - 5. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify, with certified steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 ERECTION

- A. Set structural steel accurately in locations and to elevations indicated and in accordance with ANSI/AISC 303 and ANSI/AISC 360.
- B. Baseplates Leveling Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.
 - 1. Set plates for structural members on wedges, shims, or setting nuts as required.
 - 2. Weld plate washers to top of baseplate.
 - 3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
 - 4. Promptly pack shrinkage-resistant grout solidly between bearing surfaces and plates, so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for grouting.
- C. Maintain erection tolerances of structural steel within ANSI/AISC 303.

3.3 FIELD CONNECTIONS

- A. High-Strength Bolts: Install high-strength bolts in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts" for bolt and joint type specified.
 - 1. Joint Type: Snug tightened.
- B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
 - 1. Comply with ANSI/AISC 303 and ANSI/AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.

3.4 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a special inspector to perform the following special inspections:
 - 1. Verify structural-steel materials and inspect steel frame joint details.
 - 2. Verify weld materials and inspect welds.
 - 3. Verify connection materials and inspect high-strength bolted connections.
- B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
 - 1. Bolted Connections: Inspect bolted connections in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts."

2. Welded Connections: Visually inspect field welds in accordance with AWS D1.1/D1.1M.
 - a. In addition to visual inspection, test and inspect field welds in accordance with AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
 - 1) Liquid Penetrant Inspection: ASTM E165/E165M.
 - 2) Magnetic Particle Inspection: ASTM E709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
 - 3) Ultrasonic Inspection: ASTM E164.
 - 4) Radiographic Inspection: ASTM E94/E94M.

END OF SECTION 05 1200

SECTION 05 3100 - STEEL DECKING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Roof deck.
 - 2. Composite floor deck.

1.2 ACTION SUBMITTALS

- A. Product Data:
 - 1. Roof deck.
 - 2. Composite floor 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. Certificates:
 - 1. Welding certificates.
 - 2. Product Certificates: For each type of steel deck.
- B. Test and Evaluation Reports:
 - 1. Product Test Reports: For tests performed by a qualified testing agency, indicating that power-actuated mechanical fasteners comply with requirements.
 - 2. Research Reports: For steel deck, from ICC-ES showing compliance with the building code.
- C. Field Quality-Control Submittals:
 - 1. Field quality-control reports.
- D. Qualification Statements: For welding personnel and testing agency.

1.4 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Welding Qualifications: Qualify procedures and personnel in accordance with SDI QA/QC and the following welding code:
 - a. AWS D1.3/D1.3M.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. 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.
- B. Fire-Resistance Ratings: Comply with ASTM E119; 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 listings of another qualified testing agency.

2.2 ROOF DECK

- A. 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 33, G60 zinc coating.
 - 2. Deck Profile: As indicated on drawings.
 - 3. Profile Depth: As indicated on drawings.
 - 4. Design Uncoated-Steel Thickness: As indicated on drawings.
 - 5. Span Condition: Triple span or more where possible, double span minimum.
 - 6. Side Laps: Overlapped or interlocking seam at Contractor's option.

2.3 COMPOSITE FLOOR DECK

- A. Composite Floor Deck: Fabricate panels, with integrally embossed or raised pattern ribs and interlocking side laps, to comply with SDI C, with the minimum section properties indicated, and with the following:
 - 1. Galvanized-Steel Sheet: ASTM A653/A653M, Structural Steel (SS), Grade 33, G60 zinc coating.
 - 2. Profile Depth: As indicated on drawings.
 - 3. Design Uncoated-Steel Thickness: As indicated on drawings.
 - 4. Span Condition: Triple span or more where possible, double span minimum.

2.4 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.
- C. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 minimum diameter.
- D. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber.

- E. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi, not less than 0.0359-inch design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.
- F. Pour Stops and Girder Fillers: Steel sheet, minimum yield strength of 33,000 psi, of same material and finish as deck, and of thickness and profile recommended by SDI standards for overhang and slab depth.
- G. Column Closures, End Closures, Z-Closures, and Cover Plates: Steel sheet, of same material, finish, and thickness as deck unless otherwise indicated.
- H. Weld Washers: Uncoated steel sheet, shaped to fit deck rib, with factory-punched hole of 3/8-inch minimum diameter.
- 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. Recessed Sump Pans: Single-piece steel sheet, 0.0747 inch thick, of same material and finish as deck, with 3-inch-wide flanges and level recessed pans of 1-1/2-inch minimum depth. For drains, cut holes in the field.
- K. Galvanizing Repair Paint: ASTM A780/A780M.

PART 3 - EXECUTION

3.1 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.

3.2 INSTALLATION OF ROOF DECK

- A. Roof Deck Attachment: Fasten roof-deck panels to steel supporting members as indicated on drawings.
- B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports as indicated on drawings at intervals noted.

- 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 or butted at Contractor's option.
- 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 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. mechanically fasten to substrate to provide a complete deck installation.
 - 1. Weld cover plates at changes in direction of roof-deck panels unless otherwise indicated.
- F. Flexible Closure Strips: Install flexible closure strips over partitions, walls, and where indicated. Install with adhesive in accordance with manufacturer's written instructions to ensure complete closure.

3.3 INSTALLATION OF FLOOR DECK

- A. Floor Deck Attachment: Fasten floor-deck panels to steel supporting members as indicated on drawings.
- B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, as indicated on drawings at intervals noted.
- C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 2", with end joints as follows:
 - 1. End Joints: Lapped or butted at Contractor's option.
- D. Pour Stops and Girder Fillers: Weld steel sheet pour stops and girder fillers to supporting structure in accordance with SDI recommendations unless otherwise indicated.
- E. Floor-Deck Closures: Weld steel sheet column closures, cell closures, and Z-closures to deck, in accordance with SDI recommendations, to provide tight-fitting closures at open ends of ribs and sides of deck.

3.4 REPAIR

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint in accordance with ASTM A780/A780M and manufacturer's written instructions.

3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Tests and Inspections:
 - 1. Special inspections and qualification of welding special inspectors for cold-formed steel floor and roof deck in accordance with quality-assurance inspection requirements of SDI QA/QC.
 - a. Field welds will be subject to inspection.

2. Steel decking will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.

END OF SECTION 05 3100

SECTION 05 5000 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Steel framing and supports for floor slab openings larger than 10 inches.
 - 2. Steel framing and supports for equipment items to be suspended from building structural system
 - 3. Steel framing and supports for mechanical and electrical equipment.
 - 4. Steel framing and supports for applications where framing and supports are not specified in other Sections.
 - 5. Shelf angles.
 - 6. Loose bearing and leveling plates for applications where they are not specified in other Sections.
 - 7. Steel ladders
 - 8. Fabricated prefinished downspout adapter boot.
- B. Products furnished, but not installed, under this Section include the following:
 - 1. Loose steel lintels.
 - 2. Anchor bolts, steel pipe sleeves, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.
- C. Related Sections:
 - 1. Section 05 1200 "Structural Steel Framing" for general structural requirements of steel design and fabrication.

1.2 ACTION SUBMITTALS

- A. Product Data: For the following:
 - 1. Nonslip-aggregate surface finish for ladder rungs
 - 2. Clips and anchorage devices
 - 3. Paint products.
 - 4. Grout.
- B. Shop Drawings: Show fabrication and installation details for metal fabrications.
 - 1. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.
 - 2. Provide templates for anchors and bolts specified for installation under other Sections.
 - 3. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.3 INFORMATIONAL SUBMITTALS

- A. Welding certificates.
- B. Qualification Data: For professional engineer.

1.4 QUALITY ASSURANCE

- A. Welding: 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."
- B. Engineering Responsibility: Where indicated, preparation of Shop Drawings, design calculations, and other structural data by a qualified professional engineer.
 - 1. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in Pennsylvania and who is experienced in providing engineering services of the kind indicated.
 - 2. Engineering services are defined as those performed for fabrication and installation of assemblies that are similar to those specifically indicated for this Project in material, design, and extent.
- C. Preinstallation Conference: Conduct at least one conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."
 - 1. Require representatives of each entity directly concerned with metal fabrications to attend, including the following:
 - a. Contractor's superintendent.
 - b. Affected subcontractors and separate Prime Contractors.
 - 2. Review:
 - a. Where indicated, special inspection and testing and inspecting agency procedures for field quality control.
 - b. Quality and appearance standards for various fabrication installations.
 - c. Layout and sequencing of installation
 - d. Interface with, attachment to, or incorporation within building structural components, including steel framing, masonry or concrete construction, existing construction.
 - e. Potential spatial or scheduling conflicts with other Work.
 - f. Shop finishes and preparation for scheduled field finishes.
 - g. Roof perimeter attachment requirements
 - h. Other special installation requirements.
 - i. Adjusting and cleaning

1.5 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication and indicate measurements on Shop Drawings.
 - 1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating metal fabrications without field measurements. Coordinate wall and other contiguous construction to ensure that actual dimensions correspond to established dimensions.
 - 2. Provide allowance for trimming and fitting at site.

1.6 COORDINATION

- A. Coordinate installation of anchorages for metal fabrications. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

- B. Coordinate installation of steel weld plates and angles for casting into concrete that are specified in this Section but required for work of another Section. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Design load information indicated represent non-factored service loads unless otherwise noted. Design and fabricate systems and assemblies using design load criteria indicated or otherwise required by authorities having jurisdiction. Coordinate with applicable structural notes on Drawings
- B. Structural Performance of Ladders: Provide ladders capable of withstanding the effects of loads and stresses within limits and under conditions specified in ANSI A14.3.
- C. Thermal Movements: Provide exterior metal fabrications that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation 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 METALS, GENERAL

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces, unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

2.3 FERROUS METALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- B. Steel Tubing: ASTM A 500, cold-formed steel tubing.
- C. Steel Pipe: ASTM A 53/A 53M, standard weight (Schedule 40), unless another weight is indicated or required by structural loads.
- D. Cast Iron: ASTM A 48/A 48M, Class 30, unless another class is indicated or required by structural loads.
- E. Slotted Channel Framing: Cold-formed metal box channels (struts) complying with MFMA-4.
 - 1. Size of Channels: 1-5/8 by 1-5/8 inches (41 by 41 mm).
 - 2. Material: Galvanized steel, ASTM A 653/A 653M, commercial steel, Type B, with G90 (Z275) coating; 0.079-inch (2-mm) nominal thickness.

2.4 FASTENERS

- A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 5, at exterior walls. Provide stainless-steel fasteners for fastening aluminum. Select fasteners for type, grade, and class required.

- B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A; with hex nuts, ASTM A 563; and, where indicated, flat washers.
- C. Anchor Bolts: ASTM F 1554, Grade 36.
 - 1. Provide hot-dip or mechanically deposited, zinc-coated anchor bolts where item being fastened is indicated to be galvanized.
- D. Eyebolts: ASTM A 489.
- E. Machine Screws: ASME B18.6.3.
- F. Lag Bolts: ASME B18.2.1.
- G. Wood Screws: Flat head, ASME B18.6.1.
- H. Plain Washers: Round, ASME B18.22.1.
- I. Lock Washers: Helical, spring type, ASME B18.21.1.
- J. Expansion Anchors: Anchor bolt and sleeve assembly with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.
 - 1. Material for Anchors in Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B 633, Class Fe/Zn 5.
 - 2. Material for Anchors in Exterior Locations: Alloy Group 1 stainless-steel bolts complying with ASTM F 593 and nuts complying with ASTM F 594.

2.5 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- B. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79.
 - 1. Use primer with a VOC content of 400 g/L (3.3 lb/gal.) or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - 2. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.
- C. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.
- D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.
- E. Nonshrink, Metallic Grout: Factory-packaged, ferrous-aggregate grout complying with ASTM C 1107, specifically recommended by manufacturer for heavy-duty loading applications.
- F. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- G. Concrete Materials and Properties: Comply with requirements in Division 03 Section "Cast-in-Place Concrete" for normal-weight, air-entrained, ready-mix concrete with a minimum 28-day compressive strength of 3000 psi, unless otherwise indicated.

2.6 FABRICATION, GENERAL

- A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch, unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- D. Form exposed work true to line and level with accurate angles and surfaces and straight edges.
- E. Weld corners and seams continuously to comply with 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. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts, unless otherwise indicated. Locate joints where least conspicuous.
- G. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
- I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.
 - 1. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches, with a minimum 6-inch embedment and 2-inch hook, not less than 8 inches from ends and corners of units and 24 inches o.c., unless otherwise indicated.

2.7 MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.
- B. Fabricate units from steel shapes, plates, and bars of welded construction, unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction retained by framing and supports. Cut, drill, and tap units to receive hardware, hangers, and similar items.
 - 1. Fabricate units from slotted channel framing where indicated.
 - 2. Furnish inserts for units installed after concrete is placed.
- C. Galvanize miscellaneous framing and supports at roof deck openings and where indicated.
- D. Prime miscellaneous framing and supports with zinc-rich primer, except as otherwise indicated.

2.8 LOOSE STEEL LINTELS

- A. Fabricate loose steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated. Weld adjoining members together to form a single unit where indicated.
- B. Size loose lintels to provide bearing length at each side of openings equal to 1/12 of clear span but not less than 8 inches, unless otherwise indicated.
- C. Hot-dip galvanize loose steel lintels located in exterior walls after fabrication, and provide high-performance shop prime coat on surfaces exposed to view. Use products specified in Section 05 1200 for exterior steel surfaces exposed to view and compatible with finish coat scheduled in Division 09 Section for painting.
 - 1. Basis-of-Design: Fast-curing, two-component, moisture-cured, zinc-rich urethane primer, Tnemec Series 90-97 Tnemec Zinc at 3 mil thickness, or approved equal.
 - a. Adhesion – ASTM D3359; no less than a rating of 5.
 - b. Salt Spray (Fog) – ASTM B117. No blistering, cracking, rusting, or delamination of film. No more than 1/32 inch rust creepage at scribe after 10,000 hours exposure.
 - c. Non-Lead – ASTM D520 Type II; less than 0.06% lead.

2.9 SHELF ANGLES

- A. Fabricate shelf angles from steel angles of sizes indicated and for attachment to concrete framing. Provide horizontally slotted holes to receive 3/4-inch bolts, spaced not more than 6 inches from ends and 24 inches o.c., unless otherwise indicated.
 - 1. Provide mitered and welded units at corners.
 - 2. Provide open joints in shelf angles at expansion and control joints. Make open joint approximately 2 inches larger than expansion or control joint.
- B. For cavity walls, provide vertical channel brackets to support angles from backup masonry and concrete.
- C. Galvanize shelf angles located in exterior walls.

2.10 LOOSE BEARING AND LEVELING PLATES

- A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Drill plates to receive anchor bolts and for grouting. Provide plates with integral anchorages where built into concrete and masonry construction.
- B. Size and detail pieces for field welding or bolting to deck bearing plates or to joist top chords, or for grouting to top of CMU wall, and to receive through-bolts for wood attachment at size and spacing indicated.
- C. Galvanize plates after fabrication when installed in exterior walls.

2.11 STEEL WELD PLATES AND ANGLES

- A. Provide steel weld plates and angles not specified in other Sections, for items supported from concrete construction as needed to complete the Work. Provide each unit with not less than two integrally welded steel strap anchors for embedding in concrete.

2.12 MISCELLANEOUS STEEL TRIM

- A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.
- B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.
 - 1. Provide with integrally welded steel strap anchors for embedding in concrete or masonry construction.
- C. Galvanize exterior miscellaneous steel trim, except as otherwise indicated.
- D. Prime interior miscellaneous steel trim, with zinc-rich primer, except as otherwise indicated.

2.13 METAL LADDERS

- A. Steel Fixed Ladders: Comply with ANSI A14.3, unless otherwise indicated.
 - 1. Support each ladder at top and bottom and not more than 60 inches o.c. with welded or bolted brackets, made from same metal as ladder.
 - 2. Galvanize steel exterior and interior ladders after fabrication, including brackets and fasteners.
 - 3. Siderails: Continuous, 1/2-by-2-1/2-inch steel flat bars, with eased edges.
 - 4. Space siderails 18 inches apart, unless otherwise indicated.
 - 5. Rungs: 1-inch-diameter steel bars.
 - 6. Fit rungs in centerline of siderails; plug-weld and grind smooth on outer rail faces.
- B. Nonslip Surfaces: Provide nonslip surfaces on top of each rung by one of the following methods.
 - 1. Coat rung with aluminum –oxide granules set in epoxy-resin adhesive
 - 2. Use type of manufactured rung filled with aluminum–oxide grout.
 - 3. Coating with abrasive material metallically bonded to rung.
 - a. IKG Industries, a division of Harsco Corporation; Mebac
 - b. SlipNOT Metal Safety Flooring, a W.S. Molnar company; SlipNOT
- C. Aluminum Ship's Ladders: As specified in 07 7200 *Roof Accessories*.

2.14 MANUFACTURED DOWNSPOUT ADAPTER

- A. Powder coated 304 Stainless Steel downspout connection to transition from vertical downspout piping to round horizontal underground roof drain collection systems.
 - 1. Concealed vandal-resistant stainless steel connection to building.
 - 2. Large stainless steel ground-level clean-out access hatch secured in place with stainless steel hardware.
 - 3. Self evacuating debris stainless steel grate with stainless steel hinged door.
 - 4. Internal stainless steel long sweep elbow to transition from vertical to horizontal flow of water.
 - 5. Transition coupling to adapt to collection piping.
- B. Basis of Design Product: Piedmont Downspout Adapters by Piedmont Pipe Manufacturing. 704 489 0911 www.piedmontpipe.com
 - 1. Downspout Adapter Body: 3/16" thick Stainless Steel, ASTM A 240 Type 304. Coordinate size with corresponding downspout and drain piping.
 - 2. Downspout Adapter Collar: 1/8" thick Stainless Steel, ASTM A 240, Type 304, to accept downspouts as indicated.
 - 3. Sweep: 1/8" thick Stainless Steel, ASTM A 240 Type 304.

4. Outlet Boot: Schedule 40 Polyvinyl Chloride (PVC), size coordinated with corresponding storm drainage as indicated.
5. Cleanout Cover: 1/8" thick Stainless Steel, ASTM A 240 Type 304.
6. Self Cleaning Debris Trap: 1/8" thick Stainless Steel hinged cover and removable stainless steel debris screen, ASTM A 240 Type 304.
7. Finish: Manufacturer's standard 100 percent fluropolymer resin architectural powder coat

2.15 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish metal fabrications after assembly.

2.16 STEEL AND IRON FINISHES

- A. Galvanizing: Hot-dip galvanize items as indicated to comply with applicable standard listed below:
 1. ASTM A 123/A 123M, for galvanizing steel and iron products.
 2. ASTM A 153/A 153M, for galvanizing steel and iron hardware.
- B. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with minimum requirements indicated below for SSPC surface preparation specifications and environmental exposure conditions of installed metal fabrications:
 1. Exteriors (SSPC Zone 1B): SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 2. Interiors (SSPC Zone 1A): SSPC-SP 3, "Power Tool Cleaning."
- C. Shop Priming: Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finishes and those to be embedded in concrete, sprayed-on fireproofing, or masonry, unless otherwise indicated. Comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.
 1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
 2. Verify compatibility with scheduled finish coating as specified in Division 09 Section for Painting.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

- C. Field Welding: Comply with the following requirements:
 - 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. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag bolts, wood screws, and other connectors.
- E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
- F. Corrosion Protection: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with a heavy coat of bituminous paint.

3.2 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.
- B. Support steel girders on solid grouted masonry, concrete, or steel pipe columns. Secure girders with anchor bolts embedded in grouted masonry or concrete or with bolts through top plates of pipe columns.
 - 1. Where grout space under bearing plates is indicated for girders supported on concrete or masonry, install as specified in "Installing Bearing and Leveling Plates" Article.
- C. Install pipe columns on concrete footings with grouted baseplates. Position and grout column baseplates as specified in "Installing Bearing and Leveling Plates" Article.
 - 1. Grout baseplates of columns supporting steel girders after girders are installed and leveled.
- D. Finish interior and exterior exposed ferrous metal surfaces as specified in Section 09 9100 Painting, unless otherwise indicated.

3.3 INSTALLING BEARING AND LEVELING PLATES

- A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of plates.
- B. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with grout.
 - 1. Use nonshrink grout, either metallic or nonmetallic, in concealed locations where not exposed to moisture; use nonshrink, nonmetallic grout in exposed locations, unless otherwise indicated.
 - 2. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.4 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 - 1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION 05 5000

SECTION 05 5113 - METAL PAN STAIRS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Fabricated steel stairs with concrete-filled treads and landings.
 - 2. Design and Engineering requirements for load-resisting assemblies.
 - 3. Steel guard and rail assemblies as part of stair construction.
- B. Related Sections include the following:
 - 1. Division 03 Section "Cast-in-Place Concrete" for concrete fill for stair treads and platforms.
 - 2. Division 05 Section "Structural Steel Framing" for coordination of edge conditions.
 - 3. Division 06 Section "Miscellaneous Rough Carpentry" for wood blocking for anchoring railings.
 - 4. Division 09 Section "Painting" for field finishing of interior steel railings.

1.2 ACTION SUBMITTALS

- A. Product Data: For metal pan stairs and the following:
 - 1. Abrasive nosings.
 - 2. Handrail wall brackets.
 - 3. Shop primer products.
 - 4. Grout.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
 - 1. Include plan at each level.
 - 2. Provide templates for anchors and bolts specified for installation under other Sections.
 - 3. Include design calculations and other structural data bearing professional engineer's seal.
 - 4. Indicate sizes of metal sections, thickness of metals, profiles, holes, and field joints.
 - 5. Indicate locations of anchors, weld plates, and blocking for attachment of wall-mounted handrails.
- C. Samples for Verification: For each type of exposed finish required.
 - 1. Section of interior stainless steel handrail 6-inches long in profile and finish indicated.
 - 2. Fittings and brackets.
 - 3. One picket for interior handrail in finish indicated.
- D. Delegated-Design Submittal: For installed products indicated to comply with the performance requirements of design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.3 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For professional engineer's experience with providing delegated-design engineering services of the kind indicated, including documentation that engineer is licensed in the State in which Project is located.
- B. For components and assemblies indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- C. Welding certificates.

- D. Product Test Reports: Based on evaluation of comprehensive tests performed by qualified testing agency for stairs.
 - 1. Test railings according to ASTM E 894 and ASTM E 935.
- E. Mill Certificates: Signed by manufacturers of products certifying that products comply with requirements.

1.4 QUALITY ASSURANCE

- A. Engineering Responsibility: Preparation of Shop Drawings, design calculations, and other structural data by a qualified professional engineer.
- B. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in Pennsylvania and who is experienced in providing engineering services of the kind indicated.
 - 1. Engineering services are defined as those performed for the installation of metal stair assemblies that are similar to those indicated for this Project in material, design and extent.
- C. Installer Qualifications: Fabricator of products.
- D. NAAMM Stair Standard: Comply with "Recommended Voluntary Minimum Standards for Fixed Metal Stairs" in NAAMM AMP 510, "Metal Stairs Manual," for class of stair designated, unless more stringent requirements are indicated.
 - 1. Preassembled Stairs: Commercial class.
- E. Welding: 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."
- F. Preinstallation Conference: Conduct conference at Project.
 - 1. Require representatives of each entity directly concerned with metal fabrications to attend, including the following:
 - a. Contractor's superintendent.
 - b. Independent testing agency responsible for steel construction.
 - c. Affected members and separate Prime Contractors.
 - 2. Review:
 - a. Special inspection and testing and inspecting agency procedures for field quality control.
 - b. Quality standards.
 - c. Layout and sequencing of installation, and coordination with other Work.
 - d. Protection for and temporary use of stairs during construction.
 - e. Finishes and preparation for finishes.

1.5 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with stairs and railings by field measurements before fabrication and indicate measurements on Shop Drawings.
 - 1. Provide allowance for trimming and fitting at site.

1.6 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturer's written recommendations to ensure that shop primers and topcoats are compatible with one another.

- B. Coordinate installation of anchorages for metal stairs. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- C. Coordinate locations of hanger rods and struts with other work so that they will not encroach on required stair width and will be within the fire-resistance-rated stair enclosure.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Design load information indicated represents non-factored service loads unless otherwise noted. Design and fabricate systems and assemblies using design load criteria indicated or otherwise required by authorities having jurisdiction. Coordinate with applicable structural notes on Drawings.
- B. Delegated Design: Design railings, including comprehensive engineering analysis by a qualified Pennsylvania professional engineer, using performance requirements and design criteria indicated.
- C. Structural Performance of Stairs: Provide metal stairs capable of withstanding the effects of design loads required by current and applicable International Building Code (IBC) and following within limits and under conditions indicated:
 - 1. Uniform Load: 100 lbf/sq. ft.
 - 2. Concentrated Load: 300 lbf applied on an area of 4 sq. in.
 - 3. Uniform and concentrated loads need not be assumed to act concurrently.
 - 4. Stair Framing: Capable of withstanding stresses resulting from railing loads in addition to loads specified above.
 - 5. Limit deflection of treads, platforms, and framing members to L/360 or 1/4 inch, whichever is less.
- D. Structural Performance of Railings: Provide railings capable of withstanding the effects of design loads required by current and applicable International Building Code (IBC) and following within the limits and under conditions indicated.
 - 1. Handrails and Top of Rails of Guards – comply with IBC and as follows:
 - a. Uniform load of 50lb/ft. applied in any direction.
 - b. Concentrated load or 200 lbf applied in any direction.
 - c. Uniform and concentrated loads need not be assumed to act concurrently.
 - 2. Top of Rail Guards:
 - a. Uniform load of 50 lb/ft. applied in any direction.
 - b. Concentrated load or 200 lbf applied in any direction.
 - 3. Infill of Guards:
 - a. Concentrated load of 200 lbf applied horizontally on an area of 1 s.f.
 - b. Uniform load of 25 lb/ft. applied horizontally
 - c. Infill load and other loads need not be assumed to act concurrently.
- E. Design assemblies to provide for movement of framing members without damage or overstressing, finish failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to design loading and thermal movements.

2.2 METALS, GENERAL

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces, unless otherwise indicated. For components exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

2.3 FERROUS METALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36.
- B. Steel Tubing: ASTM A 500 (cold formed) or ASTM A 513, Type 5 (mandrel drawn).
- C. Rolled-Steel Floor Plate: ASTM A 786, rolled from plate complying with ASTM A 36 or ASTM A 283, Grade C or D.
- D. Iron Castings: Either gray or malleable iron, unless otherwise indicated.
 - 1. Gray Iron: ASTM A 48, Class 30, unless another class is indicated or required by structural loads.
 - 2. Malleable Iron: ASTM A 47.
- E. Uncoated, Hot-Rolled Steel Sheet: ASTM A 1011, structural steel, Grade 30, unless another grade is required by design loads.
- F. Provide anchors for embedding units in concrete, either integral or applied to units set into concrete.
- G. Apply bituminous paint to concealed bottoms, sides, and edges of cast-metal units set into concrete.

2.4 STAINLESS STEEL

- A. Tubing: ASTM A 554, Grade MT 304.
- B. Pipe: ASTM A 312, Grade TP 304.
- C. Castings: ASTM A 743, Grade CF 8 or CF 20.
- D. Plate and Sheet: ASTM A 666, Type 304.

2.5 ABRASIVE NOSINGS

- A. Cast-Metal Units: Cast bronze, with an integral abrasive, as-cast finish consisting of aluminum oxide, silicon carbide, or a combination of both. Fabricate units in lengths necessary to accurately fit openings or conditions.
 - 1. Configuration: Cross-hatched units, 3 inches wide without lip.
 - 2. 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. Basis of Design: Wooster Products Inc.
 - b. American Safety Tread Co., Inc.
 - c. Balco; a CSW Industrials Company.
 - d. Ecoglo, Inc.
- B. Extruded Units: Bronze units with abrasive filler consisting of aluminum oxide, silicon carbide, or a combination of both, in an epoxy-resin binder. Fabricate units in lengths necessary to accurately fit openings or conditions.
 - 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. Basis of Design: Wooster Products Inc.
 - b. American Safety Tread Co., Inc.
 - c. Balco; a CSW Industrials Company.
 - d. Ecoglo, Inc.
 - 2. Provide ribbed units, with abrasive filler strips projecting 1/16 inch above aluminum extrusion.
 - 3. Nosings: Two-piece units, 3 inches wide, with subchannel for casting into concrete.

- C. Provide anchors for embedding units in concrete, either integral or applied to units, as standard with manufacturer.
- D. Apply bituminous paint to concealed surfaces of cast-metal units set into concrete.
- E. Apply clear lacquer to concealed surfaces of extruded units set into concrete.

2.6 FASTENERS

- A. General: Provide zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 5 where built into exterior walls. Select fasteners for type, grade, and class required.
- B. General: Provide the following:
 - 1. Stainless-Steel Railings: Type 304 stainless-steel fasteners.
 - 2. Steel Railings: Plated steel fasteners complying with ASTM B 633, Class Fe/Zn 25 for electrodeposited zinc coating.
- C. Fasteners for Anchoring Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction indicated and capable of withstanding design loads.
- D. Fasteners for Interconnecting Railing Components:
 - 1. Provide concealed fasteners for interconnecting railing components and for attaching them to other work.
 - 2. Provide tamper-resistant flat-head machine screws for exposed fasteners, unless otherwise indicated.
- E. Bolts and Nuts: Regular hexagon-head bolts, ASTM A307, Grade A; with hex nuts, ASTM A563; and, where indicated, flat washers.
- F. Anchor Bolts: ASTM F1554, Grade 36, of dimensions indicated; with nuts, ASTM A563; and, where indicated, flat washers.
 - 1. Provide mechanically deposited or hot-dip, zinc-coated anchor bolts for stairs indicated to be galvanized.
- G. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E488/E488M, conducted by a qualified independent testing agency.
 - 1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, unless otherwise indicated.

2.7 MISCELLANEOUS MATERIALS

- A. Handrail Wall Brackets: Cast nickel-silver, center of rail 2-1/2 inches from face of wall.
 - 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. Blum, Julius & Co., Inc.
 - b. The Wagner Companies.
- B. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- C. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI #79 and compatible with topcoat.
- D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187.

- E. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- F. Concrete Materials and Properties: Comply with requirements in Division 03 Section "Cast-in-Place Concrete" for normal-weight, air-entrained, ready-mix concrete with a minimum 28-day compressive strength of 3000 psi, unless otherwise indicated.
- G. Welded Wire Fabric: ASTM A 185, 6 by 6 inches--W1.4 by W1.4, unless otherwise indicated.

2.8 FABRICATION, GENERAL

- A. Provide complete stair assemblies, including metal framing, hangers, struts, clips, brackets, bearing plates, and other components necessary to support and anchor stairs and platforms on supporting structure.
 - 1. Join components by welding, unless otherwise indicated.
 - 2. Use connections that maintain structural value of joined pieces.
- B. Preassembled Stairs: Assemble stairs in shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.
- C. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends of returns, unless clearance between end of rail and wall is 1/4 inch or less.
- D. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.
 - 1. At brackets and fittings fastened to plaster or gypsum board partitions, provide crush-resistant fillers, or other means to transfer loads through wall finishes to structural supports and prevent bracket of fitting rotation and crushing of substrate.
- E. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by railings. Coordinate anchorage devices with supporting structure.
- F. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch, unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- G. Mechanical Connections: Connect members with concealed mechanical fasteners and fittings. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.
 - 1. Fabricate splice joints for field connection using an epoxy structural adhesive if this is manufacturer's standard splicing method.
- H. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
 - 1. Bend members in jigs to produce uniform curvature for each configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.
- I. Form exposed work true to line and level with accurate angles and surfaces and straight edges.
- J. Weld connections to comply with 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. Weld exposed corners and seams continuously, unless otherwise indicated.

5. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- K. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts unless otherwise indicated. Locate joints where least conspicuous.

2.9 STEEL-FRAMED STAIRS

- A. Manufacturers:
 1. Alfab, Inc.
 2. American Stair Corp.
 3. Bridges & Towers, Inc.
 4. Buffalo Structural Steel, Inc.
 5. Dura-Bond Steel Corporation.
 6. Jet Industries, LLC.
 7. Littell Steel Company.
 8. Moore & Morford, Inc.
 9. Oakdale Iron Works, Inc.
 10. Sipple Steel Fab.
 11. Sharon Companies, Ltd.
 12. Local fabricator, subject to qualifications requirements and Architect's approval
- B. Stair Framing:
 1. Fabricate stringers of steel shapes indicated.
 - a. Provide closures for exposed ends of tube and channel stringers.
 2. Construct platforms of steel plate or channel headers and miscellaneous framing members as needed to comply with performance requirements.
 3. Weld stringers to headers; weld framing members to stringers and headers.
 4. Where stairs are enclosed by gypsum board assemblies, provide hanger rods or struts to support landings from floor construction above or below. Locate hanger rods and struts where they will not encroach on required stair width and will be within the fire-resistance-rated stair enclosure.
 5. Where masonry walls support metal stairs, provide temporary supporting struts designed for erecting steel stair components before installing masonry.
- C. Metal-Pan Stairs: Form risers, subtread pans, and subplatforms to configurations shown from steel sheet of thickness needed to comply with performance requirements but not less than 0.0677 inch.
 1. Steel Sheet: Uncoated hot-rolled steel sheet.
 2. Directly weld metal pans to stringers; locate welds on top of subtreads where they will be concealed by concrete fill. Locate welds of bottom of subtreads where subtreads are to be covered with tile. Do not weld risers to stringers.
 3. Provide subplatforms of configuration indicated or, if not indicated, the same as subtreads. Weld subplatforms to platform framing.
 - a. Smooth Soffit Construction: Construct subplatforms with smooth soffits.

2.10 STEEL RAILINGS

- A. General: Fabricate railings to comply with requirements indicated for design, dimensions, details, finish, and member sizes, including wall thickness of tube, post spacings, and anchorage, but not less than that needed to withstand indicated loads.
 1. Configuration: As detailed on Drawings
 2. Fabricate grip handrails of stainless steel tubing.

- B. Welded Connections: Fabricate railings with welded connections. Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
- C. Form changes in direction of railings as detailed, by radius bends of radius indicated.
- D. Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.
- E. Close exposed ends of railing members with prefabricated end fittings.
- F. Provide wall returns at ends of wall-mounted handrails, unless otherwise indicated. Close ends of returns unless clearance between end of rail and wall is 1/4 inch or less.
- G. Brackets, Flanges, Fittings, and Anchors: Provide brackets, end closures, flanges, miscellaneous fittings, and anchors for interconnecting components and for attaching to other work. Furnish inserts and other anchorage devices for connecting to concrete or masonry work.

2.11 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish metal stairs after assembly.
- C. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with minimum requirements indicated below for SSPC surface preparation specifications and environmental exposure conditions of installed products:
 - 1. Interior Stairs (SSPC Zone 1A): SSPC-SP 6/NACE No.3, "Commercial Blast Cleaning."
- D. Apply shop primer to uncoated surfaces of metal stair components, except those to be embedded in concrete or masonry unless otherwise indicated. Comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.
 - 1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
- E. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. 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.
- F. Provide exposed fasteners with finish matching appearance, including color and texture, of railings.

2.12 STEEL AND IRON FINISHES

- A. For nongalvanized steel, provide nongalvanized ferrous-metal fittings, brackets, fasteners, and sleeves, except galvanize anchors to be embedded in exterior concrete or masonry.
- B. Fill vent and drain holes that will be exposed in the finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.
- C. Preparation for Shop Priming:
 - 1. Prepare uncoated ferrous-metal surfaces to comply with minimum requirements indicated below for SSPC surface preparation specifications and environmental exposure conditions of installed railings:
 - 2. Interior (SSPC Zone 1A): SSPC-SP 7/NACE No. 4, "Brush-off Blast Cleaning."

- D. Apply shop primer to prepared surfaces, unless otherwise indicated. Comply with requirements in SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting. Primer need not be applied to surfaces to be embedded in concrete or masonry.
 - 1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

2.13 STAINLESS-STEEL FINISHES

- A. Remove tool and die marks and stretch lines or blend into finish.
- B. Grind and polish surfaces to produce uniform, directionally textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.
- C. Directional Satin Finish: No. 4.
- D. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing metal stairs to in-place construction. Include threaded fasteners for concrete and masonry inserts, through-bolts, lag bolts, and other connectors.
- B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal stairs. Set units accurately in location, alignment, and elevation, measured from established lines and levels and free of rack.
- C. Install metal stairs by welding stair framing to steel structure or to weld plates cast into concrete, unless otherwise indicated.
 - 1. Grouted Baseplates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates.
 - a. Clean bottom surface of plates.
 - b. Revise requirements in subparagraphs below to suit Project.
 - c. Set plates for structural members on wedges, shims, or setting nuts.
 - d. Tighten anchor bolts after supported members have been positioned and plumbed.
 - e. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
 - f. Promptly pack grout solidly between bearing surfaces and plates so no voids remain.
 - 1) Neatly finish exposed surfaces; protect grout and allow to cure.
 - 2) Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.
- D. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
- E. Fit exposed connections accurately together to form hairline joints.
 - 1. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations.
 - 2. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

- F. Field Welding: Comply with the following requirements:
 - 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. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- G. Place and finish concrete fill for treads and platforms to comply with Division 03 Section "Cast-in-Place Concrete."
 - 1. Install abrasive nosings with anchors fully embedded in concrete.
 - 2. Center nosings on tread width.

3.2 ATTACHING HANDRAILS TO RAILING ASSEMBLY

- A. Attach handrails as shown per approved submittals. Provide brackets with 1-1/2 inch clearance from inside face of handrail and closest finished guardrail surface.
 - 1. Use type of bracket with predrilled hole for exposed bolt anchorage.
- B. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.
- C. Anchor posts to metal surfaces with oval flanges, angle type, or floor type as required by conditions, connected to posts and to metal supporting members as follows:
 - 1. For steel pipe railings, weld flanges to post and bolt to metal supporting surfaces.

3.3 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
- B. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.
- C. Clean stainless steel by washing thoroughly with clean water and soap and rinsing with clean water.

3.4 PROTECTION

- A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.
- B. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit, or provide new units.

END OF SECTION 05 5113

SECTION 06 1000 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Framing with dimension lumber.
 - 2. Wood blocking and nailers.
 - 3. Plywood panels.

1.2 ACTION SUBMITTALS

- A. Product Data:
 - 1. For preservative-treated wood products.

1.3 INFORMATIONAL SUBMITTALS

- A. Material Certificates:
 - 1. For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the ALSC Board of Review.
 - 2. For preservative-treated wood products. Indicate type of preservative used and net amount of preservative retained.
- B. Evaluation Reports: For the following, from ICC-ES:
 - 1. Wood-preservative-treated wood.
 - 2. Power-driven fasteners.
 - 3. Post-installed anchors.
 - 4. Metal framing anchors.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

- A. Lumber: Comply with DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, comply with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Grade lumber by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
 - 1. Factory mark each piece of lumber with grade stamp of grading agency.
 - 2. Dress lumber, S4S, unless otherwise indicated.
- B. Maximum Moisture Content:
 - 1. Boards: 15 percent.
 - 2. Dimension Lumber: 19 percent unless otherwise indicated.

2.2 PRESERVATIVE TREATMENT

- A. Preservative Treatment by Pressure Process: AWPB U1; Use Category UC2.
 - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or that does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
- D. Application: Treat items indicated on Drawings, and the following:
 - 1. Wood sills, sleepers, blocking, and similar members in contact with masonry or concrete.
 - 2. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.

2.3 DIMENSION LUMBER FRAMING

- A. Framing Other Than Shop-Fabricated Wood Trusses.
 - 1. Species:
 - a. Spruce-pine-fir No. 1/No. 2; NLGA.
 - b. Any species and grade with a modulus of elasticity of at least 1,400,000 psi and an extreme fiber stress in bending of at least 850 psi for 2-inch nominal thickness and 12-inch nominal width for single-member use
- B. Exposed Framing: Hand-select material for uniformity of appearance and freedom from characteristics, on exposed surfaces and edges, that would impair finish appearance, including decay, honeycomb, knot-holes, shake, splits, torn grain, and wane.
- C. Miscellaneous Framing: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
 - 1. Blocking.
 - 2. Nailers.
 - 3. Rooftop equipment bases and support curbs.
 - 4. Cants.
 - 5. Furring.
 - 6. Grounds.

2.4 PLYWOOD PANELS

- A. Plywood Sheathing Panels: Plywood, DOC PS 1, Exterior, C-C Plugged, in thickness indicated or, if not indicated, not less than 3/4-inch nominal thickness.

2.5 FASTENERS

- A. General: Fasteners are to be of size and type indicated and comply with requirements specified in this article for material and manufacture. Provide nails or screws, in sufficient length, to penetrate not less than 1-1/2 inches into wood substrate.
 - 1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A153/A153M.

- B. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.
- C. Post-Installed Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC01, ICC-ES AC58, ICC-ES AC193 or ICC-ES AC308 as appropriate for the substrate.

2.6 METAL FRAMING ANCHORS

- A. Allowable design loads, as published by manufacturer, are to meet or exceed those of basis-of-design products. Manufacturer's published values are to be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency. Framing anchors are to be punched for fasteners adequate to withstand same loads as framing anchors.
- B. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A653/A653M, G60 coating designation.
 - 1. Use for interior locations unless otherwise indicated.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- B. Set work to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry accurately to other construction. Locate furring, nailers, blocking, and similar supports to comply with requirements for attaching other construction.
- C. Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.
- D. Do not splice structural members between supports unless otherwise indicated.
- E. Comply with AWP A M4 for applying field treatment to cut surfaces of preservative-treated lumber.
- F. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 - 1. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code (IBC).
 - 2. ICC-ES evaluation report for fastener.

3.2 PROTECTION

- A. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes wet enough that moisture content exceeds that specified, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 06 1000

SECTION 06 1753 - SHOP-FABRICATED WOOD TRUSSES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Wood roof trusses.

1.2 ACTION SUBMITTALS

- A. Product Data: For metal-plate connectors, metal truss accessories, and fasteners.
- B. Shop Drawings: Show fabrication and installation details for trusses.
 - 1. Show location, pitch, span, camber, configuration, and spacing for each type of truss required.
 - 2. Indicate sizes, stress grades, and species of lumber.
 - 3. Indicate locations of permanent bracing required to prevent buckling of individual truss members due to design loads.
 - 4. Indicate locations, sizes, and materials for permanent bracing required to prevent buckling of individual truss members due to design loads.
 - 5. Indicate type, size, material, finish, design values, orientation, and location of metal connector plates.
 - 6. Show splice details and bearing details.
- C. Delegated-Design Submittals: For metal-plate-connected wood trusses indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.3 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For metal-plate-connected wood trusses, signed by officer of truss-fabricating firm.
- B. Evaluation Reports: For the following, from ICC-ES:
 - 1. Metal-plate connectors.
 - 2. Metal truss accessories.

1.4 QUALITY ASSURANCE

- A. Metal Connector-Plate Manufacturer Qualifications: A manufacturer that is a member of TPI and that complies with quality-control procedures in TPI 1 for manufacture of connector plates.
 - 1. Manufacturer's responsibilities include providing professional engineering services needed to assume engineering responsibility.
 - 2. Engineering Responsibility: Preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.

- B. Fabricator Qualifications: Shop that participates in a recognized quality-assurance program, complies with quality-control procedures in TPI 1, and involves third-party inspection by an independent testing and inspecting agency acceptable to Architect and authorities having jurisdiction.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Handle and store trusses to comply with recommendations in SBCA BCSI, "Building Component Safety Information: Guide to Good Practice for Handling, Installing, Restraining, & Bracing Metal Plate Connected Wood Trusses."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer to design metal-plate-connected wood trusses.
- B. Structural Performance: Metal-plate-connected wood trusses are to be capable of withstanding design loads within limits and under conditions indicated. Comply with requirements in TPI 1.
- C. Comply with applicable requirements and recommendations of TPI 1, TPI DSB, and SBCA BCSI.
- D. Wood Structural Design Standard: Comply with applicable requirements in AF&PA's "National Design Specifications for Wood Construction" and its "Supplement."

2.2 DIMENSION LUMBER

- A. Lumber: DOC PS 20 and applicable rules of any rules-writing agency certified by the American Lumber Standard Committee (ALSC) Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
 - 1. Provide dry lumber with 15 percent maximum moisture content at time of dressing.
- B. Permanent Bracing: Provide wood bracing that complies with requirements for miscellaneous lumber in Section 061000 "Rough Carpentry."

2.3 METAL CONNECTOR PLATES

- A. Fabricate connector plates to comply with TPI 1.
- B. Hot-Dip Galvanized-Steel Sheet: ASTM A653/A653M; Structural Steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G60 coating designation; and not less than 0.036 inch thick.

2.4 FASTENERS

- A. Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
 - 1. Provide fasteners for use with metal framing anchors that comply with written recommendations of metal framing manufacturer.

2. Where trusses are exposed to weather, in ground contact, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A153/A153M.

- B. Nails, Brads, and Staples: ASTM F1667.

2.5 METAL FRAMING ANCHORS AND ACCESSORIES

- A. Allowable design loads, as published by manufacturer, are to comply with or exceed those required by truss supplier/designer. Manufacturer's published values are to be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency. Framing anchors are to be punched for fasteners adequate to withstand same loads as framing anchors.
- B. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A653/A653M, G60 coating designation.

2.6 FABRICATION

- A. Assemble truss members in design configuration indicated; use jigs or other means to ensure uniformity and accuracy of assembly, with joints closely fitted to comply with tolerances in TPI 1. Position members to produce design camber indicated.
 1. Fabricate wood trusses within manufacturing tolerances in TPI 1.
- B. Connect truss members by metal connector plates located and securely embedded simultaneously in both sides of wood members by air or hydraulic press.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install wood trusses only after supporting construction is in place and is braced and secured.
- B. If trusses are delivered to Project site in more than one piece, assemble trusses before installing.
- C. Hoist trusses in place by lifting equipment suited to sizes and types of trusses required, exercising care not to damage truss members or joints by out-of-plane bending or other causes.
- D. Install and brace trusses according to TPI recommendations and as indicated.
- E. Anchor trusses securely at bearing points; use metal truss tie-downs. Install fasteners through each fastener hole in metal framing anchors according to manufacturer's fastening schedules and written instructions.
- F. Securely connect each truss ply required for forming built-up girder trusses.
- G. Install and fasten permanent bracing during truss erection and before construction loads are applied. Anchor ends of permanent bracing where terminating at walls or beams.
 1. Install bracing to comply with Section 061000 "Rough Carpentry."
- H. Install wood trusses within installation tolerances in TPI 1.
- I. Do not alter trusses in field. Do not cut, drill, notch, or remove truss members.

- J. Replace wood trusses that are damaged or do not comply with requirements.

END OF SECTION 06 1753

SECTION 07 1326 - SELF-ADHERING SHEET WATERPROOFING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Modified bituminous sheet waterproofing, fabric reinforced.
 - 2. Molded Sheet Drainage Panels.

1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review waterproofing requirements including surface preparation, substrate condition and pretreatment, minimum curing period, forecasted weather conditions, special details, transition and termination flashings, installation procedures, testing and inspection procedures, and protection and repairs.
 - 2. Confirm all locations to be waterproofed and as required in Division 01.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, and tested physical and performance properties of waterproofing.
 - 2. Include manufacturer's written instructions for evaluating, preparing, and treating substrate.
- B. Shop Drawings: Show locations and extent of waterproofing and details of substrate joints and cracks, sheet flashings, penetrations, inside and outside corners, tie-ins with adjoining waterproofing, and other termination conditions.
- C. Samples: For each exposed product and for each color and texture specified, including the following products:
 - 1. 8-by-8-inch square of waterproofing and flashing sheet.
 - 2. 8-by-8-inch square of insulation.
 - 3. 4-by-4-inch square of drainage panel.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
 - 1. Installer Certificates: Signed by manufacturers certifying that installers comply with requirements.
- B. Field quality-control reports.
- C. Sample Warranties: For special warranties.
 - 1. Copy of special waterproofing manufacturer's warranty stating obligations, remedies, limitations, and exclusions before starting waterproofing.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by waterproofing manufacturer.
- B. Mockups: Build mockups to verify selections made under Sample submittals and to set quality standards for installation.
 - 1. Build for each typical waterproofing installation including accessories to demonstrate surface preparation, crack and joint treatment, corner treatment, and protection.
 - a. Size: 100 sq. ft. in area.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 FIELD 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.
- B. Maintain adequate ventilation during preparation and application of waterproofing materials.

1.7 WARRANTY

- A. Manufacturer's Warranty: Manufacturer's standard materials-only warranty in which manufacturer agrees to furnish replacement waterproofing material for waterproofing that does not comply with requirements or that fails to remain watertight within specified warranty period.
 - 1. Warranty Period: Three years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Provide durable protected continuous waterproofing barrier assembly that prevents the passage of water and drains exterior groundwater to appropriate site drainage system.

2.2 MATERIALS, GENERAL

- A. Source Limitations for Waterproofing System: Obtain waterproofing materials and molded-sheet drainage panels from single source from single manufacturer.

2.3 MODIFIED BITUMINOUS SHEET WATERPROOFING

- A. Modified Bituminous Sheet: Minimum 60-mil nominal thickness, self-adhering sheet consisting of 56 mils of rubberized asphalt laminated on one side to a 4-mil-thick, polyethylene-film reinforcement, and with release liner on adhesive

side; formulated for application with primer or surface conditioner that complies with VOC limits of authorities having jurisdiction.

1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Basis of Design: Meadows, W. R., Inc.; Mel-Rol No. 714.
 - b. American Hydrotech, Inc.; VM75.
 - c. Carlisle Coatings & Waterproofing Inc.; CCW MiraDRI 860/861.
 - d. CETCO Building Materials Group, a subsidiary of AMCOL International Corp.; EnviroSheet.
 - e. Grace, W. R., & Co. - Conn.; Bituthene 3000/Low Temperature.
 - f. Henry Company; Blueskin WP 100/200.
 - g. Meadows, W. R., Inc.; SealTight Mel-Rol No. 714.
 - h. Polyguard Products, Inc.; Polyguard 650.
 - i. Protecto Wrap Company; PW 100/60.
 - j. Tamko Building Products, Inc.; TW-60.
2. Physical Properties:
 - a. Tensile Strength, Membrane: 250 psi minimum; ASTM D 412, Die C, modified.
 - b. Ultimate Elongation: 300 percent minimum; ASTM D 412, Die C, modified.
 - c. Low-Temperature Flexibility: Pass at minus 20 deg F; ASTM D 1970.
 - d. Crack Cycling: Unaffected after 100 cycles of 1/8-inch movement; ASTM C 836.
 - e. Puncture Resistance: 40 lbf minimum; ASTM E 154.
 - f. Water Absorption: 0.2 percent weight-gain maximum after 48-hour immersion at 70 deg F; ASTM D 570.
 - g. Water Vapor Permeance: 0.05 perms maximum; ASTM E 96/E 96M, Water Method.
 - h. Hydrostatic-Head Resistance: 200 feet minimum; ASTM D 5385.
3. Sheet Strips: Self-adhering, rubberized-asphalt strips of same material and thickness as sheet waterproofing.

2.4 AUXILIARY MATERIALS

- A. General: Furnish auxiliary materials recommended by waterproofing manufacturer for intended use and compatible with sheet waterproofing for a complete installation.
 1. Furnish liquid-type auxiliary materials that comply with VOC limits of authorities having jurisdiction.
- B. Primer: Liquid primer recommended for substrate by sheet-waterproofing material manufacturer.
- C. Surface Conditioner: Liquid, waterborne surface conditioner recommended for substrate by sheet-waterproofing material manufacturer.
- D. Liquid Membrane: Elastomeric, two-component liquid, cold fluid applied, of trowel grade or low viscosity.
- E. Substrate Patching Membrane: Low-viscosity, two-component, modified asphalt coating.
- F. Metal Termination Bars: Aluminum bars, approximately 1 by 1/8 inch thick, predrilled at 9-inch centers.

2.5 PROTECTION BOARD

- A. Application: Used where molded-sheet drainage is not required.

- B. Protection Course: Provide one of the following types of protection board:
1. Semirigid sheets of fiberglass or mineral-reinforced-asphaltic core, pressure laminated between two asphalt-saturated fibrous liners for 1/8 inch nominal thickness. Provide adhesive recommended by waterproofing manufacturer for type of protection course.
 - a. Protection Course; W. R. Meadows
 - b. Protection Board; Right Pointe Company
 - c. Protectar; Imperbit Membrane Industries
 2. Fan folded, with a core of extruded-polystyrene board insulation sandwiched between 2 sheets of plastic film, nominal thickness 1/4 inch, with compressive strength of 15 psi per ASTM D 1621 and maximum water absorption by volume of 0.4 percent per ASTM C 272.
 - a. Protection Board; Dow Chemical Company
 - b. Fanfold Insulation Board; R.L. Adams Plastics, Inc.
 - c. Sarnatherm Fanfold; Sika Sarnafil

2.6 MOLDED-SHEET DRAINAGE PANELS

- A. Nonwoven-Geotextile-Faced, Molded-Sheet Drainage Panel for Vertical Surfaces: Composite subsurface drainage panel consisting of a studded, nonbiodegradable, molded-plastic-sheet drainage core; with a nonwoven, needle-punched geotextile facing with an apparent opening size not exceeding No. 70 sieve laminated to one side of the core and a polymeric film bonded to the other side; and with a vertical flow rate of 9 to 15 gpm per ft..
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. W. R. Meadows, Inc; Mel-Drain 5012-B.
 - b. American Hydrotech, Inc.; Hydrodrain 400 or Hydrodrain 420.
 - c. Carlisle Coatings & Waterproofing Inc.; CCW MiraDRAIN 6200.
 - d. Grace, W. R., & Co. - Conn.; Hydroduct 220.
 - e. Protecto Wrap Company; Protecto Drain 2000-V.

2.7 INSULATION

- A. Insulation, General: Comply with Section 07 2100 "Thermal Insulation" and Drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the waterproofing.
1. Verify that concrete has cured and aged for minimum time period recommended in writing by waterproofing manufacturer.
 2. For concrete block walls, verify that joints have been struck flush and voids filled.
 3. Verify that substrate is visibly dry and within the moisture limits recommended in writing by manufacturer. Test for capillary moisture by plastic sheet method according to ASTM D 4263.
- 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. Mask off adjoining surfaces not receiving waterproofing to prevent spillage and overspray affecting other construction.
- C. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.
- D. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids.
- E. Prepare, fill, prime, and treat joints and cracks in substrates. Remove dust and dirt from joints and cracks according to ASTM D 4258.
 - 1. Install sheet strips of width according to manufacturer's written instructions and center over treated construction and contraction joints and cracks exceeding a width of 1/16 inch.
- F. Bridge and cover expansion joints and discontinuous deck-to-wall joints with overlapping sheet strips of widths according to manufacturer's written instructions.
 - 1. Invert and loosely lay first sheet strip over center of joint. Firmly adhere second sheet strip to first and overlap to substrate.
- G. Corners: Prepare, prime, and treat inside and outside corners according to ASTM D 6135.
 - 1. Install membrane strips centered over vertical inside corners. Install 3/4-inch fillets of liquid membrane on horizontal inside corners and as follows:
 - a. At footing-to-wall intersections, extend liquid membrane in each direction from corner or install membrane strip centered over corner.
- H. Prepare, treat, and seal vertical and horizontal surfaces at terminations and penetrations through waterproofing and at drains and protrusions according to ASTM D 6135.

3.3 MODIFIED BITUMINOUS SHEET-WATERPROOFING APPLICATION

- A. Install modified bituminous sheets according to waterproofing manufacturer's written instructions and recommendations in ASTM D 6135.
- B. Apply primer to substrates at required rate and allow it to dry. Limit priming to areas that will be covered by sheet waterproofing in same day. Reprime areas exposed for more than 24 hours.
- C. Apply and firmly adhere sheets over area to receive waterproofing. Accurately align sheets and maintain uniform 2-1/2-inch-minimum lap widths and end laps. Overlap and seal seams, and stagger end laps to ensure watertight installation.
 - 1. When ambient and substrate temperatures range between 25 and 40 deg F, install self-adhering, modified bituminous sheets produced for low-temperature application. Do not use low-temperature sheets if ambient or substrate temperature is higher than 60 deg F.
- D. Two-Ply Application: Install sheets to form a membrane with lap widths not less than 50 percent of sheet widths, to provide a minimum of two thicknesses of sheet membrane over areas to receive waterproofing.
- E. Horizontal Application: Apply sheets. Ensure that laps shed water.

- F. Apply continuous sheets over already-installed sheet strips, bridging substrate cracks, construction, and contraction joints.
- G. Seal edges of sheet-waterproofing terminations with mastic.
- H. Install sheet-waterproofing and auxiliary materials to tie into adjacent waterproofing.
- I. Repair tears, voids, and lapped seams in waterproofing not complying with requirements. Slit and flatten fishmouths and blisters. Patch with sheet waterproofing extending 6 inches beyond repaired areas in all directions.
- J. Install board insulation immediately to waterproofing.
- K. Immediately install protection course or molded drainage panel with butted joints over waterproofing membrane.

3.4 INSULATION INSTALLATION

- A. Install one or more layers of board insulation to achieve required thickness over waterproofed surfaces. Cut and fit to within 3/4 inch of projections and penetrations.
- B. On vertical surfaces, set insulation units in adhesive or tape applied according to manufacturer's written instructions.

3.5 PROTECTION COURSE INSTALLATION

- A. Install protection course with butted joints over waterproofing membrane before starting subsequent construction operations.
 - 1. Molded-sheet drainage panels may be used in place of a separate protection course to vertical applications when approved by waterproofing manufacturer.

3.6 MOLDED-SHEET DRAINAGE-PANEL INSTALLATION

- A. Place and secure molded-sheet drainage panels, with geotextile facing away from wall, according to manufacturer's written instructions. Extend drainage panel to top of footing across top of footing if perforated foundation drain is on top of footing. Use adhesives or other methods that do not penetrate waterproofing. Lap edges and ends of geotextile to maintain continuity. Protect installed molded-sheet drainage panels during subsequent construction.
 - 1. For vertical applications, install board insulation before installing drainage panels.
 - 2. Peel geotextile fabric from molded drainage core for sufficient distance to wrap once completely around drain. Remove excess molded drainage core where peeled from fabric.

3.7 FIELD QUALITY CONTROL

- A. Engage a site representative qualified by waterproofing membrane manufacturer to inspect substrate conditions, surface preparation, membrane application, flashings, protection, and drainage components, and to furnish daily reports to Architect.

3.8 PROTECTION, REPAIR, AND CLEANING

- A. Do not permit foot or vehicular traffic on unprotected membrane.
- B. Protect waterproofing from damage and wear during remainder of construction period.
- C. Protect installed board insulation and molded sheet drainage panels from damage due to UV light, harmful weather exposures, physical abuse, and other causes. Provide temporary coverings where insulation or drainage panels are subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.
- D. Correct deficiencies in or remove waterproofing that does not comply with requirements; repair substrates, reapply waterproofing, and repair sheet flashings.
- E. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 07 1326

SECTION 07 2100 - THERMAL INSULATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Foam-plastic board insulation.
 - 2. Cavity board wall insulation.
 - a. At metal-clad masonry wall.
 - b. At masonry-veneer cavity wall.
 - c. At grouted cavities of masonry wall.
 - 3. Spray foam insulation at misc. openings and gaps.
- B. Related Sections:
 - 1. Section 04 2000 "Unit Masonry" for installing insulation in masonry cavity walls.
 - 2. Section 07 4113 "Metal Panel Roofing" for roof nailbase insulation
 - 3. Divisions 22 and 23 Sections for insulation specified as part of plumbing and mechanical systems.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Schedule: List where each product is being installed.

1.3 INFORMATIONAL SUBMITTALS

- A. Installer's Certification: Listing type, manufacturer, and R-value of insulation installed in each element of the building thermal envelope.
 - 1. Sign, date, and post the certification in a conspicuous location on Project site.
- B. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each product.
- C. Research/Evaluation Reports: For foam-plastic insulation, from ICC-ES.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.
- B. 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.

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.

- B. Protect foam-plastic board insulation as follows:
 - 1. Do not expose to sunlight except to necessary extent for period of installation and concealment.
 - 2. Protect against ignition at all times. Do not deliver foam-plastic board materials to Project site before installation time.
 - 3. Quickly complete installation and concealment of foam-plastic board insulation in each area of construction.

PART 2 - PRODUCTS

2.1 FOAM-PLASTIC BOARD INSULATION

- A. Extruded-Polystyrene Board Insulation: ASTM C 578, of type and minimum compressive strength indicated below, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84.
 - 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. DiversiFoam Products.
 - b. The Dow Chemical Company .
 - c. Owens Corning.
 - d. Thermal Foams, Inc
 - 2. Type IV, 25 psi.: at interior surface of vertical foundation walls.
 - 3. Type VI, 40 psi.:
 - a. Horizontally under slab.
 - b. Vertically at backfilled basement walls with applied waterproofing and drainboard.
- B. Provide in thickness shown on Drawings.
- C. Geotextile-Faced Wall Insulation Drainage Panels: Extruded-polystyrene board insulation complying with ASTM C 578, Type VI, 40-psi minimum compressive strength; fabricated with tongue-and-groove edges and with one side having grooved drainage channels faced with nonwoven geotextile filter fabric.
 - 1. Application: exterior surface of vertical foundation walls.
 - a. For drainage panels at waterproofed foundation walls, refer to Section 07 1326 "Self-Adhering Sheet Waterproofing."
 - 2. 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. Owens Corning.
 - b. American Wick Drain Corporation
 - c. Certainteed Corporation
 - d. GeoTech Systems Corporation
 - e. Mirafi
 - f. Tremco barrier Solutions, Inc.
- D. Adhesive for Bonding Insulation: Product with demonstrated capability to bond insulation securely to substrates without damaging insulation and substrates.

2.2 CAVITY-WALL INSULATION

- A. General: Continuous perimeter wall insulation to be tested as a component of an NFPA 285 fire-tested exterior wall assembly.

- B. Foil-Faced, Polyisocyanurate Board Insulation: ASTM C 1289, Type I, Class 1, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Atlas Roofing Corporation; EnergyShield
 - b. Dow Chemical Company; Thermax (ci)
 - c. Rmax, Inc.; ECOMAXci
 - d. Or equal as approved by Architect.
 - 2. Application: For air cavity at Exterior Wall Types A and B, and continuous insulation at Exterior Wall Type C.
- C. Extruded-Polystyrene Board Insulation: ASTM C 578, of type and density indicated below, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively:
 - 1. Type IV, 1.60 lb/cu. ft., unless otherwise indicated.
 - a. Dow Chemical Company; "Styrofoam Cavitymate Ultra.
 - b. DiversiFoam Products; "Certifoam 25 SE"
 - c. Owens Corning; "Foamular CW25".
 - d. Or equal, subject to Architect approval.
 - 2. Application: For grouted cavity below through-wall flashing.
- D. Provide in thickness and minimum R-value as indicated on drawings.

2.3 AUXILIARY INSULATING MATERIALS

- A. Adhesive for Bonding Insulation: Type recommended by insulation board manufacturer, with demonstrated capability to bond insulation securely to substrates without damaging insulation and substrates, and compatible with air barrier membrane.
- B. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by insulation manufacturers for sealing joints and penetrations in insulation board facings.
- C. Transition Membrane Between Air Barrier Membrane and Adjacent Elements: Comply with both air barrier manufacturer's recommendations and material manufacturer's recommendations, and with Section 07 2700
- D. Sprayed Polyurethane Foam Sealant: 1- or 2-component, foamed-in-place, polyurethane foam sealant, 1.5 to 2.0 lb/cu. ft density; flame spread index of 25 or less according to ASTM E 162; with primer and noncorrosive substrate cleaner recommended by foam sealant manufacturer.
 - 1. Application:
 - a. Gaps at penetrations and openings.
 - b. Roof/wall and floor/wall junctures
 - c. Flute closures for metal roof deck perimeters and penetrations.
 - d. Miscellaneous cavities at building perimeter enclosure.
 - 2. Product:
 - a. Froth-Pak Class A Polyurethane Spray Foam by Dow Building Solutions.
 - b. Similar compatible products as approved by Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements of Sections in which substrates and related work are specified and for other conditions affecting performance.
 - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean substrates of substances that are harmful to insulation or vapor retarders, including removing projections capable of puncturing vapor retarders, or that interfere with insulation attachment.
- B. Priming: Prime substrates where recommended by insulation manufacturer. Apply primer to comply with insulation manufacturer's written instructions. Confine primers to areas to be insulated; do not allow spillage or migration onto adjoining surfaces.

3.3 INSTALLATION, GENERAL

- A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions applicable to products and applications indicated. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.
- B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.
- 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. Water-Piping Coordination: If water piping is located within insulated exterior walls, coordinate location of piping to ensure that it is placed on warm side of insulation and insulation encapsulates piping.
- E. 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.
- F. The insulation in walls must form a continuous connection to insulation at top of wall to roof system insulation.
- G. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:
 - 1. Spray Polyurethane Foam Sealant: Apply according to manufacturer's written instructions.

3.4 INSTALLATION OF BELOW-GRADE INSULATION

- A. On vertical surfaces, set insulation units using manufacturer's recommended adhesive according to manufacturer's written instructions.
 - 1. Tape or seal joints between boards at foundation walls.
 - 2. If not otherwise indicated, extend insulation a minimum of 48 inches below exterior grade line.
 - 3. Apply a bead of sealant between board and wall to minimize water penetration behind board.
- B. On horizontal surfaces, loosely lay insulation units according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.
 - 1. If not otherwise indicated, extend insulation a minimum of 48 inches in from exterior walls.

- C. On vertical waterproofed basement walls, comply with additional requirements of Section 07 1326 "Self-Adhering Sheet Waterproofing"

3.5 INSTALLATION OF CAVITY-WALL INSULATION

- A. Comply with requirements of Section 04 2000 "Unit Masonry"

3.6 INSTALLATION OF ROOF DECK INSULATION

- A. Comply with requirements of Section 07 4113 "Metal Panel Roofing"

3.7 INSTALLATION OF INSULATION AT FORMED METAL WALL PANELS

- A. Foam-Plastic Board Insulation, General: Seal joints between units by applying adhesive, mastic, or sealant to edges of each unit to form a tight seal as units are shoved into place. Fill voids in completed installation with adhesive, mastic, or sealant as recommended by insulation manufacturer.
- B. Install in cavities formed by horizontal panel support members according to the following requirements:
 - 1. Use insulation widths 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.
 - 2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
- C. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:
 - 1. Spray Polyurethane Foam Sealant: Apply according to manufacturer's written instructions.

3.8 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect spray foam insulation installation, including accessories. Report results in writing.

3.9 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 07 2100

SECTION 072423 - DIRECT-APPLIED EXTERIOR FINISH SYSTEM (DEFS)

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes composite ceiling finish system applied at the following locations, identified on Drawings as "Synthetic Stucco."
 - 1. Exterior soffits
 - 2. Interior ceilings

1.2 SYSTEM DESCRIPTION

- A. Class PB DEFS: One-coat synthetic acrylic stucco systems applied to rigid panel substrate board. System consists of an integrally reinforced base coat, a reinforcing mesh and a textured protective finish coat, similar to EIFS installed without an insulation component.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type and component and accessory of DEFS indicated, and substrate board.
- B. Shop Drawings: Include plans, elevations, sections, details of components, details of penetration and termination, flashing details, joint locations and configurations, fastening and anchorage details including mechanical fasteners, and connections and attachments to other work.
- C. Samples for Initial Selection: For each type of finish-coat color and texture indicated.
 - 1. Include similar Samples of joint sealants and exposed accessories involving color selection.
- D. Samples for Verification: 24-inch-square panels for type of finish-coat color and texture indicated, prepared using same substrate tools and techniques intended for actual work including a typical control joint filled with sealant of color selected.
 - 1. Include sealants Samples to verify color selected.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Compatibility and Adhesion Test Reports: For joint sealants from sealant manufacturer indicating the following:
 - 1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.

2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.
- C. Manufacturer Certificates: Signed by DEFS manufacturer, certifying the following:
 1. Substrate is acceptable to DEFS manufacturer.
 2. Accessory products installed with system, including joint sealants, flashing, water-resistant barriers, trim, whether or not furnished by DEFS manufacturer and whether or not specified in this Section, are acceptable to DEFS manufacturer.
- D. Sample Warranty: For manufacturer's special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For DEFS to include in maintenance manuals.
- B. Executed Warranty.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An installer who is certified in writing by DEFS manufacturer as qualified to install manufacturer's system using trained workers.
- B. Source Limitations: Obtain DEFS from single source from single DEFS manufacturer and from sources approved by DEFS manufacturer as compatible with system components.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original, unopened packages with manufacturers' labels intact and clearly identifying products.
- B. Store materials inside and under cover; keep them dry and protected from weather, direct sunlight, surface contamination, aging, corrosion, damaging temperatures, construction traffic, and other causes.
- C. Stack panels flat on leveled supports off floor or slab to prevent sagging.

1.9 PROJECT CONDITIONS

- A. Ambient Temperatures: Maintain not less than 55 deg F or more than 80 deg F for 7 days before application of Exterior Finish System, continuously during application, and after application until final finish coat is dry.
- B. Avoid conditions that result in Finish System drying too rapidly.
 1. Distribute heat evenly; prevent concentrated or uneven heat on substrate or newly applied product.
 2. Maintain relative humidity levels, for prevailing ambient temperature, that produce normal drying conditions.
 3. Ventilate building spaces in a manner that prevents drafts of air from contacting surfaces during coating application until dry.
- C. Do not install panels that are wet, moisture damaged, or mold damaged.
 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, and irregular shape.

2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

1.10 COORDINATION

- A. Coordinate installation of DEFS with related Work specified in other Sections to ensure that soffit assemblies, including weather-resistant sheathing paper, flashing and joint sealants, windows, and doors, are protected against damage from the effects of weather, age, corrosion, moisture, and other causes. Do not allow water to penetrate behind barrier coating of DEFS.

1.11 WARRANTY

- A. Manufacturer's Special Warranty: Manufacturer agrees to repair or replace components of DEFS that fail in materials or workmanship within specified warranty period.
 1. Failures include, but are not limited to, the following:
 - a. Bond integrity and weathertightness.
 - b. Deterioration of DEFS finishes and other DEFS materials beyond normal weathering.
 2. Warranty coverage includes the following DEFS components:
 - a. DEFS finish, including base coats, finish coats, and reinforcing mesh.
 - b. DEFS accessories, including trim components and flashing.
 3. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. DEFS Performance: Comply with the following:
 1. Bond Integrity: Free from bond failure within DEFS components or between system and supporting wall construction, resulting from exposure to fire, wind loads, weather, or other in-service conditions.
 2. Weathertightness: Resistant to water penetration from exterior into DEFS and assemblies behind it or through them into interior of building that results in deterioration of effectiveness or other degradation of DEFS and assemblies behind it, including substrates, supporting wall construction, and interior finish.
 3. Air Permeance: Installed assembly not to exceed 0.04 cfm/ sq. ft. of surface area at 1.57-lbf/sq. ft. pressure difference; ASTM E 2178
 4. Structural Performance of Assembly and Components:
 - a. Wind Loads: Uniform pressure as indicated on Drawings.
 5. Impact Performance: ASTM E2568, High impact resistance.
 6. Abrasion Resistance of Finish Coat: Sample cured for a minimum of 28 days and shows no cracking, checking, or loss of film integrity after exposure to 528 quarts of sand when tested in accordance with ASTM D968, Method A.
 7. Mildew Resistance of Finish Coat: Sample applied to 2-by-2-inch clean glass substrate; cured for 28 days and shows no growth when tested in accordance with ASTM D3273 and evaluated in accordance with ASTM D3274.

2.2 MANUFACTURERS

- A. Source Limitations: Obtain DEFS from single source from single manufacturer and from sources approved by manufacturer as tested and compatible with DEFS components.
- B. Manufacturers and Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Dryvit Systems, Inc.; Dryvit System for Exterior Soffits Specifications DS173.
 - 2. Parex, Inc.; a brand of ParexLahabra, Inc.; Parex Direct-Applied Finish System (DAFS).
 - 3. Senergy; BASF, Inc.; Direct finish System for Soffits and Ceilings Only.
 - 4. Sto Corp.; StoQuik Gold Finish System for Soffits F 601S.

2.3 MATERIALS

- A. Compatibility: Provide substrate adhesive, fasteners, reinforcing meshes, base- and finish-coat systems, sealants, and accessories that are compatible with one another and with substrates and approved for use by DEFS manufacturer for Project.
- B. Fasteners: Wafer-head or flat-head steel drill screws complying with ASTM C 954, with an organic-polymer coating or other corrosion-protective coating having a salt-spray resistance of more than 500 hours per ASTM B 117.
 - 1. Size and Length: As recommended by board manufacturer.
- C. Reinforcing Mesh: Balanced, alkali-resistant, open-weave, glass-fiber mesh treated for compatibility with other DEFS materials, made from continuous multiend strands.
 - 1. High-Impact Reinforcing Mesh: Not less than the weight required to comply with specified impact-performance level, but no less than 4.3 oz./sq. yd.
- D. Base-Coat Materials: DEFS manufacturer's standard mixture complying with one of the following:
 - 1. Job-mixed formulation of portland cement complying with ASTM C 150, Type I, white or natural color; and manufacturer's standard polymer-emulsion adhesive designed for use with portland cement.
 - 2. Job-combined formulation of manufacturer's standard polymer-emulsion adhesive and manufacturer's standard dry mix containing portland cement.
 - 3. Factory-blended dry formulation of portland cement, dry polymer admixture, and inert fillers to which only water is added at Project site.
 - 4. Factory-mixed noncementitious formulation of polymer-emulsion adhesive and inert fillers that is ready to use without adding other materials.
- E. Primer: DEFS manufacturer's standard factory-mixed, elastomeric-polymer primer for preparing base-coat surface for application of finish coat.
- F. Finish-Coat Materials: DEFS manufacturer's standard acrylic-based coating with enhanced mildew resistance complying with the following:
 - 1. Factory-mixed formulation of 100 percent acrylic-emulsion binder, colorfast mineral pigments and fillers.
 - 2. Colors: As selected by Architect from Manufacturer's full range.
 - 3. Texture: As selected by Architect from Manufacturer's full range.
- G. Water: Potable.
- H. Mechanical Fasteners: DEFS manufacturer's standard corrosion-resistant fasteners consisting of standard washer and shaft attachments and fastener indicated below; selected for properties of pullout, tensile, and shear strength

required to resist design loads of application indicated; capable of pulling fastener head below surface of cement board; and of the following description:

1. For attachment to steel studs from 0.033 to 0.112 inch in thickness, provide steel drill screws complying with ASTM C 954.
 2. For attachment to light-gage steel framing members not less than 0.0179 inch in thickness, provide steel drill screws complying with ASTM C 1002.
- I. Trim Accessories: Type as designated or required to suit conditions indicated and to comply with manufacturer's written instructions; manufactured from UV-stabilized PVC unless noted otherwise; and complying with ASTM D 1784, manufacturer's standard Cell Class for use intended, and ASTM C 1063.
1. Casing Bead: Prefabricated, one-piece type for attachment behind substrate board, of depth required to suit thickness of coating and insulation, with face leg perforated for bonding to coating and back leg.
 2. Drip Screed/Track: Prefabricated, one-piece type for attachment behind substrate board with face leg extended to form a drip, of depth required to suit thickness of coating and substrate board, with face leg perforated for bonding to coating and back leg.
 3. Expansion Joint: Prefabricated, one-piece V profile; designed to relieve stress of movement.
 4. Soffit Transition Vent: Prefabricated one-piece type forming an edge bead for substrate board and a ventilated reveal between ceiling or soffit perimeter and adjacent wall, of depth required to suit thickness of coating and substrate board. Perforate to provide 7 sq. in/ft. of free ventilating area. Aluminum ASTM B 209, 0.025-inch-thick, and mill finished.
 - a. Basis of Design: SST Superior Soffit Transition Mould manufactured by Delta Star, Inc.

2.4 PANEL PRODUCTS

- A. Panel Size: Provide in maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated. At contractor's option, and subject to specified requirements, and limitations of manufacturer's recommendations, provide cementitious backer boards.
- B. Gypsum Backer Units: 5/8-inch panels in maximum lengths available to minimize end-to-end butt joints, with a water-resistant core and fiber-glass mat facers meeting ASTM C 1177 and complying with applicable requirements in Section 06 1600 "Sheathing," as approved in writing by DEFS manufacturer.
- C. Cementitious Backer Units: 5/8-inch thick, ANSI A118.9 or ASTM C 1325,.
1. Basis of Design Product: PermaBase Brand Cement Board by National Gypsum Company
 2. Subject to compliance with requirements, provide Basis of Design product, or similar products by one of the following:
 - a. C-Cure; C-Cure Board 990.
 - b. Custom Building Products; Wonderboard.
 - c. FinPan, Inc.; Util-A-Crete Concrete Backer Board.
 - d. USG Corporation; DUROCK Cement Board.

2.5 ELASTOMERIC SEALANTS

- A. Elastomeric Sealant Products: Provide DEFS manufacturer's listed and recommended chemically curing, elastomeric sealant that is compatible with joint fillers, joint substrates, and other related materials, and complies with requirements for products and testing indicated in ASTM C 1481 and with requirements in Division 07 Section "Elastomeric Joint Sealants" for products corresponding to description indicated below:
1. Single-component, nonsag, neutral-curing silicone sealant.

- B. Preformed Foam Sealant Products: Provide sealant compatible with adjacent materials and complying with requirements in Division 07 Section "Joint Sealants."
- C. Sealant Color: As selected by A/E from manufacturer's full range.

2.6 MIXING

- A. General: Comply with DEFS manufacturer's requirements for combining and mixing materials. Do not introduce admixtures, water, or other materials except as recommended by DEFS manufacturer. Mix materials in clean containers. Use materials within time period specified by DEFS manufacturer or discard.

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 DEFS. Verify that sheathing application complies with sheathing manufacturer's published recommendations for horizontal applications.
- B. Examine soffit framing, flashings, openings, substrates, and junctures at other construction for suitable conditions where soffits are installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.
 - 1. Begin coating application only after surfaces are dry.
 - 2. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Protect contiguous work from moisture deterioration and soiling caused by application of DEFS. Provide temporary covering and other protection needed to prevent spattering of exterior finish coats on other work.
- B. Protect DEFS, substrates, and wall construction behind them from inclement weather during installation. Prevent penetration of moisture behind DEFS and deterioration of substrates.
- C. Prepare and clean substrates to comply with DEFS manufacturer's written instructions to obtain optimum bond between substrate and base coat.

3.3 PANEL INSTALLATION

- A. Install glass-mat faced gypsum board to metal framing to comply with board manufacturer's written instructions. Install board with steel drill screws spaced no more than 8 inches o.c. along framing with perimeter fasteners at least 3/8 inch but less than 5/8 inch from edges of boards.
 - 1. Treat exposed edges of gypsum board as follows:
 - a. Except for edges forming substrates of sealant joints, encapsulate with base coat, reinforcing mesh, and finish coat.
 - b. Encapsulate edges forming substrates of sealant joints within DEFS or between DEFS and other work with base coat and reinforcing mesh.

- c. At edges trimmed by accessories, extend base coat, reinforcing mesh, and finish coat over face leg of accessories.
 - 2. Locate edge and end joints over supports except in ceiling applications where intermediate supports or back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints, other than control joints, at corners of framed openings.
 - 3. Interrupt gypsum board where expansion joints are indicated. Form joints for sealant application with back-to-back casing beads for joints within DEFS and with perimeter casing beads at dissimilar adjoining surfaces. Make gaps between casing beads and between perimeter casing beads and adjoining surfaces of width indicated. Make gaps wide enough to produce joint widths indicated after encapsulating joint substrates with base coat and reinforcing mesh.
- B. Cementitious Backer Units: Install according to ANSI A108.11.
- 1. Where cementitious backer units abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.
 - 2. Erection Tolerance: No more than 1/16-inch offsets between planes of panels, and 1/8 inch in 8 feet noncumulative, for level, plumb, warp, and bow.
 - 3. Form control joints with space between edges of adjoining panels.
 - 4. Space fasteners in cementitious backer units a maximum of 6 inches o.c. along framing members for ceiling applications.
- C. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in the central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
- D. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.
- E. Attach panels to framing provided at openings and cutouts.
- F. Fit panels around ducts, pipes, and conduits.

3.4 DEFS INSTALLATION, GENERAL

- A. Comply with ASTM C 1397 and DEFS manufacturer's written instructions for installation of DEFS as applicable to each type of substrate indicated.

3.5 SUBSTRATE PROTECTION APPLICATION

- A. Primer/Sealer: Apply over sheathing substrates to protect substrates from degradation where required by DEFS manufacturer for improving adhesion of base coat to substrate.

3.6 TRIM INSTALLATION

- A. Trim: Apply trim accessories at perimeter of DEFS, at expansion joints and elsewhere as indicated, according to DEFS manufacturer's written instructions.
 - 1. Expansion Joint: Use where indicated on Drawings, or at edges of alternating lengths of substrate board.
 - 2. Casing Bead: Use at other locations.

3.7 BASE-COAT INSTALLATION

- A. Base Coat: Apply to exposed surfaces of substrate board in minimum thickness recommended in writing by DEFS manufacturer, but not less than 1/16-inch dry-coat thickness. Apply two layers of base coat.
- B. Reinforcing Mesh: Embed type required to meet specified impact resistance indicated below in wet base coat to produce wrinkle-free installation with mesh continuous at corners and overlapped not less than 2-1/2 inches or otherwise treated at joints to comply with ASTM C 1397 and DEFS manufacturer's written instructions. Do not lap reinforcing mesh within 8 inches of corners. Completely embed mesh, applying additional base-coat material if necessary, so reinforcing-mesh color and pattern are not visible.
 - 1. High-impact reinforcing mesh.
- C. Additional Base-Coat Application: Apply an additional base coat in same manner and thickness as first application except without reinforcing mesh. Do not apply until first base coat has cured.

3.8 FINISH-COAT INSTALLATION

- A. Finish Coat: Apply over dry base coat, maintaining a wet edge at all times for uniform appearance, in thickness required by DEFS manufacturer to produce a uniform finish of color and texture matching approved sample and free of cold joints, shadow lines, and texture variations.
 - 1. Texture: As selected by Architect.

3.9 INSTALLATION OF JOINT SEALANTS

- A. Prepare joints and apply sealants, of type and at locations indicated, to comply with applicable requirements in Division 07 Section "Elastomeric Joint Sealants" and in ASTM C 1481.
 - 1. Apply joint sealants after base coat has cured but before applying finish coat.
 - 2. Clean surfaces to receive sealants to comply with indicated requirements and EIFS manufacturer's written instructions.
 - 3. Apply primer recommended in writing by sealant manufacturer for surfaces to be sealed.
 - 4. Install sealant backing to control depth and configuration of sealant joint and to prevent sealant from adhering to back of joint.
 - 5. Apply masking tape to protect areas adjacent to sealant joints. Remove tape immediately after tooling joints, without disturbing joint seal.
 - 6. Recess sealant sufficiently from surface of DEFS so an additional sealant application, including cylindrical sealant backing, can be installed without protruding beyond DEFS surface.

3.10 CLEANING AND PROTECTION

- A. Remove temporary covering and protection of other work. Promptly remove coating materials from surfaces outside areas indicated to receive DEFS coatings.

END OF SECTION 07 2423

SECTION 07 2700 - AIR BARRIER

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes the following:
 - 1. Fluid-applied vapor permeable membrane assembly at masonry backup walls
 - 2. Continuity and performance of building air barrier system.
- B. Related Sections include the following:
 - 1. Division 04 Section "Unit Masonry" for cavity wall construction requirements
 - 2. Division 07 Section "Thermal Insulation" for cavity and other insulation at building perimeter.
 - 3. Division 07 Section for metal roofing assemblies for air-barrier performance of roofing underlayment.
 - 4. Division 08 Sections for door and window openings.
- C. Services included:
 - 1. Coordination among various installers, proper scheduling and sequencing of Work, preconstruction meetings, inspections, tests and related actions, including reports performed by Contractors, by independent agencies, and by governing authorities.
 - 2. Each affected installer shall ensure that the intent of constructing the building enclosure with a continuous air barrier system to control air leaking into or out of the conditioned space is achieved. The air barrier system shall have the following characteristics:
 - a. It must be continuous with all joints sealed
 - b. It must be structurally supported to withstand positive and negative air pressures applied to the building enclosure.
 - c. Connection shall be made between:
 - 1) Foundation and walls
 - 2) Walls and windows, doors, other openings
 - 3) Different wall systems
 - 4) Wall and roof
 - 5) Walls, floor and roof across construction, control and expansion joints
 - 6) Walls, floors and roofs to utility, pipe, duct, and other penetrations
 - 3. Air Barrier Penetrations: All penetrations of the air barrier and paths of air infiltration/ exfiltration shall be made air-tight.
 - 4. Inspection and testing services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with Contract Document requirements.
 - 5. Requirements of this section relate to the coordination among installers required to provide an airtight building enclosure and customized fabrication and installation procedures. Includes:
 - a. Continuity of the air barrier materials and products with joints to provide assemblies.
 - b. Continuity of all the enclosure assemblies with joints and transition materials to provide a whole building air barrier system.
 - c. Specified inspections, tests and related actions do not limit Contractor's quality-control procedures that facilitate compliance with Contract Document requirements.
 - d. Requirements for Contractor to provide an airtight building enclosure is not limited to quality-control services required by Architect, Owner, or authorities having jurisdiction.

- D. Air Barrier System Summary:
1. Air Barrier Assemblies at Roofing:
 - a. Metal Roofing: Roofing underlayment membrane performs as air barrier assembly.
 2. Air Barrier Assembly at Perimeter Wall Enclosure:
 - a. CMU backup at brick veneer cavity wall assembly:
 - 1) Fluid-applied membrane on masonry backup with cavity insulation adhered to air barrier
 - b. Windows and doors: Products designed and installed as air barrier assemblies.
 3. Air Barrier Continuity: Applications of accessory materials specified in this section, installed recommend by manufacturer and consistent with recommendations for system continuity in applicable ABAA Air Barrier specification.
 - a. Self-adhering butyl and/or neoprene strips
 - b. Self-adhering counterflashing strips
 - c. Spray polyurethane foam sealant
 - d. Preformed silicone-sealant extrusions
 - e. Patching materials
 - f. Mastic and sealants

1.02 DEFINITIONS

- A. ABAA: Air Barrier Association of America.
- B. Air Barrier Material: The principal air barrier component material installed on the wall.
1. Air Barrier Accessory is a transitional element installed at joints and junctions between air barrier assemblies to control air movement through the air barrier system.
- C. Air Barrier Assembly: The collection of air barrier materials and auxiliary materials applied to an opaque wall, roof, or other building enclosure assembly, including joints and junctions to abutting construction, to control air movement through the construction assembly.
- D. Air Barrier System: The sum of air barrier assemblies that comprise a building envelope's walls, roof, and ground separation installed to control air movement through the building envelope.

1.03 PERFORMANCE REQUIREMENTS

- A. General: Air barrier shall be capable of performing as a continuous vapor-retarding air barrier and as a liquid-water drainage plane flashed to discharge to the exterior incidental condensation or water penetration.
1. Where building element includes an air barrier separate from vapor barrier, provide vapor permeable air barrier component.
- B. Air barrier assemblies shall be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, penetrations, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.
- C. Air Barrier Assembly Air Leakage: Not to exceed 0.04 cfm/sq. ft. of surface area at 1.57 lbf/sq. ft.; ASTM E 783.

1.04 SUBMITTALS

- A. Product Data: Include manufacturer's written instructions for evaluating, preparing, and treating substrate; technical data; and tested physical and performance properties of air barrier.
 - 1. Submit three complete bound sets of Manufacturer's published installation instructions, for information and reference, to be maintained in Construction Manager's, Contractor's and Architect's field offices.
- B. Shop Drawings of Mock-Up: Submit Shop Drawings of proposed mock-ups showing plans, elevations, large-scale details, and air barrier transitions and terminations.
- C. Shop Drawings: Show locations and extent of air barrier. Include details for substrate joints and cracks, counterflashing strip, penetrations, inside and outside corners, terminations, and tie-ins with adjoining construction.
 - 1. Show how gaps in the construction will be bridged, how inside and outside corners are negotiated, how materials that cover the materials are secured with air-tight condition maintained, and how miscellaneous penetrations such as conduits, pipes, electric boxes and similar items are sealed
 - 2. Include details of interfaces with other materials that form part of air barrier.
 - 3. Include required values for field adhesion test on each substrate.
 - 4. Include details of proposed mockups.
- D. Samples: Submit clearly labeled samples, three inch by four inch minimum size of each material specified.
- E. Product Certificates: For air barriers, certifying compatibility of air barrier and accessory materials with Project materials that connect to or that come in contact with air barrier; signed by product manufacturer.
 - 1. Submit letter from each primary air barrier material manufacturer indicating approval of materials that are proposed to be used that are not currently listed in the accessories section of this specification for that manufacturer's material.
 - 2. Include statement from each primary air barrier material manufacturer that the materials used in their air barrier assembly which will be used to adhere to the underlying substrate are permanently chemically compatible and adhesively compatible to the substrate material.
 - 3. Submit letter from primary material manufacturer stating that cleaning materials used during installation are chemically compatible with adjacent materials proposed for use.
- F. Qualification Data: For Applicator.
- G. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for air barriers.

1.05 QUALITY ASSURANCE

- A. Applicator Qualifications: A firm experienced in applying air barrier materials similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance
 - 1. Comply with ABAA's Quality Assurance Program.
- B. Mockups: Before beginning installation of air barrier, build mockups of exterior wall assembly, as shown on approved shop drawings, incorporating backup wall construction, external cladding, glazed aluminum systems, door frame and sill, insulation, and flashing to demonstrate surface preparation, crack and joint treatment, and sealing of gaps, terminations, and penetrations of air barrier membrane.
 - 1. Coordinate construction of mockup to permit inspection by Owner's testing agency of air barrier before external insulation and cladding is installed.
 - 2. Include junction with roofing membrane, building corner condition, and foundation wall intersection.

3. If Architect determines mockups do not comply with requirements, reconstruct mockups and apply air barrier until mockups are approved.
 4. Approved does not become part of the completed Work.
- C. Preinstallation Conference: Convene conference at Project site a minimum of two weeks prior to commencing Work of this Section. Include installers of substrate construction and construction connecting to or covering air barrier, such as roofing, foundation waterproofing, masonry, joint sealants, , window and door frames, rigid insulation and fiber cement cladding.
1. Review construction and testing of mock-up, coordination with substrate preparation, air barrier materials approved for use, compatibility of materials.
 2. Review requirements including, substrate condition and pretreatment, forecasted weather conditions, special details and sheet flashings, installation procedures, sequence of installation, testing and inspecting procedures, and protection and repairs.
 3. Review coordination with installation of adjacent and covering materials, and details of chemical/fire safety plans.
 4. Review potential gaps, discontinuities and penetrations in barrier, and means for closure. Confirm compliance with manufacturer's recommendations and warranty requirements.
- D. Air Barrier Assembly Testing: Verify air barrier assembly testing by the material Manufacturer by visiting the ABAA website to ensure an ASTM E2357 test has been completed and to obtain results. Visit the ABAA website for the reported air barrier assembly leakage rate and illustrations or CAD details which includes the methods in which the assembly test mock-ups shall be assembled.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in original packages with seals unbroken, labeled with the material Manufacturer's name, product, date of manufacture, and directions for storage.
- B. Store liquid materials in their original undamaged packages in a clean, dry, protected location and within temperature range required by air barrier manufacturer.
- C. Remove and replace liquid materials that cannot be applied within their stated shelf life.
- D. Store rolls according to manufacturer's written instructions.
- E. Protect stored materials from direct sunlight.
- F. Handle materials in accordance with material manufacturer's recommendations.

1.07 PROJECT CONDITIONS

- A. Environmental Limitations: Apply air barrier within the range of ambient and substrate temperatures recommended by air barrier manufacturer. Protect substrates from environmental conditions that affect performance of air barrier. Do not apply air barrier components to a damp or wet substrate or during snow, rain, fog, or mist.
- B. Sequencing. Do not install air barrier material before the roof assembly has been sufficiently installed to prevent a buildup of water in the interior of the building
- C. Compatibility. Do not allow air barrier materials to come in contact with chemically incompatible materials.
- D. Ultra-violet exposure. Do not expose air barrier materials to sunlight longer than as recommended by the primary material manufacturer.

1.08 WARRANTY

- A. Material Warranty: Provide primary material manufacturer's standard product warranty, for a **minimum 10 years** from date of Substantial Completion.
- B. Installation Warranty: Provide a two-year installation warranty from date of Substantial Completion, including all accessories and materials of the air barrier assembly, against failures including loss of air tight seal, loss of watertight seal, loss of attachment, loss of cohesion/adhesion and failure to cure properly.

PART 2 - PRODUCTS

2.01 MANUFACTURER

- A. Obtain primary ABAA Evaluated Materials from an ABAA Evaluated Manufacturer regularly engaged in manufacturing specified air barriers. Obtain auxiliary materials from a source acceptable to the primary material manufacturer. Provide materials and installation procedures in strict compliance with manufacturer's warranty requirements.

2.02 PERFORMANCE REQUIREMENTS

- A. Air-Barrier Performance: Vapor permeable air-barrier assembly and seals with adjacent construction shall be capable of performing as a continuous air barrier and as a liquid-water drainage plane flashed to discharge to the exterior incidental condensation or water penetration. Air-barrier assemblies shall be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, penetrations, tie-ins to installed waterproofing, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.
 - 1. Material Performance: Provide air barrier materials which have an air permeance not to exceed 0.004 cubic feet per minute per square foot under a pressure differential of 1.57 pounds per square foot, when tested in accordance with ASTM E2178 (unmodified).
 - 2. Assembly Performance: Provide a continuous air barrier in the form of an assembly that has an air leakage not to exceed 0.04 cubic feet per minute per square foot under a pressure differential of 1.57 pounds per square foot when tested in accordance with ASTM E2357.
 - a. The air barrier assembly shall be capable of withstanding combined design wind, fan and stack pressures, both positive and negative on the envelope without damage or displacement, and shall transfer the load to the structure.
 - b. Materials of the air barrier assembly shall not displace adjacent materials in the assembly under full load.
 - c. The air barrier assembly shall be joined in an airtight and flexible manner to the air barrier materials of adjacent assemblies, allowing for the relative movement of assemblies due to thermal and moisture variations, creep, and anticipated seismic movement.
- B. Connections to Adjacent Materials: Provide connections to prevent air leakage at the following locations:
 - 1. Foundation and walls, including penetrations, ties and anchors.
 - 2. Walls, windows, curtain walls, storefronts, louvers and doors.
 - 3. Different assemblies and fixed openings within those assemblies.
 - 4. Wall and roof connections.
 - 5. Floors over unconditioned space.
 - 6. Walls, floor and roof across construction, control and expansion joints.
 - 7. Walls, floors and roof to utility, pipe and duct penetrations.
 - 8. Seismic and expansion joints.
 - 9. All other potential air leakage pathways in the building envelope.

2.03 ACCESSORY MATERIALS

- A. Requirement: Provide primers, transition strips, termination strips, joint reinforcing fabric and strips, joint sealants, counterflashing strips, flashing sheets and metal termination bars, termination mastic, substrate patching materials, adhesives, tapes, foam sealants, lap sealants, and other accessory materials that are recommended in writing by air-barrier manufacturer to produce a complete air-barrier assembly and that are compatible with primary air-barrier material and adjacent construction to which they may seal.
- B. Primer: Liquid waterborne or solvent-borne primer recommended for substrate by air-barrier material manufacturer.
- C. Stainless-Steel Sheet: ASTM A 240, Type 304, 0.0187 inch thick.
 - 1. Fasteners: Series 300 stainless-steel fasteners.
- D. Termination Mastic: Cold fluid-applied elastomeric liquid; trowel grade.
- E. Joint Reinforcing Strip: Air barrier manufacturer's glass-fiber-mesh tape.
- F. Substrate Patching Membrane: Manufacturer's standard trowel-grade substrate filler.
- G. Adhesive and Tape: Air barrier manufacturer's standard adhesive and pressure-sensitive adhesive tape.

2.04 AUXILIARY MATERIALS

- A. General: Auxiliary materials recommended by air barrier manufacturer for intended use and compatible with adjacent materials.
 - 1. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.
- B. Primer: Liquid waterborne primer recommended for substrate by manufacturer of air barrier material.
- C. Sprayed Polyurethane Foam Sealant: 1- or 2-component, foamed-in-place, polyurethane foam sealant, 1.5 to 2.0 lb/cu. ft density; flame spread index of 25 or less according to ASTM E 162; with primer and noncorrosive substrate cleaner recommended by foam sealant manufacturer.
 - 1. Application:
 - a. Gaps at penetrations and openings.
 - b. Roof/wall and floor/wall junctures
 - c. Flute closures for metal roof deck perimeters and penetrations.
 - 2. Product: Froth-Pak Class A Polyurethane Spray Foam by Dow Building Solutions.
- D. Joint Sealant: ASTM C 920, single-component, neutral-curing silicone; Class 100/50 (low-modulus), Grade NS, Use NT related to exposure, and, as applicable to joint substrates indicated, Use O. Comply with Division 07 Section "Elastomeric Joint Sealants."
- E. Transition Membranes, as recommended by air barrier manufacturer and adjacent component manufacturers for specific application:
 - 1. Adhesive-Coated Transition Strip: Vapor-permeable, 17-mil-thick, self-adhering strip consisting of an adhesive coating over a permeable laminate with a permeance of 37 perms.
 - 2. Elastomeric Flashing Sheet: ASTM D 2000, 2BC415 to 3BC620, minimum 50- to 65-mil-thick, cured sheet neoprene with manufacturer's recommended contact adhesives and lap sealant with stainless-steel or aluminum termination bars and stainless-steel fasteners.

- F. Counterflashing Strip: Modified bituminous 40-mil-thick, self-adhering sheet consisting of 32 mils of rubberized asphalt laminated to an 8-mil-thick, cross-laminated polyethylene film with release liner backing, or as otherwise recommended by air barrier manufacturer.
 - 1. Application: counterflash metal flashings.
- G. Butyl Strip: Vapor-retarding, 30- to 40-mil-thick, self-adhering; polyethylene-film-reinforced top surface laminated to layer of butyl adhesive with release liner backing, or as otherwise recommended by air barrier manufacturer.
 - 1. Application: Transition air barrier to roofing membrane or flashing.
 - 2. Application: Scrim-faced batt to dissimilar materials.
- H. Preformed Silicone-Sealant Extrusion: Manufacturer's standard system consisting of cured low-modulus silicone extrusion, sized to fit opening widths, with a single-component, neutral-curing, Class 100/50 (low-modulus) silicone sealant for bonding extrusions to substrates.
 - 1. 123 Silicone Seal by Dow Chemical Company
 - 2. UltraSpan US1100 by GE Construction Sealants
 - 3. Sil-Span by Pecora Corporation
 - 4. Spectrem EZ Seal by Tremco Incorporated

2.05 FLUID-APPLIED AIR BARRIERS

- A. Medium-Build, Vapor-Permeable Air Barrier: Silyl-terminated polymer material with an installed dry film thickness, according to manufacturer's written instructions, of 15 to 30 mils over smooth, void-free substrates.
 - 1. Physical and Performance Properties:
 - a. Air Permeance: Maximum 0.004 cfm/sq. ft. of surface area at 1.57-lbf/sq. ft. pressure difference; ASTM E 2178.
 - b. Vapor Permeance: Minimum 10 perms; ASTM E 96, Desiccant Method, Procedure A.
 - c. Ultimate Elongation: Minimum 250 percent; ASTM D 412, Die C.
 - d. Adhesion to Substrate: Minimum 16 lbf/sq. in. when tested according to ASTM D 4541.
 - 2. Basis of Design: Cat 5 by Prosoco Inc or, subject to compliance with requirements, one of the following:
 - a. DuPont Performance Building Solutions: Tyvek Fluid Applied WB+
 - b. Henry Company: Air-Bloc All Weather STPE
 - c. Polyguard Products, Inc.: Airluk STPE Spray-N-Roll
 - d. Carlisle Coatings & Waterproofing Inc; Barrithane VP by
 - e. Soprema: Sopraseal LM 204 VP

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Confirm site access logistics and scheduling requirements, including but not limited to use of scaffolding, lifts and staging.
- B. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance.
 - 1. Verify that substrates are sound and free of oil, grease, dirt or other contaminants.
 - 2. Verify that substrates have cured and aged for minimum time recommended in writing by air-barrier manufacturer.

3. Verify that substrates are visibly dry and free of moisture.
 - a. Inspect masonry joints to be reasonably flush and completely filled, and ensure all excess mortar sitting on masonry ties has been removed.
 - b. Test masonry for capillary moisture by plastic sheet method according to ASTM D4263 and take suitable measures until substrate passes moisture test.
- C. Verify sealants are compatible with membrane proposed for use. Perform field peel-adhesion test on materials to which sealants are adhered.
- D. Notify Architect in writing of anticipated problems using specified air barrier over substrate prior to proceeding.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 SURFACE PREPARATION

- A. Clean, prepare, and treat substrate according to manufacturer's written instructions. Provide clean, dust-free, and dry substrate for air barrier application.
- B. Mask off adjoining surfaces not covered by air barrier to prevent spillage and overspray affecting other construction.
- C. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from substrate.
- D. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids in concrete with substrate-patching membrane.
- E. Prepare, fill, prime, and treat joints and cracks in substrates. Remove dust and dirt from joints and cracks according to ASTM D 4258.
 1. Install modified bituminous strips and center over treated construction and contraction joints and cracks exceeding a width of 1/16 inch.
- F. Bridge and cover isolation joints expansion joints and discontinuous deck-to-wall and deck-to-deck joints with overlapping modified bituminous strips.
- G. At changes in substrate plane, apply sealant or termination mastic beads at sharp corners and edges to form a smooth transition from one plane to another.
- H. Cover gaps in substrate plane and form a smooth transition from one substrate plane to another with stainless-steel sheet mechanically fastened to structural framing to provide continuous support for air barrier.

3.03 INSTALLATION, GENERAL

- A. Install materials according to air-barrier manufacturer's written instructions and details to form a seal with adjacent construction and ensure continuity of air barrier.
 1. Coordinate the installation of air barrier with installation of roofing membrane and base flashing to ensure continuity of air barrier with roofing membrane.
 2. Install transition strip on roofing membrane or base flashing so that a minimum of 3 inches of coverage is achieved over each substrate.
 3. Unless manufacturer recommends in writing against priming, apply primer to substrates at required rate and allow it to dry.
 4. Apply primer to substrates at required rate and allow it to dry. Limit priming to areas that will be covered by air-barrier material on same day. Reprime areas exposed for more than 24 hours.

- B. Connect and seal exterior wall air-barrier material continuously to roofing-membrane air barrier, concrete below-grade structures, floor-to-floor construction, exterior glazing and window systems, glazed curtain-wall systems, storefront systems, exterior louvers, exterior door framing, and other construction used in exterior wall openings, using accessory materials.
- C. At end of each working day, seal top edge of strips and transition strips to substrate with termination mastic.
- D. Apply joint sealants forming part of air-barrier assembly within manufacturer's recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
- E. Wall Openings: Prime concealed, perimeter frame surfaces of windows, curtain walls, storefronts, and doors. Apply transition strip so that a minimum of 3 inches of coverage is achieved over each substrate. Maintain 3 inches of full contact over firm bearing to perimeter frames, with not less than 1 inch of full contact.
 - 1. Transition Strip: Roll firmly to enhance adhesion.
 - 2. Elastomeric Flashing Sheet: Apply adhesive to wall, frame, and flashing sheet. Install flashing sheet and termination bars, fastened at 6 inches o.c. Apply lap sealant over exposed edges and on cavity side of flashing sheet.
 - 3. Preformed Silicone Extrusion: Set in full bed of silicone sealant applied to walls, frame, and air-barrier material.
- F. Fill gaps in perimeter frame surfaces of windows, curtain walls, storefronts, and doors, and miscellaneous penetrations of air-barrier material with foam sealant.
- G. Seal top of through-wall flashings to air barrier with an additional 6-inch-wide, transition strip.
- H. Seal exposed edges of strips at seams, cuts, penetrations, and terminations not concealed by metal counterflashings or ending in reglets with termination mastic.
- I. Repair punctures, voids, and deficient lapped seams in strips and transition strips. Slit and flatten fishmouths and blisters. Patch with transition strips extending 6 inches beyond repaired areas in strip direction.
- J. Do not cover air barrier until it has been tested and inspected by testing agency.
- K. Correct deficiencies in or remove air barrier that does not comply with requirements; repair substrates and reapply air-barrier components.

3.04 SUBSTRATES AND TRANSITION STRIP INSTALLATION

- A. Install strips, transition strips, and auxiliary materials according to air barrier manufacturer's written instructions to form a seal with adjacent construction and maintain a continuous air barrier.
 - 1. Coordinate the installation of air barrier with installation of roofing membrane and base flashing to ensure continuity of air barrier with roofing membrane.
 - 2. Install butyl or modified bituminous strip on roofing membrane or base flashing so that a minimum of 3 inches of coverage is achieved over both substrates.
 - 3. Install veneer anchors as per air barrier manufacturer installation sequencing.
 - 4. Apply primer for transition material at the rate instructed by the air barrier material manufacturer for 1 inch beyond terminating edge of transition membrane. Allow primer to set/cure completely before transition strip application. Limit priming to areas that will be covered by air barrier sheet in same day. Reprime areas exposed for more than 24 hours
 - 5. Position subsequent sheets of transition material so that membrane overlaps the membrane sheet below by a minimum of 2 inches, unless greater overlap is recommended by the material manufacturer. Ensure transition membrane is securely sealed onto substrate with roller.

6. Overlap horizontally adjacent pieces of transition material a minimum of 2 inches, unless greater overlap is recommended by the material manufacturer. Roll all areas of transition strip including seams with roller.
 7. Seal around all penetrations with termination mastic/sealant, membrane counter-flashing or other procedure in accordance with material manufacturer's instructions, ensuring chemical compatibility amongst adjoining materials.
 8. Provide transition material at changes in substrate plane (with bead of mastic/sealant, membrane counter-flashing or other material recommended by material manufacturer) under membrane to eliminate all sharp 90 degree inside corners and to make a smooth transition from one plane to another.
 9. Prepare, treat, and seal inside and outside corners and vertical and horizontal surfaces at terminations and penetrations with termination mastic and according to ASTM D6135.
 10. Provide mechanically fastened non-corrosive metal sheet or other manufacturer approved transition material to span gaps greater than 1 inch in substrate plane and to make a smooth transition from one plane to the other. Transition membrane shall be installed continuously from the self-adhered membrane onto the sheet metal maintaining 2 inch overlap on both edges.
 11. At through-wall flashings, provide an additional 6 inches wide strip of manufacturer's recommended membrane counter-flashing to seal top of through-wall flashing to primary air barrier material. Seal exposed top edge of flashing with bead of mastic/sealant as required by manufacturer.
 12. At deflection and control joints, provide backup for the self-adhered membrane to accommodate anticipated movement.
 13. At expansion and seismic joints provide transition to the joint assemblies.
 14. Apply a bead or trowel coat of mastic/sealant along membrane seams at reverse lapped seams, rough cuts, and as recommended by the manufacturer.
 15. Connect air barrier in exterior wall assembly continuously to the air barrier of the roof, to concrete below-grade structures, to windows, curtain wall, storefront, louvers, exterior doors, other intersection conditions and transitions from wet cavity to dry cavity and seal penetrations using accessory materials in accordance with the material manufacturer's instructions.
- B. At end of each working day, seal top edge of strips and transition strips to substrate with termination mastic.
- C. Apply joint sealants forming part of air barrier assembly within manufacturer's recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
- D. Wall Openings: Prime concealed perimeter frame surfaces of windows, curtain walls, storefronts, and doors. Apply transition strips, flashing sheets or preformed extrusions so that a minimum of 3 inches of coverage is achieved over both substrates. Maintain 3 inches of full contact over firm bearing to perimeter frames with not less than 1 inch of full contact.
1. Transition Strip: Roll firmly to enhance adhesion.
 2. Elastomeric Flashing Sheet: Apply adhesive to wall, frame, and flashing sheet. Install flashing sheet and termination bars, fastened at 6 inches o.c. Apply lap sealant over exposed edges and on cavity side of flashing sheet.
 3. Preformed Silicone-Sealant Extrusion: Set in full bed of silicone sealant applied to walls, frame, and membrane.
- E. Fill gaps in perimeter frame surfaces of windows, curtain walls, storefronts, and doors, and miscellaneous penetrations of air barrier membrane with foam sealant.
- F. Seal strips and transition strips around masonry reinforcing or ties and penetrations with termination mastic.
- G. Seal top of through-wall flashings to air barrier with an additional 6-inch-wide, counterflashing strip.
- H. Seal exposed edges of strips at seams, cuts, penetrations, and terminations not concealed by metal counterflashings or ending in reglets with termination mastic.
- I. Repair punctures, voids, and deficient lapped seams in strips and transition strips. Slit and flatten fishmouths and blisters. Patch with transition strips extending 6 inches beyond repaired areas in strip direction.

3.05 FLUID-APPLIED AIR-BARRIER MATERIAL INSTALLATION

- A. Apply air-barrier material to form a seal with strips and transition strips and to achieve a continuous air barrier according to air-barrier manufacturer's written instructions and details. Apply air-barrier material within manufacturer's recommended application temperature ranges.
 - 1. Unless manufacturer recommends in writing against priming, apply primer to substrates at required rate and allow it to dry.
 - 2. Limit priming to areas that will be covered by air-barrier material on same day. Reprime areas exposed for more than 24 hours.
 - 3. Where multiple prime coats are needed to achieve required bond, allow adequate drying time between coats.
- B. Medium-Build Air Barriers: Apply continuous unbroken air-barrier material to substrates according to the following thickness. Apply an increased thickness of air-barrier material in full contact around protrusions such as masonry ties.
 - 1. Vapor-Permeable, Medium-Build Air Barrier: Total dry film thickness as recommended in writing by manufacturer to comply with performance requirements, applied in one coat. Apply additional material as needed to achieve void- and pinhole-free surface, but do not exceed thickness on which required vapor permeability is based.

3.06 FIELD QUALITY CONTROL

- A. Implement the site Quality Assurance Program requirements used by ABAA. Cooperate with ABAA Auditors and any independent testing and inspection agencies engaged by the Owner. Do not cover the air barrier assembly until it has been inspected, tested and accepted.
- B. Testing Agency: Owner may engage a qualified testing agency to perform tests and inspections and prepare test reports.
- C. Inspections: Air barrier materials and installation are subject to inspection for compliance with requirements. Inspections may include the following:
 - 1. Continuity of air barrier system has been achieved throughout the building envelope with no gaps or holes.
 - 2. Continuous structural support of air barrier system has been provided.
 - 3. Substrate surfaces are smooth, clean and free of cavities, protrusions, and mortar droppings.
 - 4. Site conditions for application temperature and dryness of substrates have been maintained.
 - 5. Maximum exposure time of materials to UV deterioration has not been exceeded.
 - 6. Surfaces have been primed.
 - 7. Laps in sheet materials have complied with the minimum requirements and have been shingled in the correct direction (or mastic applied on exposed edges), with no fishmouths.
 - 8. Termination mastic has been applied on cut edges.
 - 9. Air barrier components have been firmly adhered to substrate.
 - 10. Compatible materials have been used.
 - 11. Transitions at changes in direction and structural support at gaps have been provided.
 - 12. Connections between assemblies (membrane and sealants) have complied with requirements for cleanliness, preparation and priming of surfaces, structural support, integrity, and continuity of seal.
 - 13. All penetrations have been sealed.
- D. Tests: Testing to be performed will be determined by Owner's testing agency from among the following tests:
 - 1. Qualitative Testing: Air barrier assemblies will be tested for evidence of air leakage according to one of the following:
 - a. ASTM E 1186, smoke pencil with pressurization or depressurization
 - b. ASTM E 1186, chamber pressurization or depressurization with smoke tracers
 - c. ASTM E 1186, chamber depressurization using detection liquids.

2. Quantitative Air Leakage Testing: Testing not to exceed the test pressure differential, positive and negative, indicated in "Performance Requirements" Article for air barrier assembly air leakage according to ASTM E 783.
- E. Remove and replace deficient air barrier components and retest as specified above.

3.07 CLEANING AND PROTECTION

- A. Protect air barrier system from damage during application and remainder of construction period, according to manufacturer's written instructions.
1. Protect air barrier from exposure to UV light and harmful weather exposure as required by manufacturer. Remove and replace air barrier exposed to these conditions for more than 30 days.
 2. Protect air barrier from contact with creosote, uncured coal-tar products, TPO, EPDM, flexible PVC membranes, and sealants not approved by air barrier manufacturer.
- B. Clean spills, stains, and soiling from adjacent construction that would be exposed in the completed work using cleaning agents and procedures recommended by manufacturer of affected construction.
- C. Remove masking materials after installation.

END OF SECTION 07 2700

SECTION 07 4113 – METAL PANEL ROOFING

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes rooftop prefinished metal equipment screen assemblies:
 - 1. Factory-formed and field-assembled, concealed-fastener standing-seam metal roof system including panels, attachments, trim and accessories.
 - 2. Roof edge drainage.
 - 3. Deck-mounted roof curbs for skylights and ventilation equipment.
 - 4. Design and engineering requirements for load-resisting assemblies.
 - 5. Roof insulation/nailbase.
 - 6. Roof air barrier, installed as part of continuous air barrier system.
- B. Related Sections include the following:
 - 1. Division 06 Section "Miscellaneous Rough Carpentry" for wood nailers, curbs, and blocking.
 - 2. Division 07 Section "Air Barriers" for continuity of air barrier system.
 - 3. Division 07 Section "Elastomeric Joint Sealants" for joint sealants, joint fillers, and joint preparation.

1.02 DEFINITIONS

- A. Metal Roof Panel Assembly: Metal roof panels, attachment system components, miscellaneous metal framing, thermal insulation, air barrier, and accessories necessary for a complete weathertight roofing system.
- B. Roofing Terminology: Refer to ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" for definition of terms related to roofing work in this Section.
- C. Design Uplift Pressure: The uplift pressure, calculated according to procedures in SPRI's "Wind Load Design Guide for Fully Adhered and Mechanically Fastened Roofing Systems," before multiplication by a safety factor.
- D. Factored Design Uplift Pressure: The uplift pressure, calculated according to procedures in SPRI's "Wind Load Design Guide for Fully Adhered and Mechanically Fastened Roofing Systems," after multiplication by a safety factor.

1.03 PREINSTALLATION MEETINGS

- A. Preliminary Roofing Conference: Before procuring materials, conduct conference at Project site. Comply with requirements for preinstallation conferences in Division 01 Section "Project Management and Coordination." Review methods and procedures related to roof deck construction and roofing system including, but not limited to, the following:
 - 1. Meet with Owner; Architect; Construction Manager; Owner's insurer if applicable; testing and inspecting agency representative; roofing Installer; roofing system manufacturer's representative; deck Installer; and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
 - 2. Review methods and procedures related to roofing installation, including manufacturer's written instructions. Include the following:
 - a. Manufacturers' installation instructions
 - b. Substrate conditions.
 - c. Insulation, sheathing and air barrier

- d. Finishes and preparation for finishes
 - e. Warranty requirements.
 - 3. Review quality standards and field quality control
 - 4. Review layout and sequencing of installation, and coordination with other Work
 - 5. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - 6. Review structural loading limitations of roof deck during and after roofing.
 - 7. Review special details, supports, and condition of other construction that will affect roofing system.
 - 8. Review governing regulations and requirements for insurance and certificates if applicable.
 - 9. Review temporary protection requirements for roofing system during and after installation.
 - 10. Review roof observation and repair procedures after roofing installation.
- B. Preinstallation Conference: Before starting field operations, conduct conference at Project site as follow-up to Preliminary Roofing Conference. Comply with requirements in Division 01 Section "Project Management and Coordination." Review methods and procedures as discussed in Preliminary Roofing Conference, and examine substrates and adjacent work for compliance with requirements.

1.04 ACTION SUBMITTALS

- A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of metal roof panel and accessory.
- B. Roof Shop Drawings: Show fabrication and installation layouts of metal panels and support; details of edge conditions, joints, corners, anchorages, trim, and accessories; and special details. Distinguish between factory- and field-assembled work.
 - 1. Coordination Drawings: Roof plans drawn to scale and coordinating penetrations and roof-mounted items. Show the following:
 - a. Metal panels and attachments.
 - b. Roof-edge drainage system
 - 2. Accessories: Include details of the following items, at a scale of not less than 1-1/2 inches per 12 inches:
 - a. Flashing and trim.
 - b. Roof curbs.
 - c. Snow guards.
 - d. Roof-edge drainage system
- C. Delegated-Design Submittal:
 - 1. For metal roof panel assembly indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 - a. Submit description of design criteria.
 - b. Design in compliance with wind loading requirements of prevailing building code, and to ANSI/ASCE 7 Basic Wind Speed of 90 mph, whichever is greater
 - c. Include verification of attachments to structure.
 - 2. For snow guards, include analysis reports signed and sealed by the qualified professional engineer responsible for their preparation.
 - a. Include calculation of number and location of snow guards based on snow load, roof slope, snow drift, panel length and finish, coefficient of friction between snow and roof surface, and seam type and spacing.
 - b. Factor of Safety: 2

- D. Samples for Verification:
 - 1. For each type of exposed finish required, prepared on Samples of size indicated below.
 - a. Metal Panel: 6 inches long by actual panel width. Include fasteners, clips, trim, and other metal roof panel accessories.
 - b. Accessories: 6-inch-long Samples for each type of accessory.
 - 2. Underlayment: 6-inch-square sample.

1.05 INFORMATIONAL SUBMITTALS

- A. Certification: Include a letter from manufacturer certifying that the submitted warranty shall be issued at Substantial Completion.
- B. Qualification Data: For qualified Installer and professional engineer
- C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each product.
 - 1. For snow guards, provide reports indicating load at failure of attachment to roof system identical to roof system used on this Project
- D. Field quality-control reports.

1.06 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For roofing system to include in maintenance manuals.
- B. Specified warranty form stating obligations, remedies, limitations, and exclusions.
 - 1. Provide roof warranty coverage for up to 90 mph winds.

1.07 QUALITY ASSURANCE

- A. Engineering Responsibility: Preparation of Equipment Screen Shop Drawings, design calculations, and other structural data by a qualified professional engineer.
- B. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of metal framing supporting equipment screens that are similar to those indicated for this Project in material, design, and extent.
- C. Installer Qualifications: An employer of workers trained and approved by manufacturer.
- D. Source Limitations: Obtain metal roof panels and equipment screen panels through one source from a single manufacturer.
- A. Insulating Panel Manufacturer: Company that regularly manufactures polyisocyanurate and fully assembled nailbase insulation panels in-house with no outside fabrication operations.

- B. Mockups: Build in situ mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
 - 1. Build mockup of typical equipment screen assembly as shown on Drawings; approximately four panels wide with typical outside corner and inside corner, including framing, attachments, and accessories.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver components, metal roof panels, and other manufactured items so as not to be damaged or deformed. Package metal roof panels for protection during transportation and handling.
- B. Unload, store, and erect metal roof panels in a manner to prevent bending, warping, twisting, and surface damage.
- C. Stack metal roof panels on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal roof panels to ensure dryness. Do not store metal roof panels in contact with other materials that might cause staining, denting, or other surface damage.
- D. Protect strippable protective covering on metal roof panels from exposure to sunlight and high humidity, except to extent necessary for period of metal roof panel installation.

1.09 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal roof panels to be performed according to manufacturers' written instructions and warranty requirements.
- B. Install only as much insulation as can be covered the same day by a completed roof covering material.
- C. Field Measurements: Verify locations of roof framing and roof opening dimensions by field measurements before metal roof panel fabrication and indicate measurements on Shop Drawings.
 - 1. Established Dimensions: Where field measurements cannot be made without delaying the Work, either establish framing and opening dimensions and proceed with fabricating metal roof panels without field measurements, or allow for field-trimming of panels. Coordinate roof construction to ensure that actual building dimensions, locations of structural members, and openings correspond to established dimensions.

1.10 COORDINATION

- A. Coordinate metal panel roof assemblies with rain drainage work, flashing, trim, and construction of decks, purlins and rafters, parapets, walls, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.11 WARRANTY

- A. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal roof panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Fluoropolymer 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.
- B. Special Weathertightness Warranty for Metal Roof Panels: Manufacturer's standard form in which manufacturer agrees to repair or replace metal roof panel assemblies that fail to remain weathertight, including leaks, within specified warranty period.
1. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. General:
1. Provide metal roof panel assemblies that comply with performance requirements specified as determined by testing manufacturers' standard assemblies similar to those indicated for this Project, by a qualified testing and inspecting agency.
 2. Design load information indicated represent non-factored service loads unless otherwise noted. Design and fabricate systems and assemblies using design load criteria indicated or otherwise required by authorities having jurisdiction. Coordinate with applicable structural notes on Drawing S000.
- B. Delegated Design: Design metal roof panel assembly, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
1. Engineering Responsibility: Engage a roofing manufacturer or qualified Pennsylvania Professional Engineer who assumes undivided responsibility for engineering wind uplift requirements for all areas of roofing.
- C. Installer Qualifications: A qualified installer, approved by manufacturer to install manufacturer's roofing system and metal support assemblies.
- D. Source Limitations: Obtain components for metal roofing system and metal equipment screen support assembly from or approved by roofing system manufacturer.
- E. Air Infiltration: Air leakage through assembly of not more than 0.06 cfm/sq. ft. of roof area when tested according to ASTM E 283 at the following test-pressure difference:
1. Test-Pressure Difference: Positive and negative 1.57 lbf/sq. ft.
 2. Positive Preload Test-Pressure Difference: Greater than or equal to 15.0 lbf/sq. ft. and the greater of 75 percent of building live load or 50 percent of building design positive wind-pressure difference.
 3. Negative Preload Test-Pressure Difference: 50 percent of design wind-uplift-pressure difference.
- F. Water Penetration: No water penetration when tested according to ASTM E 331 at the following test-pressure difference:
1. Test-Pressure Difference: 20 percent of positive design wind pressure, but not less than 6.24 lbf/sq. ft. and not more than 12.0 lbf/sq. ft.
- G. Water Absorption: Maximum 1.0 percent absorption rate by volume when tested according to ASTM C 209.
- H. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for wind-uplift resistance class indicated.
- I. Component Reference Standards:
1. FM 1-49 Loss Prevention Data Sheets for Perimeter Flashing
 2. FM 1-29 Loss Prevention Data Sheets for Roof Deck Securement and Above-Deck Roofing Components

3. NRCA Roofing Manual: Metal Panel and SPF Roofing Systems.
 4. SMACNA Architectural Sheet Metal Manual
- J. FMG Listing: Provide metal roof panels and component materials that comply with requirements in FMG 4471 as part of a panel roofing system and that are listed in FMG's "Approval Guide" for Class 1 or noncombustible construction, as applicable. Identify materials with FMG markings.
1. Fire/Windstorm Classification: Class 1A-90.
 2. Hail Resistance: MH.
- K. Structural Performance: Provide metal roof panel assemblies capable of withstanding the effects of gravity loads and the indicated design loads and stresses within limits and under conditions indicated on Structural Drawings, based on testing according to ASTM E 1592.
- L. Thermal Movements: Provide metal roof panel assemblies that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculation 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.

2.02 PANEL MATERIALS

- A. Aluminum Sheet: 24 ga Coil-coated sheet, ASTM B 209, alclad alloy 3003, 3004, or 3105 for painted finishes, with temper as required to suit forming operations and structural performance required.
1. Exposed Finishes: Apply the following coating, as specified or indicated on Drawings.
 - a. High-Performance Organic Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 1) Fluoropolymer Two-Coat System: Manufacturer's standard two-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 2605.
- B. 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.
- C. Panel Sealants:
1. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C 1311.
 2. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.
 3. Joint Sealant: ASTM C 920; silicone sealant; of type, grade, class, and use classifications required to seal joints in metal roof panels and remain weathertight; and as recommended in writing by metal roof panel manufacturer.

2.03 MISCELLANEOUS MATERIALS

- A. Fasteners: Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads. Provide exposed fasteners with heads matching color of metal roof panels by means of plastic caps or factory-applied coating.
1. Fasteners for Metal Panels: Self-drilling or self-tapping, zinc-plated, hex-head carbon-steel screws, with a stainless-steel cap or zinc-aluminum-alloy head and EPDM or neoprene sealing washer.

2. Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws with hex washer head.
 3. Blind Fasteners: High-strength aluminum or stainless-steel rivets.
- B. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.04 METAL ROOF AND SOFFIT PANELS

- A. Roof Panels: Factory-formed metal panels designed to be field assembled by lapping and interconnecting raised side edges of adjacent panels with joint type indicated and mechanically attaching panels to supports using concealed fasteners and factory-applied sealant in side laps. Include clips, cleats, pressure plates, and accessories required for weathertight installation.
1. Manufacturers:
 - a. Basis for Design: Dimensional Metals, Inc.
 - b. Innovative Metals Company
 - c. ATAS International, Inc.
 - d. Petersen Aluminum Corporation; a Carlisle company
 2. Material: Aluminum sheet, 0.040-inch nominal thickness.
 - a. Exterior Finish: 2-coat fluoropolymer.
 - b. Color: As scheduled, subject to Architect's approval.
 3. Clips: Floating to accommodate thermal movement.
- B. Interlocking Multi-Purpose Metal Roof Panels (Basis of Design): Smooth-textured panels formed with striated profile, with concealed clipless fastening system.
1. Basis-of-Design Product: DMI Ultra-Lock UL20
 - a. Panel coverage: manufacturer's standard 16 inch nominal.
 - b. Panel length: Continuous from ridge to eave.
 2. Color: Match existing, subject to Architect approval.
- C. Reveal-Joint-Profile Metal Soffit Panels: Smooth panels formed with vertical panel edges and intermediate stiffening ribs symmetrically spaced between panel edges; with recessed reveal joint between panels.
1. Factory-formed metal soffit panels designed to be field assembled by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners in side laps. Include accessories required for weathertight installation.
 - a. Thickness: 0.032 inch.
 - b. Panel Coverage: 12 inch.
 - c. Panel Height: 7/16 inch.
 2. Material: Aluminum sheet, 0.040-inch nominal thickness.
 - a. Exterior Finish: 2-coat fluoropolymer.
 - b. Color: As scheduled, subject to Architect's approval.
 3. Basis-of-Design Product: or a comparable product by roof panel manufacturer.
 - a. DMI V-Groove VS05 non-vented metal soffit panels

2.05 ACCESSORIES

- A. Panel Accessories: Provide components required for a complete metal roof panel assembly including trim, copings, fasciae, corner units, ridge closures, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal roof panels, unless otherwise indicated.
1. Closures: Provide closures at eaves and ridges, fabricated of same metal as metal roof panels.
 2. 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 premolded to match metal roof panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
 3. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
 4. Clips: Minimum 0.0625-inch-thick, stainless-steel panel clips designed to withstand negative-load requirements.
- B. Flashing and Trim: Formed from same material as roof panels, prepainted with coil coating, minimum 0.018 inch thick. Provide flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers. Finish flashing and trim with same finish system as adjacent metal roof panels.

2.06 METAL GUTTERS AND DOWNSPOUTS

- A. Gutters:
1. Provide factory-formed box products designed to be field applied and mechanically attached to supporting construction using blind nailing. Include accessories required for complete installation.
 - a. If construction at some locations do not permit blind nailing, provide countersunk nail heads concealed with putty filler of color to match molding finish.
 2. Fabricate in minimum length sections indicated, of size and metal thickness according to SMACNA's "Architectural Sheet Metal Manual." Provide wire ball strainers of compatible metal at outlets.
- B. Hanging Gutters: Fabricate to cross section indicated, complete with end pieces, outlet tubes, and other accessories as required. Furnish flat-stock gutter spacers and gutter brackets fabricated from same metal as gutters, of size recommended by SMACNA but not less than twice the gutter thickness. Fabricate expansion joints, expansion-joint covers, and gutter accessories from same metal as gutters.
1. Gutter Style: SMACNA Style F.
 2. Material: Same material and finish as metal roof panels. Provide roll-formed 0.050-inch thick aluminum sections in 20-foot minimum lengths.
 - a. Color: As scheduled, subject to Architect's approval.
 - b. Joints: Lap type.
 3. Accessories:
 - a. Continuous removable leaf screen with sheet metal frame and hardware cloth screen
 - b. Wire ball downspout strainer
- C. Heavy Duty downspout
1. Fabricate rectangular downspouts complete with mitered elbows. Furnish with metal hangers, from same material as downspouts, and anchors.
 2. Material: Same material and finish as metal roof panels. Provide roll-formed 0.050-inch thick aluminum sections in 10-foot minimum lengths.
 - a. Size: 3"x4" inch rectangular section
 - b. Color: As scheduled, subject to Architect's approval.
 - c. Joints: Lap type.

- d. Mounting: Wall brackets as required to fasten downspout into wall material and substrate. Locate brackets as indicated on Architectural Drawings.
 - e. Design: Fabricate downspout sections as required to follow profile of adjacent structure including but not limited to projections of stone veneer, stone banding etc.
3. Fabricated Hanger Style: SMACNA figure designation 1-35C or 1-35H.
- a. Aluminum: 0.040 inch thick.

2.07 ROOF AIR BARRIER/ UNDERLAYMENT MATERIALS

- A. Self-Adhering, High-Temperature Underlayment: Provide self-adhering, cold-applied, sheet underlayment, a minimum of 30 mils thick, consisting of slip-resistant, polyethylene-film top surface laminated to a layer of butyl or SBS-modified asphalt adhesive, with release-paper backing. Provide primer when recommended by underlayment manufacturer.
- 1. Thermal Stability: Stable after testing at 240 deg F; ASTM D1970.
 - 2. Low-Temperature Flexibility: Passes after testing at minus 20 deg F; ASTM D1970.
 - 3. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to the following:
 - a. Dimensional Metals Inc; DynaClad Ultra HT Wind & Water Seal
 - b. ATAS International, Inc.; ATA-Shield Underlayment.
 - c. Carlisle WIP Products; a brand of Carlisle Construction Materials; WIP 300HT.
 - d. Henry Company; Blueskin PE200 HT.
- B. Auxiliary Materials: Provide products and methods recommended by air barrier manufacturer and roofing underlayment manufacturer for intended use and compatible with roofing underlayment and building's air barrier system. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.
- 1. Primer: Liquid waterborne primer recommended for substrate by manufacturer of air barrier material.
 - 2. Counterflashing Strip: Modified bituminous 40-mil- thick, self-adhering sheet consisting of 32 mils of rubberized asphalt laminated to an 8-mil- thick, crosslaminated polyethylene film with release liner backing.
 - a. Application: counterflash metal flashings
 - 3. Sprayed Polyurethane Foam Sealant: 1- or 2-component, foamed-in-place, polyurethane foam sealant, 1.5 to 2.0 lb/cu. ft density; flame spread index of 25 or less according to ASTM E 162; with primer and noncorrosive substrate cleaner recommended by foam sealant manufacturer.
 - a. Application: gaps at penetrations and openings
 - 4. Transitions, as recommended by manufacturer for specific application, and compatible with adjacent materials:
 - a. Modified Bituminous Transition Strip: Vapor-retarding, 40-mil- thick, smooth-surfaced, self-adhering; consisting of 36 mils of rubberized asphalt laminated to a 4-mil- thick polyethylene film with release liner backing.
 - b. Preformed Silicone-Sealant Extrusion: Manufacturer's standard system consisting of cured low-modulus silicone extrusion, sized to fit opening widths, with a single-component, neutral-curing, Class 100/50 (low-modulus) silicone sealant for bonding extrusions to substrates.
 - 5. Joint Sealant: ASTM C 920, single-component, neutral-curing silicone; Class 100/50 (low-modulus), Grade NS, Use NT related to exposure, and, as applicable to joint substrates indicated, Use O. Comply with Division 07 Section "Joint Sealants."

2.08 ROOF INSULATION/ NAILBASE

- A. General:
1. Use one type of specified insulation acceptable to roofing system manufacturer and compatible with roofing system.
 2. Provide preformed roof insulation boards that comply with requirements and referenced standards, selected from manufacturer's standard sizes and of thicknesses indicated.
- B. Polyisocyanurate Board Insulation: ASTM C 1289, Type II, Class 1, Grade 3, 25 psi, glass-fiber mat facer on both major surfaces.
- a. Dimensional Stability: ASTM D 2126, 2 percent linear change (7 days).
 - b. Moisture Vapor Transmission: ASTM E 96, < 1 perm .
 - c. Water Absorption: ASTM C 209, < 1 percent by volume.
 - d. Flame Spread (foam core): ASTM E 84, <50.
 - e. Service Temperature: Minus 100 degrees to 250 degrees F
 - f. Smoke Developed: ASTM E 84, <450.
 - g. Panel Thickness: 2-inches
 - h. Long Term Thermal Resistance R-12 per ASTM C 1289
- C. Nailbase Insulating Panels: Top layer of APA exterior grade plywood laminated off-line to black fiber reinforced faced polyisocyanurate foam insulation
1. Polyisocyanurate foam insulation: ASTM C 1289, Type V Grade 3 with a compressive strength of 25 psi minimum.
 2. Dimensional Stability: ASTM D 2126, 2 percent linear change (7 days).
 3. Moisture Vapor Transmission: ASTM E 96, < 1 perm .
 4. Water Absorption: ASTM C 209, < 1 percent by volume.
 5. Flame Spread (foam core): ASTM E 84, <50.
 6. Service Temperature: Minus 100 degrees to 250 degrees F
 7. Smoke Developed: ASTM E 84, <450.
2. Plywood Top layer: Standard 3/4-inch CDX sheathing grade conforming to PS2 - Performance Standard for Wood-based Structural-use Panels
 3. Panel Dimensions: 47-1/2 inches by 95-1/2 inches, 4.7 inch overall thickness
 - a. Long Term Thermal Resistance R-25 per ASTM C 1289
 - b. Flute spanability 4-3/8 inches
4. Basis-of-Design Products:
 - a. H-Shield Straight Cut and H-Shield NB and by Hunter Panels
- D. Fasteners: Manufacturer's standard FM Approved Panel Fasteners for steel deck application.
1. 3/16 inch shank, corrosion resistant with oversized heads. Length of fasteners as recommended by the panel manufacturer.
 2. Fasteners shall penetrate the top flute of steel deck a minimum of 1 inch. Penetration of fastener into bottom flute is not acceptable.

2.09 SNOW GUARDS

- A. Roof Panel Snow Guards: Prefabricated, noncorrosive units designed to be installed without penetrating metal roof panels, and complete with predrilled holes, clamps, or hooks for anchoring.
 - 1. Seam-Mounted, Fence-Type Snow Guards: Cast-aluminum stops designed for attachment to vertical ribs of standing-seam metal roof panels with stainless-steel set screws.
 - a. Basis of Design: S-5! Metal Roof Innovations, Ltd.; ColorGard.
 - b. Alpine Snow Guards, Div. of Vermont Slate & Copper Services, Inc.; Snow-Max.
 - c. Berger Building Products; F-Rail Snow Retention System.

2.10 FABRICATION

- A. General: Fabricate and finish metal panels and accessories at the factory to greatest extent possible, 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. Where indicated, fabricate metal roof panel joints with factory-installed captive gaskets or separator strips that provide a tight seal and prevent metal-to-metal contact, in a manner that will minimize noise from movements within panel assembly.
- D. Sheet Metal Accessories: Fabricate flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to the 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. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
 - 3. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.
 - 4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
 - 5. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended by metal roof panel manufacturer.
 - a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal roof panel manufacturer for application but not less than thickness of metal being secured.

2.11 ROOF CURBS

- A. Roof Curbs: Internally reinforced, thermally-broken, factory-insulated roof-curb units capable of supporting superimposed live and dead loads, including equipment loads and other construction indicated on Drawings, bearing continuously on roof deck, and capable of meeting performance requirements; with welded or mechanically fastened and sealed corner joints, straight sides, and integrally formed deck-mounting flange at perimeter bottom.
 - 1. Basis of Design:
 - a. LMCurbs, Longview TX; www.lmcurbs.com
 - b. R & S Manufacturing and Sales Company, Inc., Newbury Park CA; www.rnssales.com
 - c. Skylight/Equipment Manufacturer

- B. Coordination: Size of curbs, gauge of material, pitch of roof, contour location, and required options shall be coordinated by curb manufacturer, general contractor, skylight supplier, and mechanical contractor prior to fabrication
 - 1. Size: Coordinate dimensions with roughing-in information or Shop Drawings of equipment to be supported.
 - 2. Supported Load Capacity: Coordinate load capacity with information on Shop Drawings of equipment to be supported.
 - a. Coordinate with safety screen requirements of skylight assembly, as needed.
 - 3. Submit product design drawings for review and approval to the Architect prior to fabrication.
 - 4. Installer shall check as-built conditions and verify the manufacturer's curb submittal drawings for accuracy to fit the application prior to fabrication.
 - 5. Installer shall furnish mechanical fasteners and sealants consistent with the roof requirements.
- C. Aluminum: 0.080 inch thick sheet.
 - 1. Finish: Two-coat fluoropolymer matching roofing panels.
- D. Construction:
 - 1. Curb Profile: Manufacturer's standard compatible with roofing system and equipment or skylight mounting.
 - 2. On ribbed or fluted metal roofs, form deck-mounting flange at perimeter bottom to conform to roof profile.
 - a. Curb flange shall be constructed to match configuration of roof panel. Side flange shall extend to the next natural seam in the roof panels and conform to seam configurations
 - 3. Fabricate curbs to minimum height of 10 inches above roofing surface unless otherwise indicated.
 - 4. Top Surface:
 - a. Skylight: Parallel with roof slope.
 - b. Ventilation Equipment: Level top of curb. Fabricate curb with perimeter curb height tapered to accommodate roof slope so that top surface of perimeter curb is level.
 - 5. Equip unit with water diverter or cricket on side that obstructs water flow.
 - 6. Insulation: Factory insulated with 1-1/2-inch-thick glass-fiber board insulation.
 - 7. Liner: Same material as curb, of manufacturer's standard thickness and finish.
 - 8. Wind Restraint Straps and Base Flange Attachment: Provide wind restraint straps, welded strap connectors, and base flange attachment to roof structure at perimeter of curb, of size and spacing required to meet wind uplift requirements.
 - 9. Platform Cap: Where portion of roof curb is not covered by equipment, provide weathertight platform cap formed from 3/4-inch-thick plywood covered with metal sheet of same type, thickness, and finish as required for curb.
 - 10. Metal Counterflashing: Manufacturer's standard, removable, fabricated of same metal and finish as curb.

2.12 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical and painted 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.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal roof panel supports, and other conditions affecting performance of work.
 - 1. Examine primary and secondary roof framing to verify that rafters, purlins, angles, channels, and other structural panel support members and anchorages have been installed within alignment tolerances required by metal roof panel manufacturer.
 - 2. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.
- B. Examine roughing-in for components and systems penetrating metal roof panels to verify actual locations of penetrations relative to seam locations of metal roof panels before metal roof panel installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Clean substrates of substances harmful to proper installation, including projections capable of interfering with attachment.
- B. Support Framing: Install metal posts, purlins, subpurlins, eave angles, furring, and miscellaneous roof panel support members and anchorage according to metal roof panel manufacturer's written recommendations.

3.03 ROOF INSULATION AND INSULATING NAILBASE DECK

- A. Examination and Preparation
 - 1. Clean surfaces thoroughly prior to installation.
 - 2. Do not begin insulation and nailbase installation until substrates have been properly prepared.
 - 3. Verify substrate and structural backing is dry, flat, free of fins, protrusions and irregularities and ready to receive insulation.
 - 4. Notify Architect and Construction Manager of unsatisfactory conditions before proceeding.
- B. Installation
 - 1. Install in accordance with manufacturer's instructions. Butt edges and stagger joints of adjacent panels.
 - 2. In multi-layer installations, stagger joints in top and bottom layers. Do not align joints in insulation.
 - 3. For application into steel deck the minimum number of fasteners shall be 15 per 4-ft by 8-ft panel. Fasteners in metal deck shall penetrate the top flute of the steel to a depth of 1 inch
 - 4. Only apply enough panels per day that can be covered by standing seam metal roofing product.
 - 5. Use only UL or FM approved synthetic underlayment over nailbase insulation panels. The use of 15 or 30 pound roofing felt is not recommended.
- C. Protection
 - 1. Protect installed products until completion of project.
 - 2. Touch-up, repair or replace damaged products before Substantial Completion.
 - 3. Cover the top and edges of unfinished roof panel work to protect it from the weather and to prevent accumulation of water in the cores of the panels.

3.04 UNDERLAYMENT/ AIR BARRIER INSTALLATION

- A. Comply with underlayment manufacturer's written installation instructions applicable to products and applications indicated unless more stringent requirements apply.
- B. Self-Adhering Sheet Underlayment: Install self-adhering sheet underlayment, wrinkle free, on roof sheathing under metal roof panels. Comply with temperature restrictions of underlayment manufacturer for installation; use primer rather than nails for installing underlayment at low temperatures. Apply over entire roof, in shingle fashion to shed water, with end laps of not less than 6 inches staggered 24 inches between courses. Overlap side edges not less than 3-1/2 inches. Roll laps with roller. Cover underlayment within 14 days.
- C. Install flashings to cover underlayment to comply with requirements specified in Division 07 Section "Sheet Metal Flashing and Trim."
- D. Follow procedures found in the current version of the National Roofing Contractors Association's (NRCA) "Steep Slope Roofing and Waterproofing Manual", and requirements of all code bodies having jurisdiction. In the event of a conflict in installation requirements, the more stringent method of installation will prevail.

3.05 AIR BARRIER CONTINUITY

- A. Comply with additional requirements of Section 07 2726 "Air Barrier."
- B. Completely seal underlayment at terminations, obstructions, and penetrations to prevent air movement into membrane roofing system or building interior.
 - 1. Prepare, treat, and seal vertical and horizontal surfaces at terminations and penetrations with termination mastic and according to ASTM D 6135.
- C. Seal exposed edges of sheets at seams, cuts, penetrations, and terminations not concealed by metal counterflashings or ending in reglets with termination mastic.
- D. Install air barrier sheets and auxiliary materials to form a seal with adjacent construction and to maintain a continuous air barrier.
 - 1. Coordinate the installation of air barrier with installation of roofing membrane and base flashing to ensure continuity of air barrier with roofing membrane.
 - 2. Install butyl or modified bituminous strip on roofing membrane or base flashing so that a minimum of 3 inches of coverage is achieved over both substrates.
- E. Connect and seal exterior wall air barrier membrane continuously to roofing membrane air barrier.
- F. Apply joint sealants forming part of air barrier assembly within manufacturer's recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
- G. Repair punctures, voids, and deficient lapped seams in air barrier. Slit and flatten fishmouths and blisters. Patch with air barrier sheet extending 6 inches beyond repaired areas in all directions.
- H. Correct deficiencies in or remove air barrier that does not comply with requirements; repair substrates and reapply air barrier components.
- I. Clean spills, stains, and soiling from adjacent construction that would be exposed in the completed work using cleaning agents and procedures recommended by manufacturer of affected construction

3.06 ROOFING INSTALLATION, GENERAL

- A. Comply with manufacturer's instructions and SMACNA's "Architectural Sheet Metal Manual" and "The NRCA Roofing and Waterproofing Manual.". Allow for thermal expansion; set true to line and level as indicated. Install Work with laps, joints, and seams permanently watertight and weatherproof; conceal fasteners where possible.
- B. Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
 - 1. Do not solder aluminum.
- C. Roof Panels Fasteners: Use stainless-steel fasteners for surfaces exposed to the exterior and aluminum or galvanized steel fasteners for surfaces exposed to the interior.
- D. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by metal roof panel manufacturer.
 - 1. Coat back side of aluminum roof panels with bituminous coating where roof panels will contact wood, ferrous metal, or cementitious construction.
 - 2. Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of synthetic underlayment.
 - 3. Bed flanges in thick coat of asphalt roofing cement where required for waterproof performance.
- E. Thermal Movement. Rigidly fasten metal roof panels to structure at one and only one location for each panel. Allow remainder of panel to move freely for thermal expansion and contraction. Predrill panels for fasteners.
 - 1. Point of Fixity: Fasten each panel along a single line of fixing located at ridge.
 - 2. Avoid attaching accessories through roof panels in a manner that will inhibit thermal movement.
- F. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of metal roof panel assemblies. Provide types of gaskets, fillers, and sealants indicated or, if not indicated, types recommended by metal roof panel manufacturer.
 - 1. Seal metal roof panel end laps with double beads of tape or sealant, full width of panel. Seal side joints where recommended by metal roof panel manufacturer.
 - 2. Prepare joints and apply sealants to comply with requirements in Division 07 Section "Joint Sealants."

3.07 ROOF-EDGE DRAINAGE-SYSTEM INSTALLATION

- A. General: Install sheet metal roof drainage items to produce complete roof drainage system according to SMACNA recommendations, according to manufacturer's written instructions and as indicated. Coordinate installation of roof perimeter drip flashing with installation of roof drainage system.
 - 1. Where applicable, comply with standards published in "The NRCA Roofing and Waterproofing Manual."
- B. Hanging Gutters: Join sections with lapped joints sealed with sealant. Provide for thermal expansion. Attach gutters at eave or fascia to firmly anchored gutter supports spaced not more than 24 inches apart. Provide end closures and seal watertight with sealant.
 - 1. Anchor and loosely lock back edge of gutter to continuous cleat.
 - 2. Loosely lock straps to front gutter bead and anchor to wood roof structure.
 - 3. Install gutter with expansion joints at locations indicated, but not exceeding, 50 feet apart. Install expansion-joint caps.
 - 4. Install continuous gutter screens on gutters with noncorrosive fasteners, hinged to swing open for cleaning gutters.

- C. Downspouts: Join sections with 1-1/2-inch telescoping joints.
 - 1. Provide hangers with fasteners designed to hold downspouts securely to walls. Locate hangers at top and bottom and at approximately 60 inches o.c. in between.
 - 2. Connect downspouts to underground drainage system indicated.
- D. Expansion-Joint Covers: Install expansion-joint covers at locations and of configuration indicated. Lap joints a minimum of 4 inches in direction of water flow.

3.08 ACCESSORY INSTALLATION

- A. General: 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 roof panel assembly including trim, copings, ridge closures, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
- B. Bar-Type Snow Guards: Attach snow guards to metal roof panels by clamping to standing seam, as recommended by manufacturer. Do not use fasteners that will penetrate metal roof panels.
 - 1. Unless indicated otherwise, provide 2 rows of snow guards, beginning 15-inches up from gutter.
- C. 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 will be permanently watertight and weather resistant.
 - 1. Install exposed flashing and trim that is without excessive oil canning, 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 to result in waterproof and weather-resistant performance.
 - 2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

3.09 ERECTION TOLERANCES

- A. Installation Tolerances: Shim and align metal roof panel units within installed tolerance of 1/4 inch in 20 feet on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.10 FIELD QUALITY CONTROL

- A. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion and submit report to Architect.
 - 1. Notify Architect and Construction Manager 48 hours in advance of date and time of inspection.
- B. Repair or remove and replace components of roofing system where test results or inspections indicate that they do not comply with specified requirements.
- C. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.11 CLEANING AND PROTECTION

- A. Clean finished surfaces according to manufacturer's written instructions and maintain in a clean condition during construction.
- B. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- C. Replace panels or other components that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.
- D. Remove temporary protective coverings and strippable films, if any, as metal roof panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal roof panel installation, clean finished surfaces as recommended by metal roof panel manufacturer. Maintain in a clean condition during construction.

END OF SECTION 07 4113

SECTION 07 4213 - FORMED METAL WALL PANELS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Exposed-fastener, lap-seam metal wall panels.

1.2 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:
 - 1. 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.
 - 2. 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.

1.3 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: For each product, for tests performed by a qualified testing agency.
- C. Field quality-control reports.
- D. Sample Warranties: For special warranties.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For metal panels 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.
- 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. Build mockup of typical metal panel assembly, including corner, soffits, supports, attachments, and accessories.
 - 2. Water-Spray Test: Conduct water-spray test of metal panel assembly mockup, testing for water penetration according to AAMA 501.2.
 - 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. 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.

1.7 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.

1.8 COORDINATION

- A. Coordinate metal panel installation with rain drainage work, flashing, trim, construction of soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.9 WARRANTY

- A. 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: Two years from date of Substantial Completion.

- B. 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.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E 72:
 - 1. Wind Loads: As indicated on Drawings.
 - 2. Other Design Loads: As indicated on Drawings.
- B. 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..
- C. 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..
- D. 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 MANUFACTURER

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Basis for Design: Dimensional Metals, Inc.
 - 2. ATAS International, Inc.
 - 3. CENTRIA Architectural Systems.
 - 4. Innovative Metals Company
 - 5. Pac-Clad Petersen, a Carlisle Company.

2.3 EXPOSED-FASTENER, RIB PANELS

- A. General: Provide factory-formed metal panels designed for general-purpose cladding use. Include accessories required for a complete installation.

- B. Exposed-Fastener Rib Siding Panels: Solid corrugated-type cladding for fastening to cold-rolled metal wall girts.
1. Products: Subject to compliance with requirements, provide the following:
 - a. DMI WP72 Exposed Fastener 7.2 Wall Panel
 - 1) 36-inch-coverage panel with six 1-1/2-inch high ribs spaced at 7.2-inches o.c..
 - b. Or equal as approved by Architect.
 2. Aluminum Sheet: Coil-coated sheet, ASTM B 209, alloy as standard with manufacturer, with temper as required to suit forming operations and structural performance required.
 - a. Nominal Thickness: 0.032 inch.
 - b. Exterior Finish: Two-coat fluoropolymer.
 - c. Color: Custom color as selected by Architect.

2.4 MISCELLANEOUS MATERIALS

- A. Miscellaneous Metal Subframing and Furring: ASTM C 645, cold-formed, metallic-coated steel sheet, ASTM A 653/A 653M, G90 coating designation or ASTM A 792/A 792M, Class AZ50 aluminum-zinc-alloy coating designation unless otherwise indicated. 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.
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 premolded 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, endwalls, 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: Provide sealant type recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.
1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.
 2. Joint Sealant: ASTM C 920; elastomeric polyurethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended in writing by metal panel manufacturer.
 3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C 1311.

2.5 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. On-Site Fabrication: Subject to compliance with requirements of this Section, metal panels may be fabricated on-site using UL-certified, portable roll-forming equipment if panels are of same profile and warranted by manufacturer to be equal to factory-formed panels. Fabricate according to equipment manufacturer's written instructions and to comply with details shown.
- C. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.
- D. 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.
- E. 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. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
 - 3. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
 - 4. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
 - 5. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
 - 6. 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.

2.6 FINISHES

- A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. 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 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.
- C. Aluminum Panels and Accessories:
 - 1. Two-Coat Fluoropolymer: AAMA 620. 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.

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.

3.2 PREPARATION

- A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C 754 and metal panel manufacturer's written recommendations.

3.3 METAL 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. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
 - 7. 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.
 - 8. 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. Lap-Seam Metal Panels: Fasten metal panels to supports with fasteners at each lapped joint at location and spacing recommended by manufacturer.
1. Lap ribbed or fluted sheets one full rib. Apply panels and associated items true to line for neat and weathertight enclosure.
 2. Provide metal-backed washers under heads of exposed fasteners bearing on weather side of metal panels.
 3. Locate and space exposed fasteners in uniform vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of washer.
 4. Install screw fasteners with power tools having controlled torque adjusted to compress washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.
 5. Flash and seal panels with weather closures at perimeter of all openings.
- E. 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.
- F. Metal Liner Panels: Install panels on interior side of girts with flush appearance on the inside.
- G. 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, and similar items. Provide types indicated by metal wall panel manufacturer; or, if not indicated, provide types recommended by metal panel manufacturer.
- H. 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.
 2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Water-Spray Test: After installation, test area of assembly as directed by Architect for water penetration according to AAMA 501.2.
- C. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect completed metal wall panel installation, including accessories.
- D. Remove and replace metal wall panels where tests and inspections indicate that they do not comply with specified requirements.

- E. Additional tests and inspections, at Contractor's expense, are performed to determine compliance of replaced or additional work with specified requirements.
- F. Prepare test and inspection reports.

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 07 4213

SECTION 07 4243 - COMPOSITE WALL PANELS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes metal-faced composite rout-and-return rainscreen wall cladding system.

1.2 DEFINITION

- A. Metal-Faced Composite Wall Panel Assembly: Metal-faced composite wall panels, attachment system components, miscellaneous metal framing, sealants, and accessories necessary for a complete rainscreen wall system.

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 for each type of metal-faced composite wall panel and accessory.
- B. Shop Drawings: Show fabrication and installation layouts of metal-faced composite wall panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details. Distinguish among factory-, shop-, and field-assembled work.
 - 1. Accessories: Include details of the following items, at a scale of not less than 1-1/2 inches per 12 inches:
 - a. Flashing and trim.
 - b. Anchorage systems.
- C. Samples for Initial Selection: For each type of metal-faced composite wall panel indicated with factory-applied color finishes.
 - 1. Include similar samples and accessories involving color selection.
- D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:
 - 1. Metal-Faced Composite Wall Panels: Minimum 12 x 12 inches. Include fasteners, closures, and other metal-faced composite wall panel accessories.
 - a. Composite Panels: Include four-way joint.
 - 2. Trim and Closures: 12 inches long. Include fasteners and other exposed accessories.
 - 3. Accessories: 12-inch-long Samples for each type of accessory.
 - 4. Exposed Gaskets: 12 inches long.
- E. Delegated-Design Submittal: For metal-faced composite wall panel assembly indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Exterior elevations, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
 - 1. Wall panels and attachments.
 - 2. Stud framing.
 - 3. Wall-mounted items including doors, windows, louvers, and lighting fixtures.
 - 4. Penetrations of wall by pipes and utilities.
- B. Qualification Data: For professional engineer and testing agency.
- C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each product and for the system as produced by the fabricator.
- D. Field quality-control reports.
- E. Warranties: Samples of special warranties.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For metal wall panels to include in maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.
- B. Source Limitations: Obtain metal-faced composite wall panels from single source from single manufacturer.
- C. Preinstallation Conference: Conduct conference at Project site at least two weeks prior to start of installation. Conduct conference on site in conjunction with pre-installation conference for other exterior cladding systems, weather-resistive barrier, flashing, and cladding-support systems.
 - 1. Meet with Construction Manager, Architect, Owner's insurer if applicable, testing and inspecting agency representative, metal-faced composite wall panel Installer, metal-faced composite wall panel manufacturer's representative, structural-support Installer, and installers whose work interfaces with or affects metal-faced composite wall 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-faced composite wall 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 will affect metal-faced composite wall panels.
 - 6. Review governing regulations and requirements for insurance, certificates, and tests and inspections if applicable.
 - 7. Review temporary protection requirements for metal-faced composite wall panel assembly during and after installation.
 - 8. Review wall panel observation and repair procedures after metal-faced composite wall panel installation.

- D. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation. Include framing and insulation as part of mockup. Include a 4-way joint and an outside corner.
1. Build mockup of typical wall, corner and window head, jamb and sill as shown on Drawings; approximately one bay wide by one story high by full thickness, including supports, attachments, and accessories.
 - a. Include four-way joint for metal-faced composite wall panels.
 2. Conduct water-spray test of mockup of metal-faced composite wall panel assembly, testing for water penetration according to AAMA 501.2.
 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. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver components, sheets, metal-faced composite wall panels, and other manufactured items so as not to be damaged or deformed. Package metal-faced composite wall panels for protection during transportation and handling.
- B. Unload, store, and erect metal-faced composite wall panels in a manner to prevent bending, warping, twisting, and surface damage.
- C. Store metal-faced composite wall panels vertically, covered with suitable weathertight and ventilated covering. Store metal-faced composite wall panels to ensure dryness, with positive slope for drainage of water. Do not store metal-faced composite wall panels in contact with other materials that might cause staining, denting, or other surface damage. Do not allow storage space to exceed 120 deg F.
- D. Retain strippable protective covering on metal-faced composite wall panel for period of panel installation.

1.8 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal-faced composite wall panels to be performed according to manufacturer's written instructions and warranty requirements.
- B. Field Measurements: Verify locations of structural members and wall opening dimensions by field measurements before metal-faced composite wall panel fabrication and indicate measurements on Shop Drawings.

1.9 COORDINATION

- A. Coordinate metal-faced composite wall panel assemblies with rain drainage work, flashing, trim, and construction of studs, soffits, openings, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.10 WARRANTY

- A. Special Warranty on Solid-Color Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal-faced composite wall 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 (Kynar Finish): 20 years from date of Substantial Completion.
- B. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal-faced composite wall panel assemblies 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: Five years from date of Substantial Completion

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General Performance: Metal-faced composite wall panel assemblies must comply with performance requirements without failure due to defective manufacture, fabrication, installation, or other defects in construction.
- B. Delegated Design: Design metal-faced composite wall panel assembly, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- C. Air Infiltration: Air leakage through assembly of not more than 0.06 cfm/sq. ft. of wall area when tested according to ASTM E 283 at the following test-pressure difference:
- 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: 6.24 lbf/sq. ft.
- E. Structural Performance: Provide metal-faced composite wall panel assemblies capable of withstanding the effects of the following loads and stresses within limits and under conditions indicated, based on testing according to ASTM E 330:
 - 1. Wind Loads: Determine loads based on the following minimum design wind pressures:
 - a. Uniform pressure as indicated on Drawings at minimum of 20 lb/sq. ft. and 90 mph, acting inward or outward.
 - 2. Deflection Limits: Metal-faced composite wall panel assemblies must withstand wind loads with horizontal deflections no greater than 1/175 of the span at the perimeter and 1/60 of the span anywhere in the panel.

- F. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, 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 PANEL MATERIALS

- A. Aluminum Sheet: Coil-coated sheet, ASTM B 209, alloy as standard with manufacturer, with temper as required to suit forming operations and structural performance required.
1. Surface: Smooth, flat finish.
 2. Exposed Coil-Coated Solid-Color Finishes:
 - a. Two-Coat Fluoropolymer: AAMA 2605. 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.
 3. 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.
 4. Peel Strength of Bond: As tested by ASTM A1781, 22.5 in. lb./in. after 21 days soaking in water at 70° F.

2.3 MISCELLANEOUS METAL FRAMING

- A. Miscellaneous Metal Framing, General: ASTM C 645, cold-formed metallic-coated steel sheet, ASTM A 653/A 653M, G60 hot-dip galvanized or coating with equivalent corrosion resistance unless otherwise indicated.
- B. Subgirts: Manufacturer's standard Z-shaped sections 0.064-inch nominal thickness.
- C. Aluminum Extrusions: ASTM B 221, alloy and temper recommended by manufacturer for type of use and finish indicated.
- D. Fasteners for Miscellaneous Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten miscellaneous metal framing members to substrates.
1. Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads. Provide exposed fasteners with heads matching color of metal-faced composite wall panels by means of plastic caps or factory-applied coating. Provide EPDM, PVC, or neoprene sealing washers.

2.4 METAL-FACED COMPOSITE WALL PANELS

- A. General: Provide factory-formed and -assembled, metal-faced composite wall panels fabricated from two metal facings bonded, using no glues or adhesives, to solid, extruded thermoplastic core; formed into profile for installation method indicated. Include attachment system components and accessories required for weathertight system..
1. Basis-of-Design Product: Subject to compliance with requirements, provide **Arconic Architectural Products; Reynobond 160FR 4mm Rout & Return System** or comparable product, meeting all performance requirements, by one of the following:
 - a. Laminators Incorporated
 - b. 3A Composites USA Inc.
 - c. ALPOLIC, Division of Mitsubishi Chemical America, Inc..
 - d. Citadel Architectural Products, Inc

- B. Aluminum-Faced Composite Wall Panels: Formed with 0.020-inch-thick, coil-coated aluminum sheet facings.
 - 1. Panel Thickness: 0.157 inch.
 - 2. Core: Standard.
 - 3. Exterior Finish: 2-coat fluoropolymer.
 - a. Color: As scheduled on Drawings.
- C. Attachment System Components: Formed from material compatible with panel facing.

2.5 ACCESSORIES

- A. Wall Panel Accessories: Provide components required for a complete metal-faced composite wall panel assembly including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, gaskets, fillers, closure strips, and similar items. Match material and finish of metal-faced composite wall panels unless otherwise indicated.
- B. Flashing and Trim: Formed from 0.018-inch-minimum thickness, zinc-coated (galvanized) steel sheet or aluminum-zinc alloy-coated steel sheet prepainted with coil coating. Provide flashing and trim 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-faced composite wall panels.

2.6 FABRICATION

- A. General: Fabricate and finish metal-faced composite wall panels and accessories at the factory to greatest extent possible, 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. Fabricate metal-faced composite wall panels in a manner that eliminates condensation on interior side of panel and with joints between panels designed to form weathertight seals.
 - 1. Rout and Return System: Produce a barrier system by forming panels into pans and hanging them over the substrate by means of continuous, interlocking aluminum extrusions on four pan sites. Conceal fasteners and seal 1/2-inch-wide joints between pans.
- C. Metal-Faced Composite Wall Panels: Factory form panels in a continuous process with no glues or adhesives between dissimilar materials. Trim and square edges of sheets with no displacement of face sheets or protrusion of core material.
 - 1. Form panel lines, breaks, and angles to be sharp and true, with surfaces free from warp and buckle.
 - 2. Fabricate panels with sharply cut edges, with no displacement of face sheets or protrusion of core material.
 - 3. Fabricate panels with panel stiffeners, as required to comply with deflection limits, attached to back of panels with structural sealant or bond tape.
 - 4. Dimensional Tolerances:
 - a. Panel Bow: 0.8 percent maximum of panel length or width.
 - b. Squareness: 0.25 inch maximum.
- D. Sheet Metal Accessories: Fabricate flashing and trim to comply with 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. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.

3. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
5. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended by metal-faced composite wall panel manufacturer.
 - a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal-faced composite wall panel manufacturer for application, but not less than thickness of metal being secured.

2.7 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. 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.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal-faced composite wall 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-faced composite 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-faced composite wall panel manufacturer.
 3. Verify that air barrier has been installed over sheathing to prevent air infiltration or water penetration.
- B. Examine roughing-in for components and systems penetrating metal-faced composite wall panels to verify actual locations of penetrations relative to seam locations of panels before panel installation.
- C. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Miscellaneous Framing: Install subgirts, base angles, sills, furring, and other miscellaneous wall panel support members and anchorage according to ASTM C 754 and metal-faced composite wall panel manufacturer's written instructions.

3.3 METAL-FACED COMPOSITE WALL PANEL INSTALLATION

- A. General: Install metal-faced composite wall panels according to manufacturer's written instructions in orientation, sizes, and locations indicated on Drawings. Install panels perpendicular to girts and subgirts unless otherwise indicated. Anchor panels and other components of the Work securely in place, with provisions for thermal and structural movement.
 - 1. Commence metal-faced composite wall panel installation and install minimum of 300 sq. ft. in presence of factory-authorized representative.
 - 2. Shim or otherwise plumb substrates receiving metal-faced composite wall panels.
 - 3. Flash and seal metal-faced composite wall panels at perimeter of all openings. Do not begin installation until weather barrier and flashings that will be concealed by panels are installed.
 - 4. Install flashing and trim as metal-faced composite wall panel work proceeds.
 - 5. Provide weathertight escutcheons for pipe and conduit penetrating exterior walls.
- B. Fasteners:
 - 1. Aluminum Wall Panels: Manufacturer's and fabricator's standard for assembly.
- C. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action as recommended by metal-faced composite wall panel manufacturer.
- D. Attachment System Installation, General: Install attachment system required to support metal-faced composite wall panels and to provide a complete weathertight wall system, including subgirts, perimeter extrusions, tracks, drainage channels, panel clips, and anchor channels.
 - 1. Install panel with the 'rout and return' wet system.
 - 2. Include attachment to supports, panel-to-panel joinery, panel-to-dissimilar-material joinery, and panel-system joint seals.
 - 3. Do not begin installation until weather barrier and flashings that will be concealed by composite panels are installed.
- E. Clip Installation: Attach panel clips to supports at each metal-faced composite wall panel joint at locations, spacings, and with fasteners recommended by manufacturer. Attach routed-and-turned flanges of wall panels to panel clips with manufacturer's standard fasteners.

3.4 ACCESSORY INSTALLATION

- A. General: 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-faced composite wall panel assembly including trim, copings, corners, seam covers, flashings, gaskets, fillers, closure strips, and similar items.
- B. 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 will be permanently watertight and weather resistant.
 - 1. Install exposed flashing and trim that is without excessive oil canning, 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 to result in waterproof and weather-resistant performance.
 - 2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection.

3.5 ERECTION TOLERANCES

- A. Installation Tolerances: Shim and align metal-faced composite wall panel units within installed tolerance of 1/4 inch in 20 feet, non-accumulative, on level, plumb, and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.6 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Water Penetration: Test areas of installed system selected by Architect for compliance with system performance requirements according to ASTM E 1105 at minimum differential pressure of 20 percent of inward-acting, wind-load design pressure as defined by SEI/ASCE 7, but not less than 6.24 lbf/sq. ft.
- C. Water-Spray Test: After completing the installation of 75-foot-by-2-story minimum area of metal-faced composite wall panel assembly, test assembly for water penetration according to AAMA 501.2 in a 2-bay area directed by Architect.
- D. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust completed metal-faced composite wall panel installation, including accessories.
- E. Metal-faced composite wall panels will be considered defective if they do not pass tests and inspections.
- F. Additional tests and inspections, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- G. Prepare test and inspection report.

3.7 CLEANING

- A. Remove temporary protective coverings and strippable films, if any, as metal-faced composite wall panels are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of metal-faced composite wall panel installation, clean finished surfaces as recommended by panel manufacturer. Maintain in a clean condition during construction.
- B. Replace metal-faced composite wall panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 07 4243

SECTION 07 6200 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Manufactured Products:
 - a. Manufactured reglets and counterflashing.
 - 2. Formed Products:
 - a. Sloped roof sheet metal fabrications.
- B. Related Sections:
 - 1. Division 06 Section "Miscellaneous Rough Carpentry" for wood nailers, curbs, and blocking.
 - 2. Division 07 Section "Metal Panel Roofing" for sheet metal roof trim and drainage products associated with standing-seam roofing.
 - 3. Division 07 Section "Roof Accessories" for manufactured roof accessory units.
- C. Coordination:
 - 1. Coordinate sheet metal flashing and trim layout and seams with sizes and locations of penetrations to be flashed, and joints and seams in adjacent materials.
 - 2. Coordinate sheet metal flashing and trim installation with adjoining roofing and wall materials, joints, and seams to provide leakproof, secure, and noncorrosive installation.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each manufactured product and accessory.
- B. Shop Drawings: Show fabrication and installation layouts of sheet metal flashing and trim, including plans, elevations, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled work. Include the following:
 - 1. Identification of material, thickness, weight, and finish for each item and location in Project.
 - 2. Details for forming sheet metal flashing and trim, including profiles, shapes, seams, and dimensions.
 - 3. Details for joining, supporting, and securing sheet metal flashing and trim, including layout of fasteners, cleats, clips, and other attachments. Include pattern of seams.
 - 4. Details of termination points and assemblies, including fixed points.
 - 5. Details of expansion joints and expansion-joint covers, including showing direction of expansion and contraction.
 - 6. Details of edge conditions, including eaves, ridges, valleys, rakes, crickets, and counterflashings as applicable.
 - 7. Details of special conditions.
 - 8. Details of connections to adjoining work.
- C. Samples for Initial Selection: For each type of sheet metal flashing, trim, and accessory indicated with factory-applied color finishes involving color selection.

1.3 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified fabricator.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For sheet metal flashing, trim, and accessories to include in maintenance manuals.

1.5 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.
- B. Sheet Metal Flashing and Trim Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" unless more stringent requirements are specified or shown on Drawings.
- C. Preinstallation Conference: Conduct conference at Project site. Meet with Construction Manager, Architect, Owner's insurer if applicable, Installer, and installers whose work interfaces with or affects sheet metal flashing and trim including installers of roofing materials, roof accessories, and roof-mounted equipment.
 - 1. Review methods and procedures related to sheet metal flashing and trim.
 - 2. Examine substrate conditions for compliance with requirements, including flatness and attachment to structural members.
 - 3. Review special roof details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect sheet metal flashing.
 - 4. Review construction schedule. Verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - 5. Review requirements for insurance and certificates if applicable.
 - 6. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.
- D. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
 - 1. Build mockup of typical roof edge, including fascia, fascia trim, coping, as indicated on Drawings, including supporting construction cleats, seams, attachments, underlayment, and accessories.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage. Store sheet metal flashing and trim materials away from uncured concrete and masonry.
- B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to the extent necessary for the period of sheet metal flashing and trim installation.

1.7 WARRANTY

- A. Special Warranty on Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.
1. Exposed 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.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General: Sheet metal flashing and trim assemblies as indicated shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.
- B. Sheet Metal Standard for Flashing and Trim: Comply with NRCA's "The NRCA Roofing Manual: Architectural Metal Flashing, Condensation and Air Leakage Control, and Reroofing" and SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.
- C. Wind Design Standards: Fabricate and install roof edge flashing as follows:
1. Tested in accordance with ANSI/SPRI/FM 4435/ES-1 and capable of resisting the following design pressure:
 - a. Design Pressure: As indicated on Drawings.
 2. Capable of resisting the following forces according to recommendations in FMG Loss Prevention Data Sheet 1-49:
 - a. Wind Zone 2: For velocity pressures of 31 to 45 lbf/sq. ft.: 90-lbf/sq. ft. perimeter uplift force, 120-lbf/sq. ft. corner uplift force, and 45-lbf/sq. ft. outward force.
- D. Thermal Movements: Provide sheet metal flashing and trim that allows for thermal movements from ambient and surface temperature changes to prevent 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 SHEET METALS

- A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying a strippable, temporary protective film before shipping.
- B. Stainless Steel Sheet: ASTM A240/A240M, Type 304, dead soft, fully annealed; with smooth, flat surface.
1. Finish: ASTM A480/A480M, No. 2D (dull, cold rolled).
 - a. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.

- C. Metallic-Coated Steel Sheet: Provide aluminum-zinc alloy-coated steel sheet in accordance with ASTM A792/A792M, Class AZ50 coating designation, Grade 40; prepainted by coil-coating process to comply with ASTM A755/A755M.
1. Surface: Smooth, flat.
 2. Exposed Coil-Coated Finish:
 - a. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (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.
 3. Color: As selected by Architect from manufacturer's full range.
 4. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with minimum total dry film thickness of 0.5 mil.
- D. Aluminum Sheet: ASTM B 209, alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required.
1. Exposed Coil-Coated Finishes:
 - a. Two-Coat Fluoropolymer: AAMA 620. 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. Color: As selected by Architect from manufacturer's full range.
 - a. Color Range: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
 3. Concealed Finish: Pretreat with 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.

2.3 UNDERLAYMENT MATERIALS

- A. Use one of the following where necessary to separate sheet metal from dissimilar or corrosive materials.
1. Polyethylene Sheet: 6-mil-thick polyethylene sheet complying with ASTM D 4397.
 2. Felt: ASTM D 226, Type II (No. 30), asphalt-saturated organic felt, nonperforated.
 3. Slip Sheet: Building paper, 3-lb/100 sq. ft. minimum, rosin sized.

2.4 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.
- B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.
1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
 - a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating.
 - b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
 2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
- C. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.

- D. Elastomeric Sealant: ASTM C 920, elastomeric polymer sealant; low modulus; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- E. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.
- F. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.
- G. Reglets: Units of type, material, and profile indicated, formed to provide secure interlocking of separate reglet and counterflashing pieces, and compatible with flashing indicated with interlocking counterflashing on exterior face, of same metal as reglet.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide **Fry Reglet Corporation Type MA** or comparable product by one of the following:
 - a. Cheney Flashing Company.
 - b. Heckmann Building Products Inc.
 - c. Hickman, W. P. Company.
 - d. Hohmann & Barnard, Inc.; STF Sawtooth Flashing.
 - e. Keystone Flashing Company, Inc.
 - f. Sandell Manufacturing Company, Inc.
 - 2. Material: Stainless steel Type 304, 0.025 inch thick, Copper, 16 oz./sq. ft.
 - 3. Surface-Mounted Type: Provide with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.
 - 4. Concrete Type: Provide temporary closure tape to keep reglet free of concrete materials, special fasteners for attaching reglet to concrete forms, and guides to ensure alignment of reglet section ends.
 - 5. Masonry Type: Provide with offset top flange for embedment in masonry mortar joint.
 - 6. Accessories:
 - a. Flexible-Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing or where Drawings show reglet without metal counterflashing.
 - b. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of counterflashing lower edge.
 - 7. Finish: Manufacturer's standard.

2.5 FABRICATION, GENERAL

- A. General: Fabricate custom sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, geometry, metal thickness, and other characteristics of item indicated. Fabricate items at the shop to greatest extent possible.
 - 1. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
 - 2. Obtain field measurements for accurate fit before shop fabrication.
 - 3. Form sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.
 - 4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces exposed to view.
 - 1. Provide factory-formed products designed to be field applied and mechanically attached to supporting construction. Include accessories required for complete installation.
 - 2. Fabricate in minimum length sections indicated, of size and metal thickness according to SMACNA's "Architectural Sheet Metal Manual." Provide wire ball strainers of compatible metal at outlets.
- B. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

- C. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant.
- D. Expansion Provisions: Where lapped expansion provisions cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.
- E. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.
- F. Fabricate cleats and attachment devices of sizes as recommended by SMACNA's "Architectural Sheet Metal Manual" for application, but not less than thickness of metal being secured.
- G. Seams: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use.
- H. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer.
- I. Do not use graphite pencils to mark metal surfaces.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions and other conditions affecting performance of the Work.
 - 1. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 UNDERLAYMENT INSTALLATION

- A. General: Install underlayment as indicated on Drawings and as described in paragraph below "Metal Protection".
- B. Polyethylene Sheet: Install polyethylene sheet with adhesive for anchorage to minimize use of mechanical fasteners under sheet metal flashing and trim. Apply in shingle fashion to shed water, with lapped and taped joints of not less than 2 inches.
- C. Felt Underlayment: Install felt underlayment with adhesive for temporary anchorage to minimize use of mechanical fasteners under sheet metal flashing and trim. Apply in shingle fashion to shed water, with lapped joints of not less than 2 inches.

3.3 INSTALLATION, GENERAL

- A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
 - 1. Install sheet metal flashing and trim true to line and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
 - 2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
 - 3. Space cleats not more than 12 inches apart. Anchor each cleat with two fasteners. Bend tabs over fasteners.

4. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.
 5. Install sealant tape where indicated.
 6. Torch cutting of sheet metal flashing and trim is not permitted.
 7. Do not use graphite pencils to mark metal surfaces.
- B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by SMACNA.
1. Coat back side of uncoated aluminum and stainless-steel sheet metal flashing and trim with bituminous coating where flashing and trim will contact wood, ferrous metal, or cementitious construction.
 2. Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet or install a course of polyethylene sheet.
- C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.
- D. Fastener Sizes: Use fasteners of sizes that will penetrate wood sheathing not less than 1-1/4 inches for nails and not less than 3/4 inch for wood screws, gypsum sheathing, or metal decking not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.
- E. Seal joints as shown and as required for watertight construction.
1. Where sealant-filled joints are used, embed hooked flanges of joint members not less than 1 inch into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is moderate, between 40 and 70 deg F, set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F.
 2. Prepare joints and apply sealants to comply with requirements in Section 07 9200 "Joint Sealants."
- F. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter.
1. Do not solder metallic-coated steel and aluminum sheet.
 2. Do not use torches for soldering. Heat surfaces to receive solder and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.
- G. Rivets: Rivet joints where indicated and where necessary for strength, as indicated in SMACNA details.

3.4 ROOF FLASHING INSTALLATION

- A. General: Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, set units true to line, and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
- B. Roof Edge Flashing: Anchor to resist uplift and outward forces according to manufacturer's recommendations. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate at 16-inch centers.
- C. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending a minimum of 4 inches over base flashing. Install stainless-steel draw band and tighten.
- D. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4 inches over base flashing. Lap counterflashing joints a minimum of 4 inches and bed with sealant. Secure in a waterproof manner by means of snap-in installation and sealant.

- E. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with elastomeric sealant and clamp flashing to pipes that penetrate roof.

3.5 WALL FLASHING INSTALLATION

- A. Through-Wall Flashing: Installation of through-wall flashing is specified in Section 04 2000 "Unit Masonry" or shown on Drawings.

3.6 CLEANING AND PROTECTION

- A. Clean and neutralize flux materials. Clean off excess solder.
- B. Clean off excess sealants.
- C. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of installation, remove unused materials and clean finished surfaces. Maintain in a clean condition during construction.
- D. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 07 6200

SECTION 07 7200 - ROOF ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Pipe portals.
 - 2. Preformed flashing sleeves.
- B. Related Sections:
 - 1. Section 07 6200 "Sheet Metal Flashing and Trim" for formed and manufactured roof flashing items.
 - 2. Section 07 4113 "Metal Panel Roofing" for roof curbs and sheet metal roof trim and drainage products associated with standing-seam roofing.

1.2 PERFORMANCE REQUIREMENTS

- A. General Performance: Roof accessories must withstand exposure to weather and resist thermally induced movement without failure, rattling, leaking, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of roof accessory indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: For roof accessories. Include plans, elevations, keyed details, and attachments to other work. Indicate dimensions, loadings, and special conditions.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For roof accessories to include in operation and maintenance manuals.
- B. Product Warranties.

1.5 COORDINATION

- A. Coordinate layout and installation of roof accessories with roofing membrane and base flashing and interfacing and adjoining construction to provide a leakproof, weathertight, secure, and noncorrosive installation.
- B. Coordinate dimensions with rough-in information or Shop Drawings of items to be installed.
- C. Field verify heights of roof at ladder locations.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General Performance: Roof accessories must withstand exposure to weather and resist thermally induced movement without failure, rattling, leaking, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.

2.2 METAL MATERIALS

- A. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 coating designation and mill phosphatized for field painting where indicated.
 - 1. Mill-Phosphatized Finish: Manufacturer's standard for field painting.
 - 2. Factory Prime Coating: Where field painting is indicated, apply pretreatment and white or light-colored, factory-applied, baked-on epoxy primer coat, with a minimum dry film thickness of 0.2 mil.
 - 3. Exposed Coil-Coated Finish: Prepainted by the coil-coating process to comply with ASTM A 755/A 755M. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - a. Two-Coat Fluoropolymer Finish: AAMA 621. System consisting of primer and fluoropolymer color topcoat containing not less than 70 percent PVDF resin by weight.
 - 4. Baked-Enamel or Powder-Coat Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat, with a minimum dry film thickness of 1 mil for topcoat. Comply with coating manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 2 mils.
 - 5. Concealed Finish: Pretreat with 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.
- B. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, AZ50 coated.
 - 1. Factory Prime Coating: Where field painting is indicated, apply pretreatment and white or light-colored, factory-applied, baked-on epoxy primer coat, with a minimum dry film thickness of 0.2 mil.
 - 2. Exposed Coil-Coated Finish: Prepainted by the coil-coating process to comply with ASTM A 755/A 755M. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - a. Two-Coat Fluoropolymer Finish: AAMA 621. System consisting of primer and fluoropolymer color topcoat containing not less than 70 percent PVDF resin by weight.
 - 3. Baked-Enamel or Powder-Coat Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat, with a minimum dry film thickness of 1 mil for topcoat. Comply with coating manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 2 mils.
 - 4. Concealed Finish: Pretreat with 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.
- C. Aluminum Sheet: ASTM B 209, manufacturer's standard alloy for finish required, with temper to suit forming operations and performance required.
 - 1. Mill Finish: As manufactured.
 - 2. Factory Prime Coating: Where field painting is indicated, apply pretreatment and white or light-colored, factory-applied, baked-on epoxy primer coat, with a minimum dry film thickness of 0.2 mil.

3. Exposed Coil-Coated Finish: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - a. Two-Coat Fluoropolymer Finish: AAMA 620. System consisting of primer and fluoropolymer color topcoat containing not less than 70 percent PVDF resin by weight.
 4. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
 5. Concealed Finish: Pretreat with 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.
- D. Aluminum Extrusions and Tubes: ASTM B 221, manufacturer's standard alloy and temper for type of use, finished to match assembly where used, otherwise mill finished.
- E. Steel Shapes: ASTM A 36/A 36M, hot-dip galvanized according to ASTM A 123/A 123M unless otherwise indicated.
- F. Galvanized-Steel Tube: ASTM A 500, round tube, hot-dip galvanized according to ASTM A 123/A 123M.
- G. Steel Pipe: ASTM A 53/A 53M, galvanized.

2.3 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items required by manufacturer for a complete installation.
- B. Cellulosic-Fiber Board Insulation: ASTM C208, Type II, Grade 1, thickness as indicated.
- C. Glass-Fiber Board Insulation: ASTM C726, nominal density of 3 lb/cu. ft., thermal resistivity of 4.3 deg F x h x sq. ft./Btu x in. at 75 deg F, thickness as indicated.
- D. Polyisocyanurate Board Insulation: ASTM C1289, thickness and thermal resistivity as indicated.
- E. Wood Nailers: Softwood lumber, pressure treated with waterborne preservatives for aboveground use, acceptable to authorities having jurisdiction, containing no arsenic or chromium, and complying with AWWPA C2; not less than 1-1/2 inches thick.
- F. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.
- G. Fasteners: Roof accessory manufacturer's recommended fasteners suitable for application and metals being fastened. Match finish of exposed fasteners with finish of material being fastened. Provide nonremovable fastener heads to exterior exposed fasteners. Furnish the following unless otherwise indicated:
 1. Fasteners for Zinc-Coated or Aluminum-Zinc Alloy-Coated Steel: Series 300 stainless steel or hot-dip zinc-coated steel according to ASTM A153/A153M or ASTM F2329.
 2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
 3. Fasteners for Stainless Steel Sheet: Series 300 stainless steel.
- H. Gaskets: Manufacturer's standard tubular or fingered design of neoprene, EPDM, PVC, or silicone or a flat design of foam rubber, sponge neoprene, or cork.
- I. Elastomeric Sealant: ASTM C920, elastomeric polyurethane polymer sealant as recommended by roof accessory manufacturer for installation indicated; low modulus; of type, grade, class, and use classifications required to seal joints and remain watertight.

- J. Butyl Sealant: ASTM C1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for expansion joints with limited movement.

2.4 PIPE PORTALS

- A. Curb-Mounted Pipe Portal: Insulated roof-curb units with welded or mechanically fastened and sealed corner joints, stepped integral metal cant raised the thickness of roof insulation, and integrally formed deck-mounting flange at perimeter bottom; with weathertight curb cover with single or multiple collared openings and pressure-sealed conically shaped EPDM protective rubber caps sized for piping indicated, with stainless steel snaplock swivel clamps.
 - 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. Portals Plus; Duravent Group.
 - b. Roof Products and Systems (RPS); Duravent Group.
- B. Flashing Pipe Portal: Formed aluminum membrane-mounting flashing flange and sleeve with collared opening and pressure-sealed conically shaped EPDM protective rubber cap sized for piping indicated, with stainless steel snaplock swivel clamps.
 - 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. Portals Plus; Duravent Group.

2.5 PREFORMED FLASHING SLEEVES

- A. Exhaust Vent Flashing: Double-walled metal flashing sleeve or boot, insulation filled, with integral deck flange, 12 inches high, with removable metal hood and metal collar.
 - 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. Custom Solution Roof and Metal Products, a division of Colony Heating.
 - b. Menzies Metal Products.
 - c. Thaler Metal Industries Ltd.
 - 2. Metal: Aluminum sheet, 0.063 inch thick.
 - 3. Diameter: As indicated on Drawings.
 - 4. Finish: Manufacturer's standard.
- B. Vent Stack Flashing: Metal flashing sleeve, uninsulated, with integral deck flange.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Custom Solution Roof and Metal Products, a division of Colony Heating.
 - b. Menzies Metal Products.
 - c. Milcor by Duravent; Duravent Group.
 - d. Thaler Metal Industries Ltd.
 - 2. Metal: Aluminum sheet, 0.063 inch thick.
 - 3. Height: 13 inches.
 - 4. Diameter: As indicated on Drawings.
 - 5. Finish: Manufacturer's standard.

2.6 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions, and other conditions affecting performance of the Work.
- B. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
- C. Verify dimensions of roof openings for roof accessories.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install roof accessories according to manufacturer's written instructions.
 - 1. Install roof accessories level, plumb, true to line and elevation, and without warping, jogs in alignment, excessive oil canning, buckling, or tool marks.
 - 2. Anchor roof accessories securely in place so they are capable of resisting indicated loads.
 - 3. Use fasteners, separators, sealants, and other miscellaneous items as required to complete installation of roof accessories and fit them to substrates.
 - 4. Install roof accessories to resist exposure to weather without failing, rattling, leaking, or loosening of fasteners and seals.
- B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.
 - 1. Coat concealed side of uncoated aluminum roof accessories with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
 - 2. Underlayment: Where installing roof accessories directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet, or install a course of polyethylene sheet.
 - 3. Bed flanges in thick coat of asphalt roofing cement where required by manufacturers of roof accessories for waterproof performance.
- C. Preformed Flashing-Sleeve and Flashing Pipe Portal Installation: Secure flashing sleeve to roof membrane according to flashing-sleeve manufacturer's written instructions; flash sleeve flange to surrounding roof membrane according to roof membrane manufacturer's instructions.
- D. Seal joints with sealant as required by roof accessory manufacturer.

3.3 REPAIR AND CLEANING

- A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing according to ASTM A 780.
- B. Touch up factory-primed surfaces with compatible primer ready for field painting.
- C. Clean exposed surfaces according to manufacturer's written instructions.
- D. Clean off excess sealants.
- E. Replace roof accessories that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

END OF SECTION 07 7200

SECTION 07 8413 - PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes through-penetration firestop systems for penetrations through fire-resistance-rated constructions, including both empty openings and openings containing penetrating items.
- B. Responsibility: Contractor installing or removing an item penetrating a fire resistance rated assembly provides firestopping for that item or for opening left by removal of an item.
 - 1. Division 21, 22, 23, 26, 27, and 28 sections cross-reference this section.
- C. Identify locations requiring through-penetration firestop devices and systems and select appropriate device or system from schedule at end of this section considering location (floor or wall) and size, nature of assembly penetrated, nature of penetrating item(s), and fire-resistive hourly rating required to be maintained.
- D. Related Sections include the following:
 - 1. Division 07 Section "Fire-Resistive Joint Systems" for fire-resistive treatment for joints in fire-rated construction.
 - 2. Division 07 Section "Expansion Control" for fire-resistive joint components associated with building expansion joints.
 - 3. Division 21 Sections specifying fire-suppression piping penetrations.
 - 4. Division 22 and 23 Sections specifying duct and piping penetrations.
 - 5. Division 26, 27, and 28 Sections specifying cable and conduit penetrations.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated in the Firestopping Schedule.
 - 1. Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular penetration firestopping condition, submit illustration, with modifications marked, approved by penetration firestopping manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.
- B. Firestopping Schedule:
 - 1. Submit a firestopping schedule in tabular format with the following headings:
 - a. Location of Penetration (wall, floor, roof, perimeter, etc.).
 - b. Type of Penetration (cable tray, metal pipe, plastic pipe, electrical conduit, gas lines, communication wiring, ductwork, etc.)
 - c. Penetrated assembly material and construction.
 - d. Firestopping UL or FM assembly used at the condition.
 - 2. Installer may use a proprietary format that includes at least the above information and which is approved by the Architect.
 - 3. Identification of firestopping systems to be included is at the end of Part 3 in this Section.

- C. Shop Drawings: For each through-penetration firestop system, show each type of construction condition penetrated, relationships to adjoining construction, and type of penetrating item. Include firestop design designation of qualified testing and inspecting agency that evidences compliance with requirements for each condition indicated.
 - 1. Submit documentation, including illustrations, from a qualified testing and inspecting agency that is applicable to each through-penetration firestop system configuration for construction and penetrating items.
 - 2. Detail each penetration to match the conditions identified in the installation schedule.
 - 3. The accepted Shop Drawing will be included in the Operations and Maintenance Manual.
- D. Through-Penetration Firestop System Schedule: Indicate locations of each through-penetration firestop system, along with the following information:
 - 1. Types of penetrating items.
 - 2. Types of constructions penetrated, including fire-resistance ratings and, where applicable, thicknesses of construction penetrated.
 - 3. Through-penetration firestop systems for each location identified by firestop design designation of qualified testing and inspecting agency.
- E. Sample of label for use at penetrations or at given lengths along a joint detail.
- F. Qualification Data: For Installer.
- G. Installer Certificates: From Installer indicating penetration firestopping has been installed in compliance with requirements and manufacturer's written recommendations for inclusion in the Operations and Maintenance Manual.
- H. Product Test Reports: From a qualified testing agency indicating through-penetration firestop system complies with requirements, based on comprehensive testing of current products.

1.3 QUALITY ASSURANCE

- A. Installer Qualifications: A firm that has been approved by FM Global according to FM Global 4991, "Approval of Firestop Contractors," or been evaluated by UL and found to comply with its "Qualified Firestop Contractor Program Requirements" or accredited by the manufacturer of the firestop system used.
 - 1. The following is a list of approved contractors in the general area of the Project. Other firms, subject to compliance with requirements, may be accepted.
 - a. Chesapeake Firestop, Inc., 301.990.7173, Rockville, Maryland.
 - b. M.W. Holmes Construction Inc., 440.354.9214.
 - c. Multicon Fire Containment, 614-351-2683 (Randy Bosscawen) 1320 McKinley Ave. Suite C, Columbus, Ohio 43222.
 - d. JHC Fire Containment Solutions 1-877-542-6029 (Jim Shells) Cranberry Township, PA.
 - e. Cavalier Firestop Systems 1-800-210-1267 (Mike Kennedy) 4399 Leechburg Road, Lower Burrell PA 15068.
 - f. Pyro-Stop, LLC 1-610-485-9436 (Scott Rankin) Philadelphia, Pennsylvania.
- B. Installation Responsibility: Assign installation of through-penetration firestop systems and fire-resistive joint systems in Project to a single qualified installer.
- C. Source Limitations: Obtain through-penetration firestop systems, for each kind of penetration and construction condition indicated, through one source from a single manufacturer.

- D. Fire-Test-Response Characteristics: Provide through-penetration firestop systems that comply with the following requirements and those specified in Part 1 "Performance Requirements" Article:
1. Firestopping tests are performed by a qualified testing and inspecting agency. A qualified testing and inspecting agency is UL or another agency performing testing and follow-up inspection services for firestop systems acceptable to authorities having jurisdiction.
 2. Through-penetration firestop systems are identical to those tested per testing standard referenced in "Part 1 Performance Requirements" Article. Provide rated systems complying with the following requirements:
 - a. Through-penetration firestop system products bear classification marking of qualified testing and inspecting agency.
 - b. Through-penetration firestop systems correspond to those indicated by reference to through-penetration firestop system designations listed by the following:
 - 1) UL in its "Fire Resistance Directory."

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver through-penetration firestop system products to Project site in original, unopened containers or packages with intact and legible manufacturers' labels identifying product and manufacturer, date of manufacture, lot number, shelf life if applicable, qualified testing and inspecting agency's classification marking applicable to Project, curing time, and mixing instructions for multicomponent materials.
- B. Store and handle materials for through-penetration firestop systems to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.5 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install through-penetration firestop systems when ambient or substrate temperatures are outside limits permitted by through-penetration firestop system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.
- B. Ventilate through-penetration firestop systems per manufacturer's written instructions by natural means or, where this is inadequate, forced-air circulation.

1.6 COORDINATION

- A. Coordinate construction of openings and penetrating items to ensure that through-penetration firestop systems are installed according to specified requirements.
- B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate through-penetration firestop systems.
- C. Do not cover up through-penetration firestop system installations that will become concealed behind other construction until each installation has been examined by building inspector, if required by authorities having jurisdiction.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General: For penetrations through the following fire-resistance-rated constructions, including both empty openings and openings containing penetrating items, provide through-penetration firestop systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated.
 - 1. Fire-resistance-rated walls including fire barriers.
- B. Rated Systems: Provide through-penetration firestop systems with the following ratings determined per UL 1479:
 - 1. F-Rated Systems: Provide through-penetration firestop systems with F-ratings indicated, but not less than that equaling or exceeding fire-resistance rating of constructions penetrated.
 - 2. T-Rated Systems: For the following conditions, provide through-penetration firestop systems with T-ratings indicated, as well as F-ratings, where systems protect penetrating items exposed to potential contact with adjacent materials in occupiable floor areas:
 - a. Penetrations located outside wall cavities.
 - b. Penetrations located outside fire-resistance-rated shaft enclosures.
 - 3. L-Rated Systems: Provide through-penetration firestop systems with L-ratings of not more than 3.0 cfm/sq. ft. at both ambient temperatures and 400 deg F.
- C. W-Rating: Provide penetration firestopping showing no evidence of water leakage when tested according to UL 1479.
- D. Exposed Penetration Firestopping: Provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.
- E. VOC Content: Provide penetration firestopping that complies 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.
- F. For through-penetration firestop systems exposed to view, traffic, moisture, and physical damage, provide products that, after curing, do not deteriorate when exposed to these conditions both during and after construction.
 - 1. For piping penetrations for plumbing systems, provide moisture-resistant through-penetration firestop systems.
 - 2. For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of insulation.
- G. For through-penetration firestop systems exposed to view, provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.

2.2 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. A/D Fire Protection Systems Inc.
 - 2. Grace Construction Products.
 - 3. Hilti, Inc.

4. Nelson Firestop Products.
5. RectorSeal Corporation.
6. Specified Technologies Inc. (STI)
7. 3M Fire Protection Products.
8. Tremco, Inc.; Tremco Fire Protection Systems Group.
9. USG Corporation.

2.3 FIRESTOPPING, GENERAL

- A. Provide penetration firestopping that is produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems must be compatible with one another, with the substrates forming openings, and with penetrating items if any.
- B. Compatibility: Provide through-penetration firestop systems that are compatible with one another; with the substrates forming openings; and with the items, if any, penetrating through-penetration firestop systems, under conditions of service and application, as demonstrated by through-penetration firestop system manufacturer based on testing and field experience.
- C. Accessories: Provide components for each through-penetration firestop system that are needed to install fill materials and to comply with Part 2 "Performance Requirements" Article. Use only components specified by through-penetration firestop system manufacturer and approved by qualified testing and inspecting agency for firestop systems indicated.

2.4 FILL MATERIALS

- A. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer metallic sleeve lined with an intumescent strip, a radial extended flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.
- B. Latex Sealants: Single-component latex formulations that do not re-emulsify after cure during exposure to moisture.
- C. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.
- D. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced elastomeric sheet bonded to galvanized-steel sheet.
- E. Intumescent Putties: Nonhardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.
- F. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.
- G. Mortars: Prepackaged dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.
- H. Pillows/Bags: Reusable heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents, and fire-retardant additives. Where exposed, cover openings with steel-reinforcing wire mesh to protect pillows/bags from being easily removed.
- I. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

- J. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below:
 - 1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces, and nonsag formulation for openings in vertical and sloped surfaces, unless indicated firestopping limits use of nonsag grade for both opening conditions.

2.5 MIXING

- A. For those products requiring mixing before application, comply with through-penetration firestop system manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of work.
 - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning: Clean out openings immediately before installing through-penetration firestop systems to comply with firestop system manufacturer's written instructions and with the following requirements:
 - 1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of through-penetration firestop systems.
 - 2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with through-penetration firestop systems. Remove loose particles remaining from cleaning operation.
- B. Priming: Prime substrates where recommended in writing by through-penetration firestop system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.
- C. Masking Tape: Use masking tape to prevent through-penetration firestop systems from contacting adjoining surfaces that will remain exposed on completion of Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from firestop system materials. Remove tape as soon as possible without disturbing firestop system's seal with substrates.

3.3 INSTALLATION

- A. General: Install through-penetration firestop systems to comply with Part 1 "Performance Requirements" Article and with firestop system manufacturer's written installation instructions and published drawings for products and applications indicated.

- B. Install forming/damming/backing materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
 - 1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of firestop systems.
- C. Install fill materials for firestop systems by proven techniques to produce the following results:
 - 1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
 - 2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
 - 3. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 IDENTIFICATION

- A. Identify through-penetration firestop systems with preprinted metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of edge of the firestop systems so that labels will be visible to anyone seeking to remove penetrating items or firestop systems. Use mechanical fasteners for metal labels. For plastic labels, use self-adhering type with adhesives capable of permanently bonding labels to surfaces on which labels are placed and, in combination with label material, will result in partial destruction of label if removal is attempted. Include the following information on labels:
 - 1. The words "Warning - Through-Penetration Firestop System - Do Not Disturb. Notify Building Management of Any Damage."
 - 2. Contractor's name, address, and phone number.
 - 3. Through-penetration firestop system designation of applicable testing and inspecting agency.
 - 4. Date of installation.
 - 5. Through-penetration firestop system manufacturer's name.
 - 6. Installer's name.

3.5 CLEANING AND PROTECTING

- A. Clean off excess fill materials adjacent to openings as Work progresses by methods and with cleaning materials that are approved in writing by through-penetration firestop system manufacturers and that do not damage materials in which openings occur.
- B. Provide final protection and maintain conditions during and after installation that ensure that through-penetration firestop systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated through-penetration firestop systems immediately and install new materials to produce systems complying with specified requirements.

3.6 THROUGH-PENETRATION FIRESTOP SYSTEM SCHEDULE

- A. Where UL-classified systems are indicated, they refer to alpha-alpha-numeric designations listed in UL's "Fire Resistance Directory" under product Category XHEZ.
- B. Firestop Systems with No Penetrating Items FS-1:
 - 1. UL-Classified Systems: C-AJ-0001-0999, C-BJ-0001-0999 and W-J-0001-0999.
- C. Firestop Systems for Metallic Pipes, Conduit, or Tubing FS-2:
 - 1. UL-Classified Systems: C-AJ-1001-1999, C-BJ-1001-1999 and W-J-1001-1999.

- D. Firestop Systems for Nonmetallic Pipe, Conduit, or Tubing FS-3:
 - 1. UL-Classified Systems: C-AJ-2001-2999, C-BJ-2001-2999, and W-J-2001-2999.
- E. Firestop Systems for Electrical Cables FS-4:
 - 1. UL-Classified Systems: C-AJ-3001-3999, C-BJ-3001-3999 and W-J-3001-3999.
- F. Firestopping for Cable Trays with Electric Cables. FS-5.
- G. Firestop Systems for Insulated Pipes FS-6:
 - 1. UL-Classified Systems: C-AJ-5001-5999, C-BJ-5001-5999 and W-J-5001-5999.
- H. Firestop Systems for Miscellaneous Electrical Penetrants FS-7:
 - 1. UL-Classified Systems: C-AJ-6001-6999.
- I. Firestop Systems for Miscellaneous Mechanical Penetrants FS-8
 - 1. UL-Classified Systems: C-AJ-7001-7999 and W-J-7001-7999.
- J. Firestop Systems for Groupings of Penetrants FS-9:
 - 1. UL-Classified Systems: C-AJ-8001-8999, C-BJ-8001-8999 and W-J-8001-8999.
- K. Firestopping at Tops of Walls & Partitions. FS-10
- L. Firestopping at Bottom of Walls and Partitions. FS-11.
- M. Firestopping at other locations. FS-12.

END OF SECTION 07 8413

SECTION 07 9213 - ELASTOMERIC JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Silicone joint sealants.
 - 2. Urethane joint sealants.
 - 3. Latex joint sealants.
 - 4. Acoustical joint sealants.
- B. Related Sections:
 - 1. Section 04 2000 "Unit Masonry" for masonry control and expansion joint fillers and gaskets.
 - 2. Section 07 8446 "Fire-Resistive Joint Systems" for sealing joints in fire-resistance-rated construction.
 - 3. Section 08 8000 "Glazing" for glazing sealants.
 - 4. Section 09 2900 "Gypsum Board" for sealing perimeter joints.
 - 5. Section 09 5113 "Acoustical Panel Ceilings" for sealing edge moldings at perimeters with acoustical sealant.

1.2 PRECONSTRUCTION TESTING

- A. Preconstruction Compatibility and Adhesion Testing: Submit to joint-sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.
 - 1. Use ASTM C 1087 or manufacturer's standard test method to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
 - 2. Submit not fewer than eight pieces of each kind of material, including joint substrates, shims, joint-sealant backings, secondary seals, and miscellaneous materials.
 - 3. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
 - 4. For materials failing tests, obtain joint-sealant manufacturer's written instructions for corrective measures including use of specially formulated primers.
 - 5. Testing will not be required if joint-sealant manufacturers submit joint preparation data that are based on previous testing, not older than 24 months, of sealant products for adhesion to, and compatibility with, joint substrates and other materials matching those submitted.
- B. Preconstruction Field-Adhesion Testing: Before installing sealants, field test their adhesion to Project joint substrates as follows:
 - 1. Locate test joints where indicated on Project or, if not indicated, as directed by Architect.
 - 2. Conduct field tests for each application indicated below:
 - a. Each kind of sealant and joint substrate indicated.
 - 3. Notify Architect seven days in advance of dates and times when test joints will be erected.
 - 4. Arrange for tests to take place with joint-sealant manufacturer's technical representative present.
 - a. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.
 - 1) For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.

5. Report whether sealant failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. For sealants that fail adhesively, retest until satisfactory adhesion is obtained.
6. Evaluation of Preconstruction Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing, in absence of other indications of noncompliance with requirements, will be considered satisfactory. Do not use sealants that fail to adhere to joint substrates during testing.

1.3 ACTION SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.
- B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.
- C. Samples for Verification: For each kind and color of joint sealant required, provide Samples with joint sealants in 1/2-inch-wide joints formed between two 6-inch-long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.
- D. Joint-Sealant Schedule: Include the following information:
 1. Joint-sealant application, joint location, and designation.
 2. Joint-sealant manufacturer and product name.
 3. Joint-sealant formulation.
 4. Joint-sealant color.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer and testing agency.
- B. Product Certificates: For each kind of joint sealant and accessory, from manufacturer.
- C. Sealant, Waterproofing, and Restoration Institute (SWRI) Validation Certificate: For each sealant specified to be validated by SWRI's Sealant Validation Program.
- D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that sealants comply with requirements.
- E. Preconstruction Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating the following:
 1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
 2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.
- F. Preconstruction Field-Adhesion Test Reports: Indicate which sealants and joint preparation methods resulted in optimum adhesion to joint substrates based on testing specified in "Preconstruction Testing" Article.
- G. Warranties: Sample of special warranties.

1.5 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. Product Testing: Test joint sealants using a qualified testing agency.
 - 1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.
 - 2. Test according to SWRI's Sealant Validation Program for compliance with requirements specified by reference to ASTM C 920 for adhesion and cohesion under cyclic movement, adhesion-in-peel, and indentation hardness.
- D. 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.

1.6 PROJECT CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
 - 1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
 - 2. When joint substrates are wet.
 - 3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
 - 4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.7 WARRANTY

- A. Special Installer's Warranty: Manufacturer's standard form in which Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: Two years from date of Substantial Completion.
- B. Special Manufacturer's Warranty: Manufacturer's standard form in which joint-sealant manufacturer agrees to furnish joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: Five years from date of Substantial Completion.
- C. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:
 - 1. Movement of the structure caused by structural settlement or errors attributable to design or construction resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
 - 2. Disintegration of joint substrates from natural causes exceeding design specifications.
 - 3. Mechanical damage caused by individuals, tools, or other outside agents.
 - 4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.
- B. Liquid-Applied Joint Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied joint sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.
- C. Stain-Test-Response Characteristics: Where sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.
- D. Suitability for Contact with Food: Where sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.
- E. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 SILICONE JOINT SEALANTS

- A. Mildew-Resistant, Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT.
 - 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. Pecora Corporation; 898.

2.3 URETHANE JOINT SEALANTS

- A. Single-Component, Nonsag, Urethane Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT.
 - 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. BASF Building Systems; Sonolastic NP1.
 - b. Bostik, Inc.; Chem-Calk 915.
 - c. Pacific Polymers International, Inc.; Elasto-Thane 230 Type II.
 - d. Pecora Corporation; Dynatrol I-XL.
 - e. Polymeric Systems, Inc.; Flexiprene 1000.
 - f. Sika Corporation, Construction Products Division; Sikaflex - 1a.
 - g. Tremco Incorporated; Vulkem 116.

- B. Single-Component, Nonsag, Traffic-Grade, Urethane Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use T.
 - 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. BASF Building Systems; Sonolastic NP1.
 - b. Pacific Polymers International, Inc.; Elasto-Thane 230 Type II.
 - c. Sika Corporation, Construction Products Division; Sikaflex - 1a.
 - d. Tremco Incorporated; Vulkem 116.
- C. Single-Component, Pourable, Traffic-Grade, Urethane Joint Sealant: ASTM C 920, Type S, Grade P, Class 25, for Use T.
 - 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. BASF Building Systems; Sonolastic SL 1.
 - b. Bostik, Inc.; Chem-Calk 950.
 - c. Pecora Corporation; Urexpan NR-201.
 - d. Sika Corporation. Construction Products Division; Sikaflex - 1CSL.
 - e. Tremco Incorporated; Vulkem 45.

2.4 LATEX JOINT SEALANTS

- A. Latex Joint Sealant: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.
 - 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. BASF Building Systems; Sonolac.
 - b. Bostik, Inc.; Chem-Calk 600.
 - c. Tremco Incorporated; Tremflex 834.

2.5 ACOUSTICAL JOINT SEALANTS

- A. Acoustical Joint Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
 - 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. Pecora Corporation; AC-20 FTR.
 - b. USG Corporation; SHEETROCK Acoustical Sealant.

2.6 JOINT SEALANT BACKING

- A. General: Provide sealant backings of material that are nonstaining; 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 B (bicellular 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.

2.7 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: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
 - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
 - 2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
 - a. Concrete.
 - b. Masonry.
 - c. Unglazed surfaces of ceramic tile.
 - d. Exterior insulation and finish systems.
 - 3. Remove laitance and form-release agents from concrete.
 - 4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
 - a. Metal.
 - b. Glass.
 - c. Porcelain enamel.
 - d. Glazed surfaces of ceramic tile.

- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 - 1. Do not leave gaps between ends of sealant backings.
 - 2. Do not stretch, twist, puncture, or tear sealant backings.
 - 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
- D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
 - 1. Place sealants so they directly contact and fully wet joint substrates.
 - 2. Completely fill recesses in each joint configuration.
 - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- F. Tooling of Nonsag 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.
- G. Acoustical Sealant Installation: At sound-rated assemblies and elsewhere as indicated, seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations.

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.

3.6 JOINT-SEALANT SCHEDULE

- A. Joint-Sealant Application: Exterior joints in horizontal traffic surfaces.
 - 1. Joint Locations:
 - a. Isolation and contraction joints in cast-in-place concrete slabs.
 - 2. Urethane Joint Sealant: Single component, pourable, traffic grade.
 - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- B. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal nontraffic surfaces.
 - 1. Joint Locations:
 - a. Construction joints in cast-in-place concrete.
 - b. Joints between plant-precast architectural concrete units.
 - c. Control and expansion joints in unit masonry.
 - d. Joints in exterior insulation and finish systems.
 - e. Joints between metal panels.
 - f. Joints between different materials listed above.
 - g. Perimeter joints between materials listed above and frames of doors windows and louvers.
 - 2. Urethane Joint Sealant: Single component, nonsag, Class 25.
 - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- C. Joint-Sealant Application: Interior joints in horizontal traffic surfaces.
 - 1. Joint Locations:
 - a. Isolation joints in cast-in-place concrete slabs.
 - b. Control and expansion joints in tile flooring.
 - 2. Urethane Joint Sealant: Single component, nonsag, traffic grade.
 - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- D. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces.
 - 1. Joint Locations:
 - a. Control and expansion joints on exposed interior surfaces of exterior walls.
 - b. Perimeter joints of exterior openings where indicated.
 - c. Tile control and expansion joints.
 - d. Vertical joints on exposed surfaces of interior unit masonry walls.
 - e. Joints on underside of plant-precast structural concrete planks.
 - f. Perimeter joints between interior wall surfaces and frames of interior doors windows and elevator entrances.
 - 2. Joint Sealant: Latex.
 - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

E. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces.

1. Joint Sealant Location:

- a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
- b. Tile control and expansion joints where indicated.

2. Joint Sealant: Mildew resistant, single component, nonsag, neutral curing, Silicone.

3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

F. Joint-Sealant Application: Interior acoustical joints in vertical surfaces and horizontal nontraffic surfaces.

1. Joint Location:

- a. Acoustical joints where indicated.
- b. Other joints as indicated.

2. Joint Sealant: Acoustical.

3. Joint-Sealant Color: As selected by Architect from manufacturer's full range.

END OF SECTION 07 9213

SECTION 08 1213 - HOLLOW METAL FRAMES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes interior and exterior standard steel frames, factory-primed for field-coat finish.
 - 1. Hollow metal frames for the following applications:
 - a. Transaction window.
 - b. Cased openings.
 - c. Wood doors, FRP doors, glazed sidelites and transom lites.
- B. Related Sections:
 - 1. Div 08 Section "Flush Wood Doors" - Wood doors for mounting in standard steel frames.
 - 2. Div 08 Section "Door Hardware" - Door hardware for hollow-metal doors and frames.
 - 3. Div 09 Painting Sections – Field finishing steel frames.
 - 4. Division 26 and 28 Sections for electrical and access control requirements at doors
- C. Coordination:
 - 1. 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.
 - 2. Coordinate requirements for installation of door hardware, electrified door hardware, and access control.
 - 3. Coordinate requirements for fitting and installation of doors specified in other Sections.
 - 4. Coordinate and confirm compatibility of primed steel finishes with field-applied coatings specified in Section 09 9123.

1.2 PRE-INSTALLATION MEETINGS

- A. Pre-Submittal Conference: Conduct conference at jobsite with attendance by representatives of Supplier, Installer, and Contractor to review proper methods and procedures for installing hollow metal doors and frames and to verify installation of electrical knockout boxes and conduit at frames with electrified or access control hardware.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
 - 1. Include construction details, material descriptions, fire-resistance ratings, temperature-rise ratings, and finishes.
- B. Door hardware supplier is to furnish templates, template reference number and/or physical hardware to the steel frame supplier in order to prepare the frames to receive the finish hardware items.
- C. Shop Drawings: Include elevations, door edge details, frame profiles, metal thicknesses, preparations for hardware, and other details, including, but not limited to, conduit and details for electrified door hardware and glazing stops.
 - 1. Include details of each different wall opening condition.
 - 2. Include details of anchorages, accessories, joints, and connections.
 - 3. Include details of glazing frames and stops showing glazing.

- D. Schedule: For steel frames, prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings.
 - 1. Coordinate with final door hardware schedule.

1.4 INFORMATIONAL SUBMITTALS

- A. Technical Information: Submit latest edition of manufacturer's product data providing product descriptions, technical data and installation instructions. Including blank warranty form.
- B. Installer Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- C. Qualification Data for Door Inspector. Submit copy of DHI Fire Door Assembly Inspector (FDAI) certificate, in compliance with NFPA 80, section 5.2.3.1
- D. Product Test Reports: For each type of fire-rated steel door assembly and door/sidelight for tests performed by a qualified testing agency indicating compliance with performance requirements.
- E. Field quality control reports.

1.5 CLOSEOUT SUBMITTALS

- A. Record Documents: For fire-rated assemblies, list of door numbers and applicable room name and number to which door accesses.
- B. Executed Warranties.

1.6 QUALITY ASSURANCE

- A. Fire-Rated Door Inspector Qualifications: Inspector for field quality control inspections of fire-rated door assemblies shall meet the qualifications set forth in NFPA 80, section 5.2.3.1 and the following:
 - 1. Door and Hardware Institute Fire and Egress Door Assembly Inspector (FDAI) certification.
- B. Source Limitations:
 - 1. Obtain standard steel frames through one source from a single manufacturer.
 - 2. Obtain glazing and accessories from one source for each product and installation method indicated
- C. Quality Standard: In addition to requirements specified, furnish SDI-Certified manufacturer products that comply with ANSI/SDI A250.8, latest edition, "Recommended Specifications for Standard Steel Doors and Frames".
- D. Installer Qualifications: An employer of workers trained and approved by manufacturer.
 - 1. Employ an experienced installer who has completed glazing similar in material, design, and extent to that indicated for this Project; whose work has resulted in glass installations with a record of successful in-service performance; and who employs glass installers for this Project who are certified under the National Glass Association Glazier Certification Program as Level 2 (Senior Glaziers) or Level 3 (Master Glaziers).
- E. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at as close to neutral pressure as possible according to NFPA 252 or UL 10B.
 - 1. Temperature-Rise Limit: At vertical exit enclosures and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F above ambient after 30 minutes of standard fire-test exposure.

- F. Certification: Signed by manufacturers of glass and glazing products certifying that products furnished comply with requirements.
 - 1. Door assemblies shall be tested to the acceptance criteria of ASTM E2074-00, NFPA 252, UL 9, UL 10-C Standard Methods of Fire Tests of Door Assemblies.
 - 2. Window assemblies shall be tested to the acceptance criteria of ASTM E2010-01, NFPA 257, UL 10-B, UL 10C Standard methods for Fire Tests of Window Assemblies.
 - 3. Wall assemblies shall be tested to the acceptance criteria of ASTM E119, NFPA 251, UL 263 Standard Test Methods for Fire Tests of Building Construction and Materials.
 - 4. Underwriters Laboratories (UL) shall conduct fire test.
- G. Smoke-Control Door Assemblies: Comply with NFPA 105 or UL 1784.
 - 1. Smoke "S" Label: Doors to bear "S" label, and include smoke and draft control gasketing applied to frame and on meeting stiles of pair doors.
- H. Regulatory Requirements: Comply with provisions of the following:
 - 1. Where indicated to comply with accessibility requirements, comply with ANSI A117.1, as follows:
 - a. Handles, Pulls, Latches, Locks, and other Operating Devices: Shape that is easy to grasp with one hand and does not require tight grasping, tight pinching, or twisting of the wrist.
 - b. Door Closers: Comply with the following maximum opening-force requirements indicated:
 - 1) Fire Doors: Minimum opening force allowable by authorities having jurisdiction.
 - 2. NFPA 101: Comply with the following for means of egress doors:
 - a. Latches, Locks, and Exit Devices: Not more than 15 lbf to release the latch. Locks shall not require the use of a key, tool, or special knowledge for operation.
 - b. Door Closers: Not more than 30 lbf to set door in motion and not more than 15 lbf to open door to minimum required width.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver frames palletized, wrapped, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.
 - 1. Provide additional protection to prevent damage to finish of factory-finished frames.
 - 2. At delivery inspect all containers for damage.
 - 3. Examine glass and frame units for damage.
 - 4. List all damage to containers on the shipping company's Bill of Lading
 - 5. Report damage to manufacturer immediately.
 - 6. Store glazing materials and frame units in original packing containers
 - 7. Do not expose glazing material of frame units to sunlight and weather.
 - 8. Do not store horizontally.
 - 9. Place glass and frames upright, no less than 6 degrees from vertical.
 - 10. Store all materials in dry conditions, off the ground.
 - 11. Protect from construction activities.
 - 12. Fully support glass units along entire length
 - 13. Glass and frame units must be separated by non abrasive pads such as cloth or cork.
 - 14. Do not stack containers
- B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
- C. Store frames under cover at Project site. Place units in a vertical position with heads up, spaced by blocking, on minimum 4-inch-high wood blocking. Avoid using nonvented plastic or canvas shelters that could create a humidity chamber.

1.8 PROJECT CONDITIONS

- A. Field Measurements: Verify openings by field measurements before fabrication and indicate measurements on Shop Drawings.

1.9 COORDINATION

- A. Coordinate installation of anchorages for standard steel frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in masonry. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Basis of Design: Curries Company; an Assa Abloy Group company.
 - 2. Steelcraft; an Allegion brand.
 - 3. Amweld Building Products, LLC.
 - 4. Ceco Door Products; an Assa Abloy Group company.
 - 5. Republic Doors and Frames; an Allegion brand
 - 6. Pioneer Industries, Inc., an Assa Abloy Group company

2.2 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, CS, Type B; suitable for exposed applications.
- B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, CS, Type B for reinforcing and other concealed locations.
- C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 or A60 metallic coating for interior doors and G90 for exterior doors.
- D. Frame Anchors: ASTM A 591/A 591M, Commercial Steel (CS), 40Z coating designation; mill phosphatized.
 - 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: Not permitted.
- G. 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.
- H. Spray Polyurethane Foam Insulation: ASTM C1029, Type II, closed cell, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E84.
- I. Glazing: Division 08 Glazing Sections.
- J. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat.

2.3 STANDARD HOLLOW METAL FRAMES

- A. General: Comply with ANSI/SDI A250.8.
 - 1. Fire rated frames: Fabricate per NFPA 80, listed and labeled by a qualified testing agency, for fire-protection ratings indicated.
 - a. Frames at labeled doors shall bear the same frame label.
 - 2. Hardware Reinforcement: Per ANSI/SDI A250.6 Table 4 with reinforcement plates from same material as frames.
- B. Exterior Frames: Fabricated of hot-dipped zinc coated steel that complies with ASTM A 653, Coating Designation A60.
 - 1. Fabricate frames with mitered or coped corners. Profile as indicated on drawings.
 - 2. Fabricate frames as full profile welded unless otherwise indicated.
 - 3. Frames for Level 4 Steel Doors: 0.067-inch-(14-gage) thick steel sheet.
- C. Thermal Break Frames: Subject to the same compliance standards and requirements as standard hollow metal frames. Tested for thermal performance in accordance with NFRC 102, and resistance to air infiltration in accordance with NFRC 400. Where indicated provide thermally broken frame profiles available for use in both masonry and drywall construction. Fabricate with 1/16" positive thermal break and integral vinyl weatherstripping.
- D. Interior Frames: Fabricated from cold-rolled steel sheet.
 - 1. Fabricate frames with mitered or coped and welded face corners and seamless face joints.
 - 2. Frames for Level 3 Steel Doors: 0.053-inch-(14-gage) thick steel sheet.
 - 3. Frames for Wood Doors: 0.053-inch-(14-gage) thick steel sheet.
 - 4. Frames for Borrowed Lights: 0.053-inch-(14-gage) thick steel sheet.
 - 5. Sidelite and Transom Frames: Fabricated from same thickness material as adjacent door frame.
 - 6. Construction: Full profile welded with mitered or coped corners with all welds ground smooth on exposed surfaces unless otherwise noted. Profile as indicated on drawings.
 - a. Exception: Subject to approval, knocked-down frames may be used in office areas where prevailing codes permit and where door slabs do not exceed 36 inches in width.
- E. Hardware Reinforcement: ANSI/SDI A250.6. Fabricate reinforcement plates from same material as frames to comply with the following minimum sizes:
 - 1. Hinges: Minimum 0.123 inch thick by 1-1/2 inches wide by 6 inches longer than hinge, secured by not less than 6 spot welds.
 - 2. Lock Face, Flush Bolts, Closers, and Concealed Holders: Minimum 0.067 inch thick.
 - 3. All Other Surface-Mounted Hardware: Minimum 0.067 inch thick.

2.4 FRAME ANCHORS

- A. Jamb Anchors; minimum size and type required by applicable door and frame standard, and suitable for performance level indicated:
 - 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 to permit unobstructed grouting of frames.
 - 2. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick.
 - 3. Postinstalled 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, not less than 0.042 inch thick, and as follows:
 - 1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.

2. Separate Topping Concrete Slabs: Adjustable-type anchors with extension clips, allowing not less than 2-inch height adjustment. Terminate bottom of frames at finish floor surface.

2.5 STOPS AND MOLDINGS

- A. Fixed Frame Moldings: Formed integral with hollow metal frames, a minimum of 5/8 inch high unless otherwise indicated.
- B. Loose Stops for Glazed Lites in Frames: Minimum 0.042 inch thick, same material as frames.
- C. Glazing: Comply with requirements in Division 08 Glazing Sections.

2.6 ACCESSORIES

- A. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.
- B. Ceiling Struts: Minimum 1/4-inch-thick by 1-inch-wide steel.
- C. Grout Guards: Formed from same material as frames, not less than 0.016 inch thick.

2.7 FABRICATION

- A. General: Fabricate standard steel frames to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.
 1. When shipping limitations so dictate, frames for large openings are to be fabricated in sections for splicing or splining in the field.
- B. Tolerances: Fabricate hollow metal work to tolerances indicated in SDI 117.
- C. Hollow Metal Frames: Fabricate in one piece except where handling and shipping limitations require multiple sections. Where frames are fabricated in sections, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
 1. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
 2. Sidelight and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
 3. Equal Rabbet Frames: Provide frames with equal rabbet dimensions unless glazing and removable stops require wider dimensions on glass side of frame.
 4. High Frequency Hinge Reinforcement: Provide high frequency hinge reinforcements at door openings 48-inches and wider with mortise butt type hinges at top hinge locations.
 5. Continuous Hinge Reinforcement: Provide welded continuous 12 gauge straps for continuous hinges specified in hardware sets in Division 08 Section "Door Hardware".
 6. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
 7. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
 - a. Welded frames shall be filled with spray-foam insulation, unless otherwise noted.
 8. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
 9. Jamb Anchors: Provide number and spacing of anchors as follows:
 - a. Masonry Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. 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 1 additional anchor per jamb for each 24 inches or fraction thereof above 120 inches high.
- b. Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
- 1) Three anchors per jamb up to 60 inches high.
 - 2) Four anchors per jamb from 60 to 90 inches high.
 - 3) Five anchors per jamb from 90 to 96 inches high.
 - 4) Five anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.
 - 5) Two anchors per head for frames more than 42 inches wide and mounted in metal-stud partitions.
- c. Postinstalled Expansion Type: Locate anchors not more than 6 inches from top and bottom of frame. Space anchors not more than 26 inches o.c.
10. Door Silencers: Except on weather-stripped doors, drill stops to receive door silencers. Provide plastic plugs to keep holes clear during construction.
- a. Single-Door Frames: Three door silencers.
 - b. Double-Door Frames: Two door silencers at head jamb.
- D. Hardware Preparation: Factory prepare hollow metal work to receive templated mortised hardware according to the Door Hardware Schedule and templates furnished as specified in Division 08 Section "Door Hardware."
1. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8.
 2. Reinforce frames to receive nontemplated, mortised and surface-mounted door hardware.
 3. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.
 4. Coordinate locations of conduit and wiring boxes for electrical connections with Division 26 electrical Sections.
- E. Stops and Moldings: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints.
1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow metal work.
 2. Multiple Glazed Lites: Provide fixed and removable stops and moldings so that each glazed lite is capable of being removed independently.
 3. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
 4. Provide loose stops and moldings on inside of hollow metal work.
 5. Coordinate rabbet width between fixed and removable stops with type of glazing and type of installation indicated.

2.8 STEEL FINISHES

- A. Prime Finish: Apply manufacturer's standard primer immediately after cleaning and pretreating.
- B. Steel Surface Preparation: Clean surfaces to comply with SSPC-SP 1, "Solvent Cleaning"; remove dirt, oil, grease, or other contaminants that could impair paint bond. Remove mill scale and rust, if present, from uncoated steel; comply with SSPC-SP 3, "Power Tool Cleaning," or SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
- C. Factory Priming for Field-Painted Finish: Apply shop primer specified below immediately after surface preparation and pretreatment. Apply a smooth coat of even consistency to provide a uniform dry film thickness of not less than 0.7 mils.
1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; compatible with substrate and field-applied finish paint system indicated; and providing a sound foundation for field-applied topcoats despite prolonged exposure.

- D. Field Paint: See Division 09 Painting Sections

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 standard steel doors and frames.
1. Examine roughing-in for embedded and built-in anchors to verify actual locations of standard steel frame connections before frame installation.
 2. Ensure 3/8 inch shim space at all walls
 3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prior to installation and with installation spreaders in place, adjust and securely brace standard steel door frames for squareness, alignment, twist, and plumb to the following tolerances:
1. Tolerances shall comply with SDI-117 "Manufacturing Tolerances Standard Steel Doors and Frames."
- B. 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. Touch up factory-applied finishes where spreaders are removed.
- C. Coordinate frame preparation with requirements of scheduled hardware and door functions. Drill and tap frames to receive scheduled hardware.

3.3 INSTALLATION

- A. General: Provide frames of sizes, thicknesses, and designs indicated. Install standard steel frames plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.
1. Comply with SDI-117 "Manufacturing Tolerances Standard Steel Doors and Frames."
- B. Hollow Metal Frames: Comply with ANSI/SDI A250.11.
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. At fire-protection-rated openings, install frames according to NFPA 80.
 - b. 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.
 - c. Install frames with removable glazing stops located on secure side of opening.
 - d. Install door silencers in frames before grouting.
 - e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
 - f. Check plumbness, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
 - g. Field apply bituminous coating to backs of frames that are filled with grout containing antifreezing agents.
 2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.

3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation behind frames.
 - a. In-Place Gypsum Board Partitions: Secure frames in place with postinstalled expansion anchors through floor anchors at each jamb. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
 - b. Ceiling Struts: Extend struts vertically from top of frame at each jamb to overhead structural supports or substrates above frame unless frame is anchored to masonry or to other structural support at each jamb. Bend top of struts to provide flush contact for securing to supporting construction. Provide adjustable wedged or bolted anchorage to frame jamb members.
 - c. Welded frames shall be filled solid with spray-foam insulation unless otherwise noted.
 4. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.
 5. Concrete Walls: Solidly fill space between frames and concrete with grout. Take precautions, including bracing frames, to ensure that frames are not deformed or damaged by grout forces.
 6. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
 7. 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. Glazing: Comply with installation requirements in Division 08 Section "Glazing" and with hollow metal manufacturer's written instructions.
1. Provide nonremovable stops on outside of exterior doors and on secure side of interior doors for glass, louvers, and other panels in doors.
 2. Provide removable concealed fastener type screw-applied with snap-on cover or snap-on removable, glazing stops on inside of glass, louvers, and other panels in doors.
 3. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches o.c. and not more than 2 inches o.c. from each corner.

3.4 REPAIR AND TOUCH UP

- A. Limited to minor repair of small scratches. Use only manufacturer's recommended products.
 1. Such repairs shall match original finish for quality or material and view.
 2. Repairs and touch-up not visible from a distance of 5 feet Owner and Architect to approve.
- B. Remove and replace glass that is broken, chipped, cracked, abraded, or damaged.

3.5 FIELD QUALITY CONTROL

- A. Inspection Agency: Engage a qualified inspector to perform inspections and to furnish reports to Architect.
- B. Inspections: Inspect each fire-rated door in accordance with NFPA 80, section 5.2
- C. Repair or remove and replace installations where inspections indicate that they do not comply with specified requirements.
- D. Reinspect repaired or replaced installations to determine if replaced or repaired door assembly installations comply with specified requirements.

- E. Prepare and submit separate inspection report for each fire-rated door assembly indicating compliance with each item listed in NFPA 80.

3.6 PROTECTING, 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.
- B. 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.
- C. Protect 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.
 - 1. Do not clean with astringent cleaners. Use a clean "grit free" cloth and a small amount of mild soap and water or mild detergent.
 - 2. Protect surface applied film. Do not use any of the following:
 - a. Steam jets
 - b. Abrasives
 - c. Strong acidic or alkaline detergents, or surface-reactive agents
 - d. Detergents not recommended in writing by the manufacturer
 - e. Do not use any detergent above 77 degrees F
 - f. Organic solvents including but not limited to those containing ester, ketones, alcohols, aromatic compounds, glycol ether, or halogenated hydrocarbons.
 - g. Metal or hard parts of cleaning equipment must not touch the glass surface
- D. Protect glass from contact with contaminating substances resulting from construction operations, including weld splatter. If, despite such protection, contaminating substances do come into contact with glass, remove them immediately as recommended by glass manufacturer.
- 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 by glass manufacturer.

END OF SECTION 08 1213

SECTION 08 1416 - FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Solid-core doors with high-pressure decorative-laminate veneer faces.
 - 2. Factory fitting flush wood doors to frames and factory machining for hardware.
- B. Related Sections:
 - 1. Division 08 Section "Hollow Metal Doors and Frames" – steel frames to receive wood doors
 - 2. Division 08 Section "Door Hardware" - finish hardware for flush wood doors
 - 3. Division 08 Section "Glazing" - glass view panels in flush wood doors.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of door indicated. Include details of core and edge construction and trim for openings. Include factory-finishing specifications. Include sound ratings where specified.
- B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; location and extent of hardware blocking; and other pertinent data.
 - 1. Indicate dimensions and locations of mortises and holes for hardware.
 - 2. Indicate dimensions and locations of cutouts.
 - 3. Indicate requirements for veneer matching.
 - 4. Indicate doors to be factory finished and finish requirements.
 - 5. Include details of sound control seals, door bottoms, and thresholds.
- C. Samples for Initial Selection: Color charts consisting of actual materials in small sections for plastic-laminate door faces proposed as other than scheduled products.
- D. Samples for Verification:
 - 1. Factory finishes applied to actual door face materials, approximately 8 by 10 inches, for each material and finish.
 - a. Submit corner sections of doors, approximately 8 by 10 inches with door faces and edges representing actual materials to be used.
 - 1) Provide samples for each color, texture, and pattern of laminate finish required
 - 2) Provide sample for sound seal where required.
 - 2. Frames for light openings, 6 inches long, for each material, type, and finish required.

1.3 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and acoustical testing agency.
- B. Product Certificates: For each type of sound control door assembly.

- C. Product Test Reports: For each sound control door assembly, for tests performed by a qualified testing agency, or by manufacturer and witnessed by a qualified testing agency.
- D. Warranty: Sample of special warranty.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: To include in maintenance manuals.

1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain flush wood doors from single manufacturer.
- B. Acoustical Testing Agency Qualifications: An independent agency accredited as an acoustical laboratory according to the National Voluntary Laboratory Accreditation Program of NIST.
- C. Quality Standard: In addition to requirements specified, comply with WDMA I.S.1-A, "Architectural Wood Flush Doors."
 - 1. Extra Heavy Duty
- D. Minimum Performance Criteria:
 - 1. Screw Holding: 700 lbs. minimum per TM10 WDMA.
 - 2. Split Resistance: 900 lbs. minimum per TM5 WDMA.
 - 3. Hinge Loading: 860 lbs. minimum per TM8 WDMA.
- E. Fire-Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 252.
 - 1. Temperature-Rise Rating: At exit enclosures, provide doors that have a temperature-rise rating of 450 deg F maximum in 30 minutes of fire exposure.
- F. Non-Fire-Rated Wood Doors: When non-fire-rated doors are indicated, provide without fire rating labels. Where labels are removed after manufacturing, finish door to remove evidence of label and its attachment.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Comply with requirements of referenced standard and manufacturer's written instructions.
 - 1. Provide additional protection to prevent damage to factory-finished units.
- B. Package doors individually in plastic bags or cardboard cartons.
- C. Mark each door on top and bottom rail with opening number used on Shop Drawings.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Warping (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section.
 - b. Telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch span.
 - c. Failure to meet sound rating requirements.
 - d. Faulty operation of sound seals.
 - 2. Warranty also includes installation and finishing that may be required due to repair or replacement of defective doors.
 - 3. Warranty Period for Solid-Core Interior Doors: Life of installation.
 - a. Sound Control Components: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Smoke- and Draft-Control Door Assemblies: Listed and labeled for smoke and draft control by a qualified testing agency acceptable to authorities having jurisdiction, based on testing in accordance with UL 1784 and installed in compliance with NFPA 105.

2.2 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Basis of Design: VT Industries
 - 2. Forte Opening Solutions (Marshfield-Algoma, Mohawk).
 - 3. Oshkosh Door Company.
 - 4. Ohio Valley Door; New Albany, IN

2.3 DOOR CONSTRUCTION, GENERAL

- A. Structural-Composite-Lumber-Core Doors: WDMA I.S.10.
 - 1. Colors, Patterns, and Finishes: As scheduled.
 - 2. Exposed Vertical and Top Edges: Match edgebands with face laminate. Clean edge on top.
 - 3. WDMA I.S.1-A Performance Grade: Extra Heavy Duty

2.4 VENEERED-FACED DOORS FOR LAMINATED FINISH

- A. Interior Solid-Core Doors:
 - 1. Core: Structural composite lumber with approved core material per WDMA acceptance criteria.
 - 2. Construction: Five plies. Stiles and rails are bonded to core, then entire unit abrasive planed before veneering.
 - 3. Edge Construction: At hinge stiles, provide manufacturer's standard laminated-edge construction with improved screw-holding capability and split resistance and with outer stile matching face veneer.

- B. Labeled Fire-Rated Doors:
1. Construction: Construction and core specified above for type of face indicated and meeting minimum test ratings indicated.
 2. Blocking: For mineral-core doors, provide composite blocking with improved screw-holding capability approved for use in doors of fire ratings indicated as follows:
 - a. 5-inch top-rail blocking.
 - b. 5-inch bottom-rail blocking, in doors indicated to have protection plates.
 - c. 5-inch midrail blocking, in doors indicated to have exit devices.
 3. Edge Construction: At hinge stiles, provide manufacturer's standard laminated-edge construction with improved screw-holding capability and split resistance and with outer stile matching face veneer.
 - a. 5/8-inch single-ply stiles.
 - b. For Single Doors and Pairs of Doors: No metal edges acceptable.

2.5 LIGHT FRAMES

- A. Wood Beads for Light Openings in Wood Doors: Provide manufacturer's standard wood beads as follows unless otherwise indicated. **Basis of Design: VT3 (107)**
1. Wood Species: Any compatible closed-grain hardwood.
 2. Profile: Manufacturer's standard shape.
- B. Wood-Veneered Beads for Light Openings in Fire Doors: Manufacturer's standard noncombustible beads matching door faces and approved for use in doors of fire rating indicated. Include concealed metal glazing clips where required for opening size and fire rating indicated.

2.6 FABRICATION

- A. Fabricate doors in sizes indicated for Project-site fitting.
- B. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.
1. Comply with clearance requirements of referenced quality standard for fitting. Comply with requirements in NFPA 80 for fire-rated doors.
 2. Bevel non-fire-rated doors 1/8 inch in 2 inches (3-1/2 degrees) at lock and hinge edges.
- C. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, DHI A115-W series standards, and hardware templates.
1. Coordinate with hardware mortises in metal frames to verify dimensions and alignment before factory machining.
- D. Openings: Cut and trim openings through doors in factory.
1. Light Openings: Trim openings with moldings of material and profile indicated.
 2. Glazing: Factory install glazing in doors indicated to be factory finished. Comply with applicable requirements in Division 08 Section "Glazing."
- E. Provide Factory-Undercut doors where scheduled.
- F. Transom and Side Panels: Fabricate panels to match adjoining doors in materials, finish, and quality of construction.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine doors and installed door frames before hanging doors.
 - 1. Verify that frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
 - 2. Reject doors with defects.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Hardware: For installation, see Division 08 Section "Door Hardware."
- B. Installation Instructions: Install doors to comply with manufacturer's written instructions and the referenced quality standard, and as indicated.
- C. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.
- D. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

3.3 ADJUSTING

- A. Operation: Rehang or replace doors that do not swing or operate freely.
- B. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION 08 1416

SECTION 08 3113 – ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Wall access doors and frames.
 - 2. Fire-rated access doors and frames.

1.2 SUBMITTALS

- A. Product Data: For each type of door and frame indicated. Include construction details relative to materials, individual components and profiles, finishes, and fire ratings (if required) for access doors and frames.
- B. Schedule: Provide complete door and frame schedule, including types, general locations, sizes, construction details, latching or locking provisions, and other data pertinent to installation.
- C. Coordination Drawings: Reflected ceiling plans drawn to scale and coordinating penetrations and ceiling-mounted items with concealed framing, suspension systems, piping, ductwork, and other construction. Show the following:
 - 1. Method of attaching door frames to surrounding construction.
 - 2. Ceiling-mounted items including access doors and frames, lighting fixtures, diffusers, grilles, speakers, sprinklers, and special trim.

1.3 QUALITY ASSURANCE

- A. Source Limitations: Obtain doors and frames through one source from a single manufacturer.
- B. Fire-Rated Access Doors and Frames: Units complying with NFPA 80 that are identical to access door and frame assemblies tested for fire-test-response characteristics per the following test method and that are labeled and listed by UL, ITS, or another testing and inspecting agency acceptable to authorities having jurisdiction:
 - 1. NFPA 252 or UL 10B for vertical access doors.
 - 2. ASTM E 119 and NFPA 251 or UL 263 for horizontal access doors and frames.
 - 3. Temperature Rise Rating: Provide floor doors that have a temperature rise rating of 325 deg F (163 deg C) maximum in 2 hours of fire exposure.
- C. Size Variations: Obtain Architect's acceptance of manufacturer's standard-size units, which may vary slightly from sizes indicated.

1.4 COORDINATION

- A. Verification: Determine specific locations and sizes for access doors needed to gain access to concealed equipment, and indicate on schedule specified in "Submittals" Article.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Acudor Products, Inc.
 - 2. Babcock-Davis.
 - 3. Cierra Products Inc.
 - 4. JL Industries, Inc.; a division of the Activar Construction Products Group.
 - 5. Elmdor/Stoneman; Div. of Acorn Engineering Co.
 - 6. Karp Associates, Inc.
 - 7. Milcor; a division of Hart & Cooley, Inc.
 - 8. Nystrom.

2.2 MATERIALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- B. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B, with A60 (ZF180) zinc-iron-alloy (galvannealed) coating or G60 (Z180) mill-phosphatized zinc coating; stretcher-leveled standard of flatness; with minimum thickness indicated representing specified thickness according to ASTM A 924/A 924M.
- C. Stainless-Steel Sheet, Strip, Plate, and Flat Bars: ASTM A 666, Type 304; with minimum sheet thickness indicated representing specified thickness according to ASTM A 480/A 480M.
- D. Stainless-Steel Bars and Shapes: ASTM A 276, Type 304.
- E. Drywall Beads: Edge trim formed from 0.0299-inch (0.76-mm) zinc-coated steel sheet formed to receive joint compound and in size to suit thickness of gypsum board.

2.3 PAINT

- A. Shop Primers: Provide primers that comply with Division 9 Section "Painting."
- B. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.

2.4 ACCESS DOORS AND FRAMES

- A. Flush, Insulated, Fire-Rated Access Doors and Trimless Frames: Fabricated from metallic-coated steel sheet. Use stainless steel sheet for access doors in kitchens, toilet rooms, shower rooms, and pool rooms.
 - 1. Locations: Gypsum board and plaster wall surfaces requiring a fire rating.
 - 2. Door Size: Minimum 2'x 2', unless indicated otherwise.
 - 3. Fire-Resistance Rating: As required for rated assembly.
 - 4. Temperature Rise Rating: 250 deg F at the end of 30 minutes.
 - 5. Door: Flush panel with a core of mineral-fiber insulation enclosed in sheet metal with a minimum thickness of 0.036 inch.
 - 6. Frame: Minimum 0.060-inch-thick sheet metal with drywall bead or plaster bead.
 - 7. Hinges: Concealed continuous piano hinge.
 - 8. Automatic Closer: Spring type.
 - 9. Latch and Lock: Self-latching door hardware, operated by knurled knob with interior release.

- B. Flush, Uninsulated, Fire-Rated Access Doors and Frames with Exposed Trim: Fabricated from metallic-coated steel sheet. Use stainless steel sheet for access doors in kitchens, toilet rooms, shower rooms, and pool rooms and crawl spaces.
 - 1. Locations: Masonry and ceramic-tile wall surfaces.
 - 2. Door Size: Minimum 2'x 2', unless indicated otherwise.
 - 3. Fire-Resistance Rating: As required for rated assembly.
 - 4. Door: Minimum 0.060-inch- thick sheet metal, flush construction.
 - 5. Frame: Minimum 0.060-inch-thick sheet metal with 1-1/4-inch-wide, surface-mounted trim.
 - 6. Hinges: Concealed continuous piano hinge.
 - 7. Automatic Closer: Spring type.
 - 8. Latch and Lock: Self-latching door hardware, operated by knurled knob with interior release
- C. Flush Access Doors and Frames with Exposed Trim: Fabricated from metallic-coated steel sheet. Use stainless steel sheet for access doors in kitchens, toilet rooms, shower rooms, and pool rooms.
 - 1. Locations: Masonry and ceramic-tile wall surfaces.
 - 2. Door Size: 2 feet wide by 4 feet high for toilet room chases.
 - 3. Door: Minimum 0.060-inch- thick sheet metal, set flush with exposed face flange of frame.
 - 4. Frame: Minimum 0.060-inch-thick sheet metal with 1-1/4-inch-wide, surface-mounted trim.
 - 5. Hinges: Concealed continuous piano hinge.
 - 6. Latch: Cam latch operated by spanner head or security pin tool with interior release.
- D. Recessed Access Doors and Trimless Frames: Fabricated from metallic-coated steel sheet. Use stainless steel sheet for access doors in kitchens, toilet rooms, shower rooms.
 - 1. Locations: Gypsum board and plaster wall and ceiling surfaces.
 - 2. Door Size: Minimum 2'x 2', unless indicated otherwise.
 - 3. Door: Minimum 0.060-inch-thick sheet metal in the form of a pan recessed 5/8 inch for gypsum board and plaster infill.
 - 4. Frame: Minimum 0.060-inch-thick sheet metal with drywall bead for gypsum board surfaces and plaster bead for plaster surfaces.
 - 5. Hinges: Concealed pivoting rod hinge for ceiling applications and continuous (piano) hinge for wall applications.
 - 6. Latch: Cam latch operated by spanner head or security pin tool with interior release.

2.5 FABRICATION

- A. General: Provide access door assemblies manufactured as integral units ready for installation.
- B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.
- C. Steel Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access panels to types of supports indicated.
 - 1. Exposed Flanges: As indicated.
 - 2. For trimless frames with drywall bead for installation in gypsum board assembly, provide edge trim for gypsum board securely attached to perimeter of frames.
 - 3. For trimless frames with plaster bead for full-bed plaster applications, provide zinc-coated expanded metal lath and exposed casing bead welded to perimeter of frames.
 - 4. Provide mounting holes in frames to attach frames to metal framing in plaster and drywall construction and to attach masonry anchors in masonry construction. Furnish adjustable metal masonry anchors.
- D. Recessed Access Doors: Form face of panel to provide recess for application of applied finish. Reinforce panel as required to prevent buckling.
 - 1. For recessed doors with plaster infill, provide self-furring expanded metal lath attached to door panel.

- E. Latching Mechanisms: Furnish number required to hold doors in flush, smooth plane when closed.
 - 1. For cylinder lock, furnish two keys per lock and key all locks alike.
 - 2. For recessed panel doors, provide access sleeves for each locking device. Furnish plastic grommets and install in holes cut through finish.
 - 3. For doors with latches released by and locks operated by mortise cylinders, prepare access doors for cylinders specified in Division 08 Section "Door Hardware."

2.6 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish metal fabrications after assembly.

2.7 METALLIC-COATED STEEL FINISHES

- A. Galvanizing of Steel Shapes and Plates: Hot-dip galvanize items indicated to comply with applicable standard listed below:
 - 1. ASTM A 123/A 123M, for galvanizing steel and iron products.
 - 2. ASTM A 153/A 153M, for galvanizing steel and iron hardware.
- B. Surface Preparation: Clean surfaces with nonpetroleum solvent so surfaces are free of oil and other contaminants. For galvanized surfaces, apply, after cleaning, a conversion coating suited to the organic coating to be applied over it. For metallic-coated surfaces, clean welds, mechanical connections, and abraded areas, and apply galvanizing repair paint specified below to comply with ASTM A 780.
 - 1. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.
- C. Factory Priming for Field-Painted Finish: Apply shop primer immediately after cleaning and pretreating.

2.8 STAINLESS-STEEL FINISHES

- A. Remove tool and die marks and stretch lines or blend into finish.
- B. Grind and polish surfaces to produce uniform, directionally textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.
- C. Bright, Directional Polish: No. 4 finish.
 - 1. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with manufacturer's written instructions for installing access doors and frames.
- B. Set frames accurately in position and attach securely to supports with plane of face panels aligned with adjacent finish surfaces.

- C. Install access doors with trimless frames and floor doors flush with adjacent finish surfaces or recessed to receive finish material.

3.2 ADJUSTING AND CLEANING

- A. Adjust doors and hardware after installation for proper operation.
- B. Remove and replace doors and frames that are warped, bowed, or otherwise damaged.

END OF SECTION 08 3113

SECTION 08 3323 - OVERHEAD COILING DOORS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following types of overhead coiling doors:
 - 1. Motorized exterior insulated service doors. (ICD)
- B. Related Sections:
 - 1. Section 05 5000 "Metal Fabrications" for miscellaneous steel supports.

1.2 DEFINITIONS

- A. Operation Cycle: One cycle of a door is complete when it is moved from the closed position to the fully open position and returned to the closed position.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type and size of overhead coiling door and accessory. Include the following:
 - 1. Summary of forces and loads on walls and jambs.
 - 2. Construction details, material descriptions, dimensions of individual components, profiles for slats, and finishes.
 - 3. Rated capacities, operating characteristics, electrical characteristics, and furnished accessories.
- B. Test Data: Independent testing lab results showing air infiltration in compliance with Performance Requirements.
- C. Shop Drawings: For each installation and for special components not dimensional or detailed in manufacturer's product data. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - 2. Points of attachment and their corresponding static and dynamic loads imposed on structure.
 - 3. For exterior components, include details of provisions for assembly expansion and contraction and for excluding and draining moisture to the exterior.
 - 4. Show locations of controls, locking devices, detectors or replaceable fusible links, and other accessories.
 - 5. Wiring Diagrams: For power, signal, and control wiring.
- D. Samples for Initial Selection: Manufacturer's color charts showing full range of colors available for units with factory-applied finishes.
- E. Samples for Verification: Of each type of exposed finish required, prepared on Samples of size indicated below.
 - 1. Curtain Slats: 12 inches long.
 - 2. Bottom Bar: 6 inches long.
 - 3. Guides: 6 inches long.
 - 4. Brackets: 6 inches square.
 - 5. Hood: 6 inches square.

- F. Delegated-Design Submittal: For overhead coiling doors and steel supports indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 - 1. Summary of forces and loads on walls and jambs.

1.4 INFORMATIONAL SUBMITTALS

- A. Manufacturer Installation Instructions.
- B. Qualification Data: For Manufacturer and Installer.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For overhead coiling doors to include in maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Minimum of five years' experience in producing doors of the type specified.
- B. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for both installation and maintenance of units required for this Project.
 - 1. Maintenance Proximity: Not more than four hours' normal travel time from Installer's place of business to Project site.
- C. Source Limitations: Obtain overhead coiling doors through one source from a single manufacturer.
 - 1. Obtain operators and controls from overhead coiling door manufacturer.
- D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- E. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design exterior overhead coiling doors and steel supports, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
 - 1. Structural Performance: Provide exterior overhead coiling doors capable of withstanding the effects of gravity loads and the following loads and stresses without evidencing permanent deformation of door components:
 - a. Corner Zone: Within 24.7 feet of building corners, uniform pressure of 41.0 lbf/sq. ft. acting inward, and 55.9 lbf/sq. ft. acting outward.
 - b. Other Than Corner Zone: Uniform pressure of 34.5 lbf/sq. ft. acting inward, and 43.5 lbf/sq. ft. acting outward.

- B. Design Requirements:
1. Air Infiltration to Comply With:
 - a. ASHRAE Standard 90.1-2007, 2010 & 2013 requirements of less than 0.3 CFM/Sq Ft
 - b. IECC 2012 requirements of less than 1.0 CFM/Sq Ft
 2. Operation-Cycle Requirements: Provide overhead coiling door components and operators capable of operating for 20 cycles per day and for not less than 20,000 cycles for the life of the door.
 - a. Include tamperproof cycle counter.
 3. Insulated Door Slat Material Requirements:
 - a. Flame Spread Index of 0 and a Smoke Developed Index of 10 as tested per ASTM E84
 - b. Minimum R-value of 8.0 (U-value of 0.125) as calculated using the ASHRAE Handbook of Fundamentals
 - c. Insulation to be CFC Free with an Ozone Depletion Potential (ODP) rating of zero

2.1 INSULATED SERVICE DOOR

- A. **Insulated Service Door:** Overhead coiling door formed with curtain of interlocking metal slats.
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. Basis of Design: CornellCookson, LLC;
 - 1) ICD1: Cornell Model ESD30 Thermiser Max
 - 2) ICD2: Cornell Model ESD30 Thermiser Max NEMA 4x Operation
 - b. Clopay Corporation
 - c. Cookson, a CornellCookson Company
 - d. Overhead Door Corporation
 - e. McKeon Door Company
 2. Door Curtain Material: Galvanized steel, 24 ga.
 3. Door Curtain Slats: Flat profile slats of nominal 3-inch center-to-center height.
 4. Curtain Jamb Guides: Galvanized steel with exposed finish matching curtain slats.
- B. Hood: Match curtain material and finish.
1. Shape: Round.
 2. Mounting: Face of wall.
- C. Air Infiltration Package: Equip door with guide cover and cap; dual brush guide seal; lintel seal; bottom astragal.
1. Include insulated guides.
- D. Electric Door Operator:
1. Operator Location: Confirm operator location at each door location with field conditions. Provide location that allows for maximum interior clearance.
 2. Motor Exposure: Interior.
 3. Emergency Manual Operation: Chain type with padlockable chain keeper.
 4. Obstruction-Detection Devices:
 - a. Photoelectric sensor array
 - b. Automatic electric sensor edge on bottom bar; self-monitoring type.
 - 1) Sensor Edge Bulb Color: Black.

5. Remote-Control Station:
 - a. Interior 3-button switch.
 - b. Exterior key switch and card reader.
 6. Other Equipment: Audible and visual signals
- E. Door Finish:
1. Zinc-enriched Powder-Coat Finish: Color as selected by Architect from manufacturer's full range.
 2. Interior Curtain-Slat Facing: Match finish of exterior curtain-slat face.

2.2 DOOR CURTAIN MATERIALS AND CONSTRUCTION

- A. Door Curtains: Fabricate overhead coiling door curtain of interlocking slats, designed to withstand wind loading indicated, in a continuous length for width of door without splices. Unless otherwise indicated, provide slats of thickness and mechanical properties recommended by door manufacturer for performance, size, and type of door indicated, and as follows:
1. Steel Door Curtain Slats: Zinc-coated (galvanized), cold-rolled structural steel (SS) sheet; complying with ASTM A 653/A 653M, G90 (Z275) coating designation. Manufacturer recommended gauge based on performance requirements
 - a. Basis of Design Finish: SpectraShield Coating System
 - 1) ASTM A 653 galvanized base coating treated with dual process rinsing agents in preparation for chemical bonding, gray baked-on base coat and gray baked-on polyester finish coat
 - 2) Zirconium treatment followed by baked-on polyester powder coat, with color as selected by Architect from manufacturer's standard color range; minimum 2.5 mils cured film thickness; ASTM D-3363 pencil hardness: H or better
 2. Insulation for exterior Service Doors: Fill slats for insulated doors with manufacturer's standard thermal insulation complying with maximum flame-spread and smoke-developed indexes of 0 and 10, respectively, according to ASTM E 84. Enclose insulation completely within slat faces.
 - a. Basis of Design: 7/8 inch foamed-in-place, closed cell urethane
 3. Inside Curtain Slat Face: To match material of outside metal curtain slat.
- B. Endlocks for Service Doors: Manufacturer's standard. Provide locks on not less than alternate curtain slats for curtain alignment and resistance against lateral movement.
- C. Insulated Bottom Bar: Reinforced extruded aluminum interior face with full depth insulation and exterior skin slat to match curtain material and gauge. Minimum 4" tall x 1-1/16" thickness.
1. Air Infiltration Certification Label: Must be affixed to bottom bar
 2. Finish: Powder coat to match slats
- D. Curtain Jamb Guides for Service Doors: Provide Thermal-Break design.
1. Fabricate curtain jamb guides of steel angles or channels and angles, with sufficient depth and strength to retain curtain, to allow curtain to operate smoothly, and to withstand loading. Build up units with not less than 3/16-inch-thick galvanized steel sections complying with ASTM A 36 and ASTM A 123. Slot bolt holes for guide adjustment.
 2. Provide removable stops on guides to prevent overtravel of curtain, and a continuous bar for holding windlocks.
 3. Top of inner and outer guide angles to be flared outwards to form bellmouth for smooth entry of curtain into guides. Provide removable guide stoppers to prevent over travel of curtain and bottom bar.

4. Finish:
 - a. ICD1 - Hot-dip Galvanized: ASTM A 123, Grade 85 zinc coating, hot-dip galvanized after fabrication
 - b. ICD2 - **SpectraShield Coating System**: Zirconium treatment followed by baked-on polyester powder coat, color as selected by Architect from manufacturer's standard color range, over 180 colors; minimum 2.5 mils cured film thickness; ASTM D-3363 pencil hardness: H or better

2.3 HOODS AND ACCESSORIES

- A. Hood: Form to act as weather/fire seal and entirely enclose coiled curtain and operating mechanism at opening head. Contour to fit end brackets to which hood is attached. Roll and reinforce top and bottom edges for stiffness. Provide closed ends for surface-mounted hoods and provide fascia for any portion of between-jamb mounting projecting beyond wall face. Provide intermediate support brackets as required to prevent sagging.
 1. Basis of Design Finish: **SpectraShield Coating System**
 - a. ASTM A 653 galvanized base coating treated with dual process rinsing agents in preparation for chemical bonding, gray baked-on base coat and gray baked-on polyester finish coat
 - b. Zirconium treatment followed by baked-on polyester powder coat, with color as selected by Architect from manufacturer's standard color range, over 180 colors; minimum 2.5 mils cured film thickness; ASTM D-3363 pencil hardness: H or better
- B. Weatherseals for exterior Service Doors:
 1. General:
 - a. Provide replaceable, adjustable, continuous, compressible weatherstripping gaskets fitted to bottom and top of exterior doors, unless otherwise indicated. At door head, use 1/8-inch-thick, replaceable, continuous sheet secured to inside of hood.
 - b. Provide replaceable, adjustable, continuous, flexible, 1/8-inch-thick seals of flexible vinyl, rubber, or neoprene at door jambs for a weathertight installation.
 2. Basis of Design:
 - a. **Bottom Bar**: Sensing/weather edge with neoprene astragal extending full width of door bottom bar
 - b. **Guides**: Replaceable vinyl strip on guides sealing against fascia side of curtain
 - c. **Lintel Seal**: Double brush seal with EPDM sandwiched between the two brush seals at door header to impede air flow.

2.4 COUNTERBALANCING MECHANISM

- A. General: Counterbalance doors by means of adjustable-tension, steel helical torsion spring mounted around a steel shaft and contained in a spring barrel connected to door curtain with barrel rings. Use grease-sealed bearings or self-lubricating graphite bearings for rotating members.
- B. Counterbalance Barrel: Fabricate spring barrel of hot-formed, structural-quality, welded or seamless carbon-steel pipe, of sufficient diameter and wall thickness to support rolled-up curtain without distortion of slats and to limit barrel deflection to not more than 0.03 in./ft. of span under full load.
- C. Fabricate torsion rod for counterbalance shaft of cold-rolled steel, sized to hold fixed spring ends and carry torsional load.
- D. Brackets: Provide mounting brackets of manufacturer's standard design, either cast iron or cold-rolled steel plate.
 1. Basis of Design: Fabricate from minimum 1/2 inch steel plate with permanently lubricated ball or roller bearings at rotating support points to support counterbalance shaft assembly and form end closures
 2. Basis of Design Finish: **SpectraShield Coating System**

2.5 ELECTRIC DOOR OPERATORS

- A. General: Electric door operator assembly of size and capacity recommended and provided by door manufacturer for door and operation-cycles requirement specified, with electric motor and factory-prewired motor controls, starter, gear-reduction unit, solenoid-operated brake, clutch, remote-control stations, control devices, integral gearing for locking door, and accessories required for proper operation.
 - 1. Comply with NFPA 70.
 - 2. Provide control equipment complying with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6, with NFPA 70 Class 2 control circuit, maximum 24 V, ac or dc.
- B. Usage Classification: Electric operator and components capable of operating for not less than number of cycles per hour indicated for each door.
- C. Door Operator Location(s): Confirm operator location at each door location with field conditions. Provide location that allows for maximum interior clearance.
- D. Electric Motors: Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements specified or otherwise referenced in Division 26 unless otherwise indicated.
 - 1. Basis of Design:
 - a. ICD1: Model SG (Super Duty Gear Head) Operator:
 - 1) UL listed to comply with UL requirements in The United States and Canada.
 - 2) Totally Enclosed Fan Cooled gear head operators rated 1/2 hp as recommended by door manufacture for size and type of door.
 - b. ICD2: Model SGHNX (Super Duty Gear Head NEMA 4X) Operator:
 - 1) UL Listed NEMA 4X rated
 - 2) Totally Enclosed Non-Ventilated gear head operators rated 1/2 hp as recommended by door manufacture for size and type of door.
 - 3) Stainless Steel Corrosion Resistant finish to withstand low pressure direct spray
 - c. The operator must not extend above or below the door coil when mounted front-of-coil.
 - d. Provide complete with electric motor and factory pre-wired motor control terminals, maintenance-free solenoid actuated brake, emergency manual chain hoist provided up to 2 hp and control station.
 - e. Motor shall be high starting torque, industrial type, with overload protection.
 - f. Primary speed reduction shall be heavy-duty gears running in grease or oil bath with mechanical braking to hold the door in any position.
 - g. When equipped, the emergency manual chain hoist assembly is automatically disengaged when motor is energized. A disconnect chain shall not be required to engage or release the manual chain hoist.
 - h. Operator drive and door driven sprockets shall be provided with minimum #50 roller chain.
 - i. Fully adjustable, driven linear screw type cam limit switch mechanism shall synchronize the operator with the door.
 - j. The motor shall be removable without affecting the limit switch settings.
 - 2. Electrical Characteristics: Single phase 115 v 60 Hz
 - 3. Motor Type and Controller: Reversible motor and controller (disconnect switch) for motor exposure indicated.
 - 4. Motor Size: Minimum size as indicated. If not indicated, large enough to start, accelerate, and operate door in either direction from any position, at a speed not less than 8 in./sec. and not more than 12 in./sec., without exceeding nameplate ratings or service factor.
 - 5. Operating Controls, Controllers (Disconnect Switches), Wiring Devices, and Wiring: Manufacturer's standard unless otherwise indicated.
 - 6. Coordinate wiring requirements and electrical characteristics of motors and other electrical devices with building electrical system and each location where installed.

- E. Limit Switches: Equip each motorized door with adjustable switches interlocked with motor controls and set to automatically stop door at fully opened and fully closed positions.
- F. Obstruction Detection Device: Equip motorized door with indicated external automatic safety sensor capable of protecting full width of door opening. For non-fire-rated doors, activation of device immediately stops and reverses downward door travel.
 - 1. Fail-safe, UL325-2010 Compliant Entrapment Protection for Motor Operation
 - 2. Photoelectric Sensor: Manufacturer's standard system designed to detect an obstruction in door opening without contact between door and obstruction.
 - a. Self-Monitoring Type: Designed to interface with door operator control circuit to detect damage to or disconnection of sensing device. When self-monitoring feature is activated, door closes only with sustained pressure on close button.
 - b. Basis of Design: SafetyGard UL325 Light Curtain with Dynamic Sequential Blanking
 - 1) Monitored, non-contact light curtain consisting of a transmitter and a receiver to be mounted to the guide assembly of the door in the provided mounting channel, projecting a thru beam across the width of the door for the height of the light curtain. Interruption of beam before door fully closes shall cause door to immediately stop downward travel and reverse direction to the fully opened position
 - 3. Sensor Edge: Automatic safety sensor edge, located within astragal or weather stripping mouthed to bottom bar. Contact with sensor activates device. Connect to control circuit using manufacturer's standard take-up reel or self-coiling cable.
 - a. Self-Monitoring Type: Four-wire configured device designed to interface with door operator control circuit to detect damage to or disconnection of sensor edge.
 - 1) Basis of Design: **SmartSync Wireless Edge Kit**
 - a) Continuously monitored, wireless sensing/weather edge seal extending full width of door bottom bar. Contact before door fully closes shall cause door to immediately stop downward travel and reverse direction to the fully opened position. Wireless edge kit will use Zigbee wireless technology. Radio band wireless sensing edges will not be permitted.
- G. Remote-Control Station: Momentary-contact, three-button control station with push-button controls labeled "Open," "Close," and "Stop."
 - 1. Portable Radio-Control System: Consisting of eight of the following per door operator:
 - a. Three-channel universal coaxial receiver to open, close, and stop door.
 - b. Portable control device to open and stop door may be momentary-contact type; control to close door is to be sustained- or constant-pressure type.
 - c. Remote-antenna mounting kit.
 - 2. Interior-Mounted Units: Full-guarded, surface-mounted, heavy-duty type, with general-purpose NEMA ICS 6, Type 1 enclosure.
 - a. ICD1 and ICD2: Keyswitch operated
 - 3. Exterior-Mounted Units: Full-guarded, standard-duty, surface-mounted, weatherproof type, NEMA ICS 6, Type 4 enclosure.
 - a. ICD1: RC Control
 - b. ICD2: Card Reader
- H. Emergency Manual Operation: Equip each electrically powered door with capability for emergency manual operation. Design manual mechanism so required force for door operation does not exceed 25 lbf.
- I. Emergency Operation Disconnect Device: Equip operator with hand-operated disconnect mechanism for automatically engaging manual operator and releasing brakes for emergency manual operation while disconnecting motor

without affecting timing of limit switch. Mount mechanism so it is accessible from floor level. Include interlock device to automatically prevent motor from operating when emergency operator is engaged.

- J. Motor Removal: Design operator so motor may be removed without disturbing limit-switch adjustment and without affecting emergency manual operation.
- K. Audible and Visual Signals: Audible alarm and visual indicator lights in compliance with regulatory requirements for accessibility.

2.6 FINISHES, GENERAL

- A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. 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.

2.7 GALVANIZED STEEL FINISHES

- A. Powder-Coat Finish: Manufacturer's standard powder-coat finish consisting of primer and topcoat according to coating manufacturer's written instructions for cleaning, pretreatment, application, thermosetting, and minimum dry film thickness.
 - 1. Color and Gloss: Match Architect's sample.
- B. Galvanizing: Hot-dip galvanize products made from rolled, pressed, and forged steel shapes, castings, plates, bars, and strips indicated to be galvanized to comply with ASTM A 123/A 123M.
 - 1. Hot-dip galvanize steel and iron hardware indicated to be galvanized to comply with ASTM A 153/A 153M.
- C. Fill vent and drain holes that will be exposed in finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates upon which work will be installed and verify conditions are in accordance with approved shop drawings
- B. Coordinate with Construction Manager and appropriate Prime Contractors to perform corrective work on unsatisfactory substrates
- C. Commencement of work by installer is acceptance of substrate

3.2 INSTALLATION

- A. General: Install coiling doors and operating equipment complete with necessary hardware, jamb and head molding strips, anchors, inserts, hangers, and equipment supports.
- B. Observe Manufacturer's installation instructions

3.3 ADJUSTING and CLEANING

- A. Following completion of installation, including related work by other Prime Contracts, lubricate, test, and adjust doors for ease of operation, free from warp, twist, or distortion
- B. Adjust seals to provide weathertight fit around entire perimeter.
- C. Clean surfaces soiled by work as recommended by manufacturer.

3.4 STARTUP SERVICES

- A. Engage a factory-authorized service representative to perform startup service.
 - 1. Complete installation and startup checks according to manufacturer's written instructions.
 - 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.5 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain overhead coiling doors. Refer to Division 01 Section "Demonstration and Training."

END OF SECTION 08 3323

SECTION 08 4115 - ALUMINUM-FRAMED FRP DOORS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Aluminum-framed doors with fiberglass reinforced polyester (FRP) flush faces.
 - 2. Aluminum frames for FRP doors.
 - 3. Factory fitting FRP doors to frames and factory machining for hardware.
- B. Related Sections:
 - 1. Division 08 Section "Hollow Metal Frames" – interior steel frames for mounting FRP doors
 - 2. Division 08 Section "Door Hardware" - finish hardware for FRP doors
 - 3. Division 08 Section "Glazing" - glass view panels in FRP doors

1.2 DEFINITIONS

- A. ADA/ABA Accessibility Guidelines: U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disability Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities."

1.3 ACTION SUBMITTALS

- A. Shop Drawings: For aluminum-framed FRP faced doors. Include plans, elevations, sections and details.
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation instructions.
 - 4. Operation and maintenance data.
 - 5. Locations of preparation for hardware and framing specified in other Division 08 Sections.
- B. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.
- C. Fabrication Sample: Of each vertical-to-horizontal intersection of aluminum-framed systems, made from 12-inch lengths of full-size components and showing details of the following:
 - 1. Joinery, including concealed welds.
 - 2. Glazing lite frame.
 - 3. Flashing and drainage.
- D. Qualification Data: For qualified Installer.
- E. Warranties: Sample of warranty.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for aluminum-framed systems.
 - 1. Fabrication and hardware mounting details.
 - 2. Preparation instructions and recommendations.
 - 3. Storage and handling requirements and recommendations.
 - 4. Installation instructions.
 - 5. Operation and maintenance data.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For aluminum-framed doors to include in maintenance manuals.
 - 1. Include recommendations for periodic checking and adjustment and periodic cleaning and maintenance of all components.
- B. Executed Warranty.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing FRP and aluminum door and aluminum frame systems of the type required for this project, with minimum ten continuous years' documented experience.
- B. Installer Qualifications: Company specializing in installation aluminum door and frame systems of the type required for this project, with minimum five continuous years' documented experience.
- C. Product Options: Information on Drawings and in Specifications establishes requirements for doors' aesthetic effects and performance characteristics. 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. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, and in-service performance.
 - 1. Do not revise intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If revisions are proposed, submit comprehensive explanatory data to Architect for review.
- D. Accessible Entrances: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.
- E. Welding Qualifications: Qualify procedures and personnel according to AWS D1.2, "Structural Welding Code - Aluminum."

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver doors and frames palletized, wrapped or individually crated.
- B. Store products under cover in manufacturer's unopened packaging with labels intact until installation.
 - 1. Do not use non-vented plastic or canvas covers.
 - 2. Remove packaging immediately if packaging becomes wet.
 - 3. Provide 0.25-inch air spaces between stacked doors.

- C. Protect materials and finish from damage during handling and installation.

1.8 SEQUENCING

- A. Ensure that templates and other information required for installation of products of this section are furnished to affected trades in time to prevent interruption of construction progress.

1.9 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of framing for aluminum-framed doors by field measurements before fabrication and indicate measurements on Shop Drawings.
- B. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.
- C. Coordinate field measurements and fabrication schedule with construction progress to avoid construction delays.

1.10 WARRANTY

- A. Manufacturer's standard form in which manufacturer agrees to repair or replace components of aluminum-framed doors that do not comply with requirements or that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including, but not limited to, corner joinery.
 - b. Core deterioration.
 - c. Delamination or bubbling of door skin and other materials beyond normal weathering.
 - d. Water leakage through fixed glazing and framing areas.
 - 2. Warranty Period: Ten (10) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General Performance: Aluminum-framed doors shall withstand the effects of the following performance requirements without exceeding performance criteria or failure due to defective manufacture, fabrication, installation, or other defects in construction:
 - 1. Movements of supporting structure indicated on Drawings including, but not limited to, deflection from uniformly distributed and concentrated live loads.
- B. Structural Loads:
 - 1. Wind Loads: As indicated on Drawings.
- C. Thermal Movements: Provide aluminum-framed doors that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures. Base engineering calculation 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.

- D. Condensation Resistance: Provide aluminum-framed systems with fixed glazing and framing areas having condensation-resistance factor (CRF) of not less than 53 when tested according to AAMA 1503.
- E. Thermal Conductance: Provide aluminum-framed systems with fixed glazing and framing areas having an average U-factor of not more than 0.31Btu/sq. ft. x h x deg F when tested according to AAMA 1503.

2.2 MANUFACTURERS and PRODUCTS

- A. Manufacturers and Products: Subject to compliance with requirements, provide FRP faced doors and aluminum thermal frames by one of the following:
 - 1. Capitol Aluminum & Glass Corporation: 4900 FRP Series
 - 2. Cline Doors, Series 200BE Flush Doors.
 - 3. Kawneer North America, FlushLine Series.
 - 4. Manko Window Systems Inc. Model: Series 170
 - 5. Special-Lite, Inc. Model SL-17
 - 6. YKK AP America, Inc. Model 25FD Flush Doors
 - 7. Vale FRP doors

2.3 MATERIALS

- A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
 - 1. Sheet and Plate: ASTM B 209.
 - 2. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221, 6063-T5 alloy.
- B. FRP (Fiberglass Reinforced Polyester) Face Sheet: A synthetic resin which undergoes polymerization during curing and is reinforced with continuous glass filaments having diameters in the range of 10 to 30 μ m. The finished panels have a smooth surface, through color and the following properties:
 - 1. Surface-Burning Characteristics: Maximum flame-spread and smoke-developed indices of 145 and 345, respectively.
 - 2. Impact Strength: ASTM D 256 of 13.5 ft.lbf.(18.3 J).
 - 3. Core Compression strength of 90 psi minimum per ASTM C365.
 - 4. Thickness: 0.120 inch (3 mm) minimum.
 - 5. UV inhibited
- C. Core Materials: Manufacturer's standard
- D. Color: As selected by Architect from manufacturer's standard color selections.

2.4 DOORS

- A. Doors: Manufacturer's standard FRP-faced doors for manual-swing operation.
 - 1. Door Construction: 1-3/4-inch overall thickness, with minimum 0.125-inch-thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deeply penetrated and fillet welded or that incorporate concealed tie rods.
 - 2. Door Design: As indicated on Drawings.
 - a. Accessible Doors: Smooth surfaced for width of door in area within 10 inches above floor or ground plane.

3. Glazing Stops and Gaskets: Beveled, snap-on, extruded-aluminum stops and preformed gaskets.
 - a. Provide nonremovable glazing stops on outside of door.
- B. Door Hardware
1. Provide manufacturer's standard full height mid-rail recessed pull.
 2. Balance of hardware as specified in Section 08 7100 "Door Hardware"
 3. Door Manufacturer is to coordinate with hardware installer to provide necessary reinforcement and to prepare doors for specified hardware after hardware submittals have been reviewed.
 4. Hinges will be continuous geared hinges unless specified otherwise.

2.5 ALUMINUM FRAMES

- A. General: Provide Manufacturer's standard thermally-broken frames from extruded tube backer with an applied stop.
1. Fabricate frames with butted ends.
 2. Fabricate frames with corner brackets for secure fastening.
 3. Stops are to be screw applied and include gasketing.
- B. Surface Applied Hardware Reinforcements: Fabricate according to ANSI/SDI A250.6.

2.6 FABRICATION

- A. Fabricate Doors of the type, size and design indicated on the Drawings.
1. Thickness: 1.75-inches, 5-ply composite laminate system.
 2. Door Size: Sizes are nominal; provide standard clearances as follows:
 - a. Hinge and Lock Stiles: 0.125-inch.
 - b. Between Meeting Stiles: 0.25-inch.
 - c. At Top Rails: 0.125-inch.
 - d. Between Door Bottom and Threshold: 0.125-inch.
 - 1) Provide bottom clearance for door undercut where indicated.
- B. Form or extrude aluminum shapes before finishing.
- C. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
- D. Framing Members, General: Fabricate components that, when assembled, have the following characteristics:
1. Profiles that are sharp, straight, and free of defects or deformations.
 2. Accurately fitted joints with ends coped or mitered.
 3. Means to drain water passing joints, condensation within framing members, and moisture migrating within the system to exterior.
 4. Physical and thermal isolation of glazing from framing members.
 5. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
 6. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
 7. Door Frame box tubing is to be 0.125 inch minimum thickness.

- E. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.
 - 1. At exterior doors, provide compression weather stripping at fixed stops.
 - 2. 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.
- F. Hardware Preparation: Factory prepare work to receive template mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to the Door Hardware Schedule and templates furnished as specified in Division 08 Section, "Door Hardware."
 - 1. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8.
 - 2. Reinforce doors to receive non-template, mortised and surface-mounted door hardware.
 - 3. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of work for hardware.
- G. Entrance Doors: Reinforce doors as required for installing entrance door hardware.
 - 1. Internal Reinforcement shall be continuous within the structure to allow for mounting of specified hardware. Reinforcing material shall be a dense matrix of cloth glass fibers and premium resin with a minimum hinge screw holding value of 1000 lbs per screw. All reinforcing materials shall be completely encapsulated. Documented strength of frame screw holding value after third insert must be submitted. Dissimilar materials, such as steel, will be deemed unacceptable as reinforcement for hardware attachment.
 - 2. At exterior doors, provide weather sweeps applied to door bottoms.
- H. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.7 ALUMINUM FINISHES

- A. High-Performance Organic Finish: 2-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: As selected from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and 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 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

- A. 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 nonmovement joints.
 - 5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration.
 - 6. Seal joints watertight unless otherwise indicated.
- B. Metal Protection:
 - 1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or applying sealant or tape, or by installing nonconductive spacers as recommended by manufacturer for this purpose.
 - 2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
- C. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.
- D. Install components plumb and true in alignment with established lines and grades, and without warp or rack.
- E. Entrance Doors: Install doors to produce smooth operation and tight fit at contact points.
 - 1. Exterior Doors: Install to produce weathertight enclosure and tight fit at weather stripping.

3.4 ERECTION TOLERANCES

- A. Install aluminum-framed doors to comply with the following maximum erection tolerances:
 - 1. Location and Plane: Limit variation from true location and plane to 1/8 inch in 12 feet; 1/4 inch over total length.
 - 2. Alignment:
 - a. Where surfaces abut in line, limit offset from true alignment to 1/16 inch.
 - b. Where surfaces meet at corners, limit offset from true alignment to 1/32 inch.

3.5 ADJUSTING AND CLEANING

- A. Adjust operating entrance door hardware to function smoothly as recommended by manufacturer.
 - 1. For entrance doors accessible to people with disabilities, adjust closers to provide a 3-second closer sweep period for doors to move from a 70-degree open position to 3 inches from the latch, measured to the leading door edge.
- B. Upon completion of installation, thoroughly clean door and frame surfaces in accordance with AAMA 609. Do not use abrasive, caustic or acid cleaning agents.

3.6 PROTECTION

- A. Protect products of this section from damage caused by subsequent construction until substantial completion.
- B. Repair damaged or defective products to original specified condition in accordance with manufacturer's recommendations.
- C. Replace damaged or defective products that cannot be repaired to Architect's acceptance.

END OF SECTION 08 4115

SECTION 08 4115 - ALUMINUM-FRAMED FRP DOORS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Aluminum-framed doors with fiberglass reinforced polyester (FRP) flush faces.
 - 2. Aluminum frames for FRP doors.
 - 3. Factory fitting FRP doors to frames and factory machining for hardware.
- B. Related Sections:
 - 1. Division 08 Section "Hollow Metal Frames" – interior steel frames for mounting FRP doors
 - 2. Division 08 Section "Door Hardware" - finish hardware for FRP doors
 - 3. Division 08 Section "Glazing" - glass view panels in FRP doors

1.2 DEFINITIONS

- A. ADA/ABA Accessibility Guidelines: U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disability Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities."

1.3 ACTION SUBMITTALS

- A. Shop Drawings: For aluminum-framed FRP faced doors. Include plans, elevations, sections and details.
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation instructions.
 - 4. Operation and maintenance data.
 - 5. Locations of preparation for hardware and framing specified in other Division 08 Sections.
- B. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.
- C. Fabrication Sample: Of each vertical-to-horizontal intersection of aluminum-framed systems, made from 12-inch lengths of full-size components and showing details of the following:
 - 1. Joinery, including concealed welds.
 - 2. Glazing lite frame.
 - 3. Flashing and drainage.
- D. Qualification Data: For qualified Installer.
- E. Warranties: Sample of warranty.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for aluminum-framed systems.
 - 1. Fabrication and hardware mounting details.
 - 2. Preparation instructions and recommendations.
 - 3. Storage and handling requirements and recommendations.
 - 4. Installation instructions.
 - 5. Operation and maintenance data.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For aluminum-framed doors to include in maintenance manuals.
 - 1. Include recommendations for periodic checking and adjustment and periodic cleaning and maintenance of all components.
- B. Executed Warranty.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing FRP and aluminum door and aluminum frame systems of the type required for this project, with minimum ten continuous years' documented experience.
- B. Installer Qualifications: Company specializing in installation aluminum door and frame systems of the type required for this project, with minimum five continuous years' documented experience.
- C. Product Options: Information on Drawings and in Specifications establishes requirements for doors' aesthetic effects and performance characteristics. 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. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, and in-service performance.
 - 1. Do not revise intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If revisions are proposed, submit comprehensive explanatory data to Architect for review.
- D. Accessible Entrances: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.
- E. Welding Qualifications: Qualify procedures and personnel according to AWS D1.2, "Structural Welding Code - Aluminum."

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver doors and frames palletized, wrapped or individually crated.
- B. Store products under cover in manufacturer's unopened packaging with labels intact until installation.
 - 1. Do not use non-vented plastic or canvas covers.
 - 2. Remove packaging immediately if packaging becomes wet.
 - 3. Provide 0.25-inch air spaces between stacked doors.

- C. Protect materials and finish from damage during handling and installation.

1.8 SEQUENCING

- A. Ensure that templates and other information required for installation of products of this section are furnished to affected trades in time to prevent interruption of construction progress.

1.9 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of framing for aluminum-framed doors by field measurements before fabrication and indicate measurements on Shop Drawings.
- B. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.
- C. Coordinate field measurements and fabrication schedule with construction progress to avoid construction delays.

1.10 WARRANTY

- A. Manufacturer's standard form in which manufacturer agrees to repair or replace components of aluminum-framed doors that do not comply with requirements or that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including, but not limited to, corner joinery.
 - b. Core deterioration.
 - c. Delamination or bubbling of door skin and other materials beyond normal weathering.
 - d. Water leakage through fixed glazing and framing areas.
 - 2. Warranty Period: Ten (10) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General Performance: Aluminum-framed doors shall withstand the effects of the following performance requirements without exceeding performance criteria or failure due to defective manufacture, fabrication, installation, or other defects in construction:
 - 1. Movements of supporting structure indicated on Drawings including, but not limited to, deflection from uniformly distributed and concentrated live loads.
- B. Structural Loads:
 - 1. Wind Loads: As indicated on Drawings.
- C. Thermal Movements: Provide aluminum-framed doors that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures. Base engineering calculation 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.

- D. Condensation Resistance: Provide aluminum-framed systems with fixed glazing and framing areas having condensation-resistance factor (CRF) of not less than 53 when tested according to AAMA 1503.
- E. Thermal Conductance: Provide aluminum-framed systems with fixed glazing and framing areas having an average U-factor of not more than 0.31Btu/sq. ft. x h x deg F when tested according to AAMA 1503.

2.2 MANUFACTURERS and PRODUCTS

- A. Manufacturers and Products: Subject to compliance with requirements, provide FRP faced doors and aluminum thermal frames by one of the following:
 - 1. Capitol Aluminum & Glass Corporation: 4900 FRP Series
 - 2. Cline Doors, Series 200BE Flush Doors.
 - 3. Kawneer North America, FlushLine Series.
 - 4. Manko Window Systems Inc. Model: Series 170
 - 5. Special-Lite, Inc. Model SL-17
 - 6. YKK AP America, Inc. Model 25FD Flush Doors
 - 7. Vale FRP doors

2.3 MATERIALS

- A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
 - 1. Sheet and Plate: ASTM B 209.
 - 2. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221, 6063-T5 alloy.
- B. FRP (Fiberglass Reinforced Polyester) Face Sheet: A synthetic resin which undergoes polymerization during curing and is reinforced with continuous glass filaments having diameters in the range of 10 to 30 μ m. The finished panels have a smooth surface, through color and the following properties:
 - 1. Surface-Burning Characteristics: Maximum flame-spread and smoke-developed indices of 145 and 345, respectively.
 - 2. Impact Strength: ASTM D 256 of 13.5 ft.lbf.(18.3 J).
 - 3. Core Compression strength of 90 psi minimum per ASTM C365.
 - 4. Thickness: 0.120 inch (3 mm) minimum.
 - 5. UV inhibited
- C. Core Materials: Manufacturer's standard
- D. Color: As selected by Architect from manufacturer's standard color selections.

2.4 DOORS

- A. Doors: Manufacturer's standard FRP-faced doors for manual-swing operation.
 - 1. Door Construction: 1-3/4-inch overall thickness, with minimum 0.125-inch-thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deeply penetrated and fillet welded or that incorporate concealed tie rods.
 - 2. Door Design: As indicated on Drawings.
 - a. Accessible Doors: Smooth surfaced for width of door in area within 10 inches above floor or ground plane.

3. Glazing Stops and Gaskets: Beveled, snap-on, extruded-aluminum stops and preformed gaskets.
 - a. Provide nonremovable glazing stops on outside of door.
- B. Door Hardware
 1. Provide manufacturer's standard full height mid-rail recessed pull.
 2. Balance of hardware as specified in Section 08 7100 "Door Hardware"
 3. Door Manufacturer is to coordinate with hardware installer to provide necessary reinforcement and to prepare doors for specified hardware after hardware submittals have been reviewed.
 4. Hinges will be continuous geared hinges unless specified otherwise.

2.5 ALUMINUM FRAMES

- A. General: Provide Manufacturer's standard thermally-broken frames from extruded tube backer with an applied stop.
 1. Fabricate frames with butted ends.
 2. Fabricate frames with corner brackets for secure fastening.
 3. Stops are to be screw applied and include gasketing.
- B. Surface Applied Hardware Reinforcements: Fabricate according to ANSI/SDI A250.6.

2.6 FABRICATION

- A. Fabricate Doors of the type, size and design indicated on the Drawings.
 1. Thickness: 1.75-inches, 5-ply composite laminate system.
 2. Door Size: Sizes are nominal; provide standard clearances as follows:
 - a. Hinge and Lock Stiles: 0.125-inch.
 - b. Between Meeting Stiles: 0.25-inch.
 - c. At Top Rails: 0.125-inch.
 - d. Between Door Bottom and Threshold: 0.125-inch.
 - 1) Provide bottom clearance for door undercut where indicated.
- B. Form or extrude aluminum shapes before finishing.
- C. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
- D. Framing Members, General: Fabricate components that, when assembled, have the following characteristics:
 1. Profiles that are sharp, straight, and free of defects or deformations.
 2. Accurately fitted joints with ends coped or mitered.
 3. Means to drain water passing joints, condensation within framing members, and moisture migrating within the system to exterior.
 4. Physical and thermal isolation of glazing from framing members.
 5. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
 6. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
 7. Door Frame box tubing is to be 0.125 inch minimum thickness.

- E. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.
 - 1. At exterior doors, provide compression weather stripping at fixed stops.
 - 2. 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.
- F. Hardware Preparation: Factory prepare work to receive template mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to the Door Hardware Schedule and templates furnished as specified in Division 08 Section, "Door Hardware."
 - 1. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8.
 - 2. Reinforce doors to receive non-template, mortised and surface-mounted door hardware.
 - 3. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of work for hardware.
- G. Entrance Doors: Reinforce doors as required for installing entrance door hardware.
 - 1. Internal Reinforcement shall be continuous within the structure to allow for mounting of specified hardware. Reinforcing material shall be a dense matrix of cloth glass fibers and premium resin with a minimum hinge screw holding value of 1000 lbs per screw. All reinforcing materials shall be completely encapsulated. Documented strength of frame screw holding value after third insert must be submitted. Dissimilar materials, such as steel, will be deemed unacceptable as reinforcement for hardware attachment.
 - 2. At exterior doors, provide weather sweeps applied to door bottoms.
- H. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.7 ALUMINUM FINISHES

- A. High-Performance Organic Finish: 2-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: As selected from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and 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 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

- A. 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 nonmovement joints.
 - 5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration.
 - 6. Seal joints watertight unless otherwise indicated.
- B. Metal Protection:
 - 1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or applying sealant or tape, or by installing nonconductive spacers as recommended by manufacturer for this purpose.
 - 2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
- C. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.
- D. Install components plumb and true in alignment with established lines and grades, and without warp or rack.
- E. Entrance Doors: Install doors to produce smooth operation and tight fit at contact points.
 - 1. Exterior Doors: Install to produce weathertight enclosure and tight fit at weather stripping.

3.4 ERECTION TOLERANCES

- A. Install aluminum-framed doors to comply with the following maximum erection tolerances:
 - 1. Location and Plane: Limit variation from true location and plane to 1/8 inch in 12 feet; 1/4 inch over total length.
 - 2. Alignment:
 - a. Where surfaces abut in line, limit offset from true alignment to 1/16 inch.
 - b. Where surfaces meet at corners, limit offset from true alignment to 1/32 inch.

3.5 ADJUSTING AND CLEANING

- A. Adjust operating entrance door hardware to function smoothly as recommended by manufacturer.
 - 1. For entrance doors accessible to people with disabilities, adjust closers to provide a 3-second closer sweep period for doors to move from a 70-degree open position to 3 inches from the latch, measured to the leading door edge.
- B. Upon completion of installation, thoroughly clean door and frame surfaces in accordance with AAMA 609. Do not use abrasive, caustic or acid cleaning agents.

3.6 PROTECTION

- A. Protect products of this section from damage caused by subsequent construction until substantial completion.
- B. Repair damaged or defective products to original specified condition in accordance with manufacturer's recommendations.
- C. Replace damaged or defective products that cannot be repaired to Architect's acceptance.

END OF SECTION 08 4115

SECTION 08 5113 - ALUMINUM WINDOWS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes fixed and operable project-out aluminum windows for exterior locations.
 - 1. Provide new factory glazed aluminum windows units, together with necessary mullions, subframe, trim, muntins, operating hardware, installation hardware, and all other accessories necessary for a complete and finished installation.
 - 2. Remove from site and legally dispose of all debris, packaging, banding, and all other surplus materials and equipment.
 - 3. Seal all joints within each window assembly.
 - 4. Seal entire perimeter of window units after installation.
 - 5. Observe field conditions and field-verify measurements of existing openings and conditions.
 - 6. Installation instructions.
 - 7. Field visitations by window manufacturer as required to assure proper installation procedures.
- B. Related Requirements:
 - 1. Section 07 9200 "Elastomeric Joint Sealants" for installation of joint sealants installed with aluminum-framed systems and for sealants to the extent not specified in this Section.
 - 2. Sections 08 4113 "Aluminum-Framed Entrances and Storefronts" and 08 4413 "Glazed Aluminum Curtain Walls" for coordinating aluminum finishes among aluminum fenestration units.
 - 3. Section 08 8000 "Glazing" for glazing requirements to the extent not specified in this Section.

1.2 DEFINITIONS

- A. Performance class designations according to AAMA/WDMA 101/I.S.2/NAFS:
 - 1. AW: Architectural.
- B. Performance grade number according to AAMA/WDMA 101/I.S.2/NAFS:
 - 1. Design pressure number in pounds force per square foot used to determine the structural test pressure and water test pressure.
- C. Structural Test Pressure: For uniform load structural test, is equivalent to 150 percent of the design pressure.
- D. Minimum Test Size: Smallest size permitted for performance class (gateway test size). Products must be tested at minimum test size or at a size larger than minimum test size to comply with requirements for performance class.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 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. Review and discuss the finishing of aluminum windows that is required to be coordinated with the finishing of other aluminum work for color and finish matching.
 - a. Coordinate aluminum finishes with products of this Section, Section 08 4113 "Aluminum Framed Entrances and Storefronts."
 - 3. Review, discuss, and coordinate the interrelationship of aluminum windows with other exterior wall components. Include provisions for anchorage, flashing, sealing perimeters, and protecting finishes.
 - 4. Review and discuss the sequence of work required to construct a watertight and weathertight exterior building envelope.
 - 5. Inspect and discuss the condition of substrate and other preparatory work performed by other trades.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, glazing and fabrication methods, dimensions of individual components and profiles, hardware, and finishes for aluminum windows.
 - 2. AAMA Certified Products: Submit verification.
- B. Shop Drawings: Include plans, elevations, sections, hardware, accessories, insect screens, operational clearances, and details of installation, including anchor, flashing, and sealant installation, attachment to other work and the following:
 - 1. Mullion details, including reinforcement and stiffeners.
 - 2. Joinery details.
 - 3. Expansion provisions.
 - 4. Flashing and drainage details for the window and the wall opening.
 - 5. Weather stripping details.
 - 6. Thermal-break details.
 - 7. Glazing details.
 - 8. SHGC value on each elevation for each window type.
 - 9. Window System Operators: Show locations, mounting, and details for installing operator components and controls
- C. Samples for Verification: For aluminum windows and components required, showing full range of color variations for finishes, and prepared on Samples of size indicated below:
 - 1. Main Framing Member: 6-inch-long, full-size sections of extrusions with factory-applied color finish.
 - 2. Window Corner Fabrication: 12-by-12-inch-long, full-size window corner including full-size sections of extrusions with factory-applied color finish, weather stripping, and glazing.
 - 3. Operable Window: Full-size unit with factory-applied finish.
 - 4. Hardware: Full-size units with factory-applied finishes.
 - 5. Weather Stripping: 12-inch long sections.
 - 6. Screen Material: 6 inch by 6 inch.
- D. Product Schedule: For aluminum windows. Use same designations indicated on Drawings.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For manufacturer and Installer.
- B. Product Test Reports: For each type of aluminum window, for tests performed by a qualified testing agency.
- C. Energy Performance Standards: Comply with NFRC requirements for energy performance and submit NFRC label certificate per NFRC CMA procedures for the fixed and operable windows.
- D. Sample Warranties: For manufacturer's warranties.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For operable window sash, operating hardware, weather stripping and finishes, for including in maintenance manuals.
- B. Executed Warranty

1.7 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A manufacturer capable of fabricating aluminum windows that meet or exceed performance requirements indicated and of documenting this performance by test reports, and calculations.
- B. Installer Qualifications: An installer acceptable to aluminum window manufacturer 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. Provide system with materials, components, and assemblies matching curtainwall construction in existing building in appearance, quality, performance, and maintenance, to the satisfaction of Architect.
 - 2. Do not revise intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If revisions are proposed, submit comprehensive explanatory data to Architect for review.
- D. Fenestration Standard: Comply with ANSI/AAMA/WDMA/CSA 101/I.S.2/A440 North American Fenestration Standard/Specification for windows, doors and unit skylights (NAFS) for definitions and minimum standards of performance, materials, components, accessories, and fabrication. Comply with more stringent requirements if indicated.
- E. Furnish a valid AAMA "Authorization for Product Certification" indicating that the windows for the project conform to AAMA/WDMA/CSA 101/I.S.2/A440-05.
- F. Furnish visible, permanent IGCC certification labels indicating conformance to ASTM E 2190-02 on insulating glass units.
- G. Furnish visible, permanent SGCC certification labels indicating conformance to ANSI Z97.1-04 and/or 16 CFR 1201 on tempered glass lites, if included on the project, and laminated glass lites, if included on the project.
- H. Energy Performance Standards: Comply with NFRC for minimum standards of energy performance, materials, components, accessories, and fabrication. Comply with more stringent requirements if indicated.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to the project site ready for use and fabricated in as large sections and assemblies as practical, in unopened original factory packaging clearly labeled to identify manufacturer.
- B. Store products in manufacturer's unopened packaging until ready for installation.
- C. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.9 PROJECT CONDITIONS

- A. Observe environmental requirements (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.
- B. Field Measurements: Verify actual locations of structural supports for glazed aluminum curtain walls by field measurements before fabrication and indicate measurements on Shop Drawings.

1.10 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace aluminum windows that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Failure to meet performance requirements.
 - b. Structural failures including excessive deflection, water leakage, condensation, and air infiltration.
 - c. Deterioration of materials and finishes beyond normal weathering.
 - d. Failure of insulating glass.
 - e. Failure of operating components.
 - 2. Warranty Period:
 - a. Window: 5 years from date of Substantial Completion.
 - b. Glazing Units: 10 years from date of Substantial Completion.
 - c. Aluminum Organic Finish: 20 years from date of Substantial Completion.

1.11 EXTRA MATERIALS

- A. Furnish and deliver to Owner, at the project location, extra material for maintenance and replacement as required.
 - 1. Spare parts kit inclusive of six of each of the following as applicable: locks, keepers, limit stops, and Anderberg arms.
- B. Upon delivery, obtain signed receipt from Owner's representative. Include copy of receipt with submittals required at the time of substantial completion.

PART 2 - PRODUCTS

2.1 WINDOW PERFORMANCE REQUIREMENTS

- A. All test unit sizes and configurations shall conform to the minimum sizes in accordance with AAMA/WDMA/CSA/1.S.A 440, with a performance class of AW-PG80-AP (Project-out awning) and AW-PG80-FW (Fixed).
1. Test units shall not be smaller in either width or height than the "Gateway Test Size" specified in NAFS-2011 for AW Performance Class.
 2. "Downsize" testing to meet Optional Performance Class requirements specified herein shall not be permitted.
 3. Testing to previous, less stringent versions of NAFS shall not be acceptable.
 4. Test units shall employ manufacturer's standard sealing, lock spacing and anchorage.
- B. Windows shall also comply with the following specific performance requirements indicated:
1. Air Infiltration: When tested in accordance with ASTM E283 at differential static pressure of 6.24 psf, completed window systems shall have maximum allowable infiltration of 0.10 cfm/sf.
 2. Water Infiltration: No uncontrolled water other than condensation on indoor face of any component when tested in accordance with ASTM E 331 and E 547 at a minimum test pressure differential of 12 PSF operable, 15 PSF fixed.
 - a. Static water test shall be repeated after application of design test pressures.
 3. Structural Test Performance Requirements
 - a. Uniform Load Deflection Test: No deflection of any unsupported span L of test unit (framing rails, muntins, mullions, etc.) in excess of L/175 at both a positive and negative load of 100 psf (design test pressure) when tested in accord with ASTM E330.
 - b. Uniform Load Structural Test: Unit to be tested at 1.5 x design test pressure, both positive and negative, acting normal to plane of wall in accord with ASTM E330.
 - 1) No glass breakage; permanent damage to fasteners, hardware parts, or anchors; damage to make windows inoperable; or permanent deformation of any main frame or ventilator member in excess of 0.2% of its clear span.
 4. Forced Entry Test: When tested in accordance with ASTM F 588, shall have a minimum performance grade of 10.
 5. Thermal Cycling Test: When tested in accordance with AAMA 910, all AW products shall be subjected to six thermal cycles, ranging from 0 degrees F to 180 degrees F, at 8 hours per cycle per AAMA 501.5.
 6. Thermal Performance: Perform in accordance with NFRC 102 and/or AAMA 1503, or provide finite element computer thermal modeling and calculations per NFRC 100, NFRC 705 or AAMA 507, using DOE/LBL THERM, WINDOW, and/or CMAST software:
 - a. Condensation Resistance Factor (CRF): A minimum of 55
 - b. Thermal Transmittance U value: 0.46 (project-out units) and 0.38 (fixed units) BTU/HR/FT²/°F or less using an insulating glass unit with a COG of 0.29
 - c. Solar Heat Gain Coefficient (SHGC) for the overall window area shall not exceed 38
 7. Life Cycle Testing: When tested in accordance with AAMA 910-10, there shall be no damage to fasteners, hardware parts, or any other damage that would cause the specimen to be inoperable.
 - a. Resistance to air leakage and water penetration resistance test results shall not exceed the gateway performance. Air infiltration and water resistance tests shall meet the primary performance requirements specified after completion of 4000 operational cycles plus thermal cycling.
 - b. Testing to previous, less stringent versions of AAMA 910 shall not be acceptable.
- C. Design Wind Loads - Allowable Stress Design (ASD)
1. The design wind pressure for the project shall be as indicated on Structural Drawings.

2.2 MANUFACTURERS

- A. Basis of Design Products: Subject to compliance with requirements, provide the following products or comparable products by manufacturers listed above.
1. Basis for Design: **EFCO, LLC**, an Apogee Industries company; **Series 325X Thermal**, Architectural Grade project-out and fixed windows
 - a. Include special formed or extruded aluminum covers, clips, shapes, trim and panning in profiles indicated
- B. Manufacturers: Subject to compliance with requirements, provide Basis of Design or comparable approved products by one of the following:
1. Graham Architectural Products, an Oldcastle company.
 2. Manko Window Systems, Inc.
 3. Peerless Products Inc
 4. Quaker Commercial Windows and Doors
 5. Wausau Window and Wall Systems
- C. Window System:
1. Thermally broken frame and vent.
 2. Description: The windows shall be extruded aluminum; 2-7/8" frame depth; Vents shall be flush with frame and have mitered corner construction; Factory-assembled.
 3. Configuration: Project-Out Ventilator.
 4. Size and Configuration: See Drawings.
 5. Glazing: 1-inch insulating units; Exterior: EPDM weather seal; Interior: polyurethane foam warm edge spacer and structural silicone sealant; Factory or bench glazed.
- D. Source Limitations: Obtain aluminum windows from single source from single manufacturer.

2.3 MATERIALS, GENERAL

- A. Aluminum Extrusions: Alloy 6063-T5 and temper recommended by aluminum window manufacturer for strength, corrosion resistance, and application of required finish, but not less than 22,000-psi ultimate tensile strength, not less than 16,000-psi minimum yield strength.
1. Mechanical fasteners, welded components, and hardware items shall not bridge thermal barriers.
- B. Fasteners: Aluminum, nonmagnetic stainless steel, epoxy adhesive, or other materials warranted by manufacturer to be noncorrosive and compatible with aluminum window members, trim, hardware, anchors, and other components. Cadmium-plated steel fasteners are not permitted.
1. Reinforcement: Where fasteners screw-anchor into aluminum less than 0.125 inch thick, reinforce interior with aluminum or nonmagnetic stainless steel to receive screw threads, or provide standard, noncorrosive, pressed-in, splined grommet nuts.
 2. Exposed Fasteners: Unless unavoidable for applying hardware, do not use exposed fasteners. For application of hardware, use fasteners that match finish of member or hardware being fastened, as appropriate.
- C. Anchors, Clips, and Accessories: Aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions; provide sufficient strength to withstand design pressure indicated. Cadmium-plated steel anchors, clips, and accessories are not permitted.
- D. Reinforcing Members: Aluminum, nonmagnetic stainless steel, nickel/chrome-plated steel complying with ASTM B 456 for Type SC 3 severe service conditions, or zinc-coated steel or iron complying with ASTM B 633 for

SC 3 severe service conditions; provide sufficient strength to withstand design pressure indicated. Cadmium-plated steel reinforcing members are not permitted.

- E. Weather-Stripping Material: Manufacturer's standard system complying with NAFS.
 - 1. Compression-Type Weather Stripping: Provide compressible weather stripping designed for permanently resilient sealing under bumper or wiper action and for complete concealment when aluminum window is closed.
- F. Sealant: For sealants required within fabricated windows, provide window manufacturer's standard, permanently elastic, nonshrinking, and nonmigrating type recommended by sealant manufacturer for joint size and movement.

2.4 GLAZING

- A. Glazing System: Manufacturer's dry-glazing system that produces weathertight seal. Wet or taped glazed windows will not be acceptable..
- B. Glass and Glazing Materials: Refer to Division 08 Section "Glazing" for insulating-glass units and glazing requirements applicable to glazed aluminum window units.

2.5 HARDWARE

- A. General: Provide manufacturer's standard hardware fabricated from aluminum, stainless steel, carbon steel complying with AAMA 907, or other corrosion-resistant material compatible with aluminum; designed to smoothly operate, tightly close, and securely lock aluminum windows and sized to accommodate sash or ventilator weight and dimensions. Cadmium-plated hardware is not permitted. Do not use aluminum in frictional contact with other metals. Where exposed, provide extruded, cast, or wrought aluminum, solid white bronze, die-cast zinc with special coating finish or nonmagnetic stainless steel.
- B. Hardware: Comply with AAMA 904 (PROJECTING)
 - 1. Cam type locking handles; white bronze alloy with a US25D brushed finish.
 - 2. Operating hardware shall be four-bar stainless steel arms.
 - 3. Friction shoes of nylon or other nonabrasive, nonstaining, noncorrosive, durable material.
 - 4. Limit Devices: Provide concealed limit devices designed to restrict sash or ventilator opening.
- C. Weather-Strip: manufacturer's standard all weather-strip.
- D. Thermal Barrier: Rigid, structural thermal barrier that shall transfer shear during bending and promote composite action between the exterior and interior extrusions.
 - 1. No thermal short circuits are acceptable between the exterior and interior components.
 - 2. Ensinger's Insulbar, or approved substitution consisting of two glass-reinforced polyamide nylon 6/6 struts mechanically crimped in raceways extruded as part of the exterior and interior extrusions.
 - 3. Poured-and-debridged urethane thermal barrier will be acceptable only if dual-color unit can be provided, with different colors on the exterior and interior surfaces, and only if windows meet U-value, CRF and other performance requirements specified.

2.6 INSTALLATION ACCESSORIES

- A. Hardware: Standard concealed stainless steel 4 bar hinges, white bronze cam handles and strikes, black nylon snubbers, key released limit stops.

- B. Exterior: wrap around panning as shown.
- C. Interior: two-piece snap trim as shown
- D. Fasteners: All fasteners to be AISI 300 series stainless steel.
- E. Sealant: Non-skinning type, AAMA 803.3.
- F. Glazing: Setting blocks, edge blocks, and spacers in accordance with ASTM C864, shore durometer hardness as recommended by manufacturer.

2.7 INSECT SCREENS

- A. General: Design windows and hardware to accommodate screens in a tight-fitting, removable arrangement, with a minimum of exposed fasteners and latches. Locate screens on inside of window and provide for each operable exterior sash or ventilator. Fabricate insect screens to fully integrate with window frame.
 - 1. Comply with SMA 1004, "Specifications for Aluminum Tubular Frame Screens for Windows," for minimum standards of appearance, fabrication, attachment of screen fabric, hardware, and accessories unless more stringent requirements are indicated.
- B. Aluminum Insect Screen Frames: Manufacturer's standard aluminum alloy complying with SMA 1004. Fabricate frames with mitered or coped joints or corner extrusions, concealed fasteners, and removable PVC spline/anchor concealing edge of frame.
 - 1. Extruded-Aluminum or Aluminum Tubular Framing Sections and Cross Braces: Not less than 0.040-inch wall thickness.
 - 2. Finish and Color: Match aluminum window.
- C. Aluminum Wire Screen Fabric: GSA-FS-RR-W-365 and USDC-CS-138; 18-by-16 mesh of 0.011-inch- diameter, coated aluminum wire.
 - 1. Wire-Fabric Finish: Match existing window screens.

2.8 FABRICATION

- A. General: Fabricate aluminum windows, in sizes indicated, that comply with NAFS for performance class and performance grade indicated. Include a complete system for assembling components and anchoring windows.
- B. Fabricate aluminum windows that are reglazable without dismantling sash or ventilator framing.
- C. Thermally Improved Construction: Fabricate aluminum windows with an integral, concealed, low-conductance thermal barrier; located between exterior materials and window members exposed on interior side; in a manner that eliminates direct metal-to-metal contact.
 - 1. Provide thermal-break construction that has been in use for not less than three years and has been tested to demonstrate resistance to thermal conductance and condensation and to show adequate strength and security of glass retention.
 - 2. Provide thermal barriers tested according to AAMA 505; determine the allowable design shear flow per the appendix in AAMA 505.
- D. Weather Stripping: Provide full-perimeter weather stripping for each operable sash and ventilator.

- E. Weep Holes: Provide weep holes and internal passages to conduct infiltrating water to exterior.
 - 1. Water control: pressure equalization gasket on vent interior; tubular sill with weeps and flap covers to allow water to drain by gravity and resist wind-driven water.
- F. Factory-Glazed Fabrication:
 - 1. Complete fabrication, assembly, finishing, hardware application, and other work in the factory to greatest extent possible. Disassemble components only as necessary for shipment and installation.
 - 2. Glaze aluminum windows in the factory where practical and possible for applications indicated. Comply with requirements in Division 08 Section "Glazing" and with NAFS.
- G. Panning: Provide manufacturer's standard and custom extruded and formed panning, trim and receptors in profiles as detailed on Drawings.
- H. Mullions: Provide thermally broken mullions and cover plates, matching window units, complete with anchors for support to structure and installation of window units. Allow for erection tolerances and provide for movement of window units due to thermal expansion and building deflections, as indicated. Provide mullions and cover plates capable of withstanding design wind loads of window units.

2.9 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's "Metal Finishes Manual" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.10 ALUMINUM FINISHES

- A. General:
 - 1. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
 - 2. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- D. High-Performance Organic Finish: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 1. Colors: Single-color frame finished as scheduled on Drawings or as otherwise approved., with one color on interior surfaces of unit and the same color on the exterior surfaces.
 - a. **Match PPG Duranar UC43350 Bone White (EFCO LT609-70).**

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances; rough opening dimensions; levelness of sill plate; coordination with wall flashings, vapor retarders, and other built-in components; operational clearances; and other conditions affecting performance of work.
 - 1. Masonry Surfaces: Visibly dry and free of excess mortar, sand, and other construction debris.
 - 2. Metal Surfaces: Dry; clean; free of grease, oil, dirt, rust, corrosion, and welding slag; without sharp edges or offsets at joints.
- B. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure weathertight window installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with manufacturer's written instructions for installing windows, hardware, accessories, and other components. For installation procedures and requirements not addressed in manufacturer's written instructions, comply with installation requirements in ASTM E 2112.
- B. Install windows level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction to produce weathertight construction.
- C. Metal Protection: Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials by complying with requirements specified in "Dissimilar Materials" Paragraph in NAFS Appendix B.
- D. Adjust operating sashes and ventilators, screens, hardware, operators, and accessories for a tight fit at contact points and weather stripping for smooth operation and weathertight closure. Lubricate hardware and moving parts.
- E. Install windows and components to drain condensation, water penetrating joints, and moisture migrating within windows to the exterior.

3.3 FIELD QUALITY CONTROL

- A. Testing Agency: Owner may elect to engage a qualified independent testing agency to perform tests and inspections and prepare test reports. Testing and inspecting agency will interpret tests and state in each report whether tested work complies with or deviates from requirements
 - 1. Windows will be considered defective if they do not pass tests and inspections.
- B. Testing Services: Testing and inspecting of installed windows shall take place as follows:
 - 1. Testing Methodology: Testing of windows for air infiltration and water resistance shall be performed according to AAMA 502, Test Method B, by applying same test pressures required to determine compliance with AAMA/WDMA 101/I.S.2/NAFS in Part 1 "Performance Requirements" Article.

2. Air-Infiltration Testing:
 - a. Test Pressure: That required to determine compliance with AAMA/WDMA/CSA 101/I.S.2/A440 performance class indicated.
 - b. Allowable Air-Leakage Rate: 1.5 times the applicable AAMA/WDMA/CSA 101/I.S.2/A440 rate for product type and performance class rounded down to one decimal place.
 3. Water-Resistance Testing:
 - a. Test Pressure: Two-thirds times test pressure required to determine compliance with AAMA/WDMA/CSA 101/I.S.2/A440 performance grade indicated.
 - b. Allowable Water Infiltration: No water penetration.
 4. Testing Extent: Three windows of each type as selected by Architect and a qualified independent testing and inspecting agency. Windows shall be tested after perimeter sealants have cured.
 5. Test Reports: Shall be prepared according to AAMA 502.
- C. Remove and replace noncomplying aluminum window and retest as specified above.
- D. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.4 ADJUSTING, CLEANING, AND PROTECTION

- A. Protect window surfaces from contact with contaminating substances resulting from construction operations. In addition, monitor window surfaces adjacent to and below exterior concrete and masonry surfaces during construction for presence of dirt, scum, alkaline deposits, stains, or other contaminants. If contaminating substances do contact window surfaces, remove contaminants immediately according to manufacturer's written recommendations.
- B. Clean exposed surfaces immediately after installing windows. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.
 1. Keep protective films and coverings in place until final cleaning.
- C. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

3.5 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain window operating system. Refer to Division 01 Section "Demonstration and Training."

END OF SECTION 08 5113

SECTION 08 6213 – DOMED UNIT SKYLIGHTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Thermally-broken, curb-mounted double dome plastic glazed unit skylights.

1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct Conference at Project Site.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of unit skylight.
 - 1. Include product dimensions, construction details, material descriptions, dimensions of individual components and profiles, and finishes for unit skylights.
- B. Shop Drawings: For unit skylight work.
 - 1. Include plans, elevations, sections, details, and connections to supporting structure and other adjoining work.
- C. Aluminum Finish Samples: For each type of exposed finish required, in a representative section of each unit skylight in manufacturer's standard size.
- D. Glazing Samples: For each color and finish of glazing indicated, 12 inches square and of same thickness indicated for the final Work.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.
- B. Product Test Reports: For each type and size of unit skylight, for tests performed within the last four years by a qualified testing agency. Test results based on testing of smaller unit skylights than specified will not be accepted.
- C. Sample Warranty: For special warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For unit skylights to include in maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An installer acceptable to unit skylight manufacturer for installation of units required for this Project.

1.7 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of unit skylights that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Failure to meet performance requirements.
 - b. Water leakage not controlled by drainage features.
 - c. Deterioration of materials and finishes beyond normal weathering.
 - d. Retain applicable subparagraphs below for glazing types specified, and revise to suit Project.
 - e. Yellowing of acrylic glazing.
 - f. Breakage of polycarbonate glazing.
 - 2. Skylight Warranty Period: Ten years from date of Substantial Completion.
 - 3. Finish Warranty Period: Five years from date of Substantial Completion.
 - 4. Insulating Glass Warranty Period: Ten years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Unit Skylight Standard: Comply with AAMA/WDMA/CSA 101/I.S.2/A440 for definitions and minimum standards of performance, materials, components, accessories, and fabrication unless more stringent requirements are indicated.
 - 1. Performance Class and Grade: Class CW-PG 40.
 - 2. Certification: AAMA-, WDMA-, or CSA-certified unit skylights with label attached to each.
 - 3. Units shall be impact tested to 400 ft.-lbs. over 1 sf of the surface, to comply with the intent of OSHA fall protection regulation 29 CFR 1910.29.
- B. Thermal Transmittance: NFRC 100 maximum U-factor of 0.6 Btu/sq. ft. x h x deg F
- C. Solar Heat-Gain Coefficient (SHGC): NFRC 200 maximum SHGC of 0.46.
- D. Visible Light Transmittance (VLT) and Percent Haze: ASTM D 1003: VLT = 61.9%, Haze = 100%
- E. Windborne-Debris Impact Resistance: Passes ASTM E1886 missile-impact and cyclic-pressure tests in accordance with ASTM E1996 for Wind Zone 4 for basic protection.

2.2 MANUFACTURERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide **CMD2 Curb-Mount Dynamic Double Dome Skylight by Velux Commercial NA** or comparable product by one of the following:
 - 1. Kingspan Light + Air LLC
 - 2. AES Sunoptics; Acuity Brands International, Inc.

2.3 UNIT SKYLIGHTS

- A. General: Provide factory-assembled unit skylights that include glazing, extruded-aluminum glazing retainers, gaskets, and inner frames and that are capable of withstanding performance requirements indicated.
- B. Unit Shapes and Sizes: As indicated on drawings.
- C. Plastic Sheets: Monolithic, formable, transparent (colorless) or translucent (white) sheets with good weather and impact resistant.

1. Double dome: Polycarbonate (LuxGuard) – Outer dome clear polycarbonate, 0.118 inches in thickness with UV blocking cap layer. Inner dome white prismatic polycarbonate, 0.118 inches in thickness.
- D. Structural Sealant: Factory applied InstantGlaze sealant, bonding the dome to the aluminum frame and suitable for external exposure.
- E. Condensation Control: Fabricate unit skylights with integral internal gutters and nonclogging weeps to collect and drain condensation to the exterior.
- F. Thermal Break: Fabricate unit skylights with thermal barrier separating exterior and interior metal framing.

2.4 ACCESSORY MATERIALS

- A. Factory Insulated Curb: Per Section 07 4113 "Metal Roofing Panels".
 1. Provided with integral fall protection safety screen constructed from 0.1875 inch steel mesh with a 6 inch on center grid spacing. Basis of Design: VELUX America LLC Model, CCA3.
- B. Fasteners: Same metal as metal being fastened, nonmagnetic stainless steel, or other noncorrosive metal as recommended by manufacturer. Finish exposed fasteners to match material being fastened.
- C. Bituminous Coating: Cold-applied asphalt mastic, compounded for 15-mil dry film thickness per coat.

2.5 ALUMINUM FINISHES

- A. Clear Anodic Finish: AAMA 611, AA-M12C22A32/A31, Class II, 0.010 mm or thicker.
 1. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Coordinate installation of unit skylight with installation of substrates, roof insulation, roofing membrane, and flashing as required to ensure that each element of the Work performs properly and that combined elements are waterproof and weathertight.
 1. Anchor unit skylights securely to supporting substrates.
 2. Install unit skylights on curbs specified in another section with tops of curbs parallel to finished roof slope.
 3. For custom flashings, install unit skylight curb counter-flashing to produce weatherproof seal with curb and overlap with metal roofing system flashing termination at top of curb.
- B. Comply with recommendations in AAMA 1607 and with manufacturer's written instructions for installing unit skylights.

- C. Install unit skylights level, plumb, and true to line, without distortion.
- D. Anchor unit skylights securely to supporting substrates.
- E. Where aluminum surfaces of unit skylights will contact another metal or corrosive substrates, such as preservative-treated wood, apply bituminous coating on concealed metal surfaces or provide other approved permanent separation recommended in writing by unit skylight manufacturer.

3.3 FIELD QUALITY CONTROL

- A. Work will be considered defective if it does not pass inspections.
- B. Additional testing and inspections, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- C. Prepare inspection reports.

3.4 CLEANING

- A. Clean exposed unit skylight surfaces according to manufacturer's written instructions. Touch up damaged metal coatings and finishes.
- B. Remove excess sealants, glazing materials, dirt, and other substances.
- C. Remove and replace glazing that has been broken, chipped, cracked, abraded, or damaged during construction period.
- D. Protect unit skylight surfaces from contact with contaminating substances resulting from construction operations.

END OF SECTION 08 6213

SECTION 08 8000 - GLAZING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes glazing for the following products and applications, including those specified in other Sections:
 - 1. Curtainwall.
 - 2. Windows
 - 3. Doors.
 - 4. Glazed entrances and storefront systems
- B. Related Requirements:
 - 1. Section 08 8813 "Fire-Resistant Glazing" for protection-rated and resistance-rated glazing.
 - 2. Sections 06 4023 "Interior Architectural Woodwork and Finish Carpentry for glass sliding window assembly (Window Type W-3).

1.2 DEFINITIONS

- A. Manufacturers of Glass Products: Firms that produce primary glass, fabricated glass, or both, as defined in referenced publications.
- B. Interspace: Space between lites of an insulating-glass unit that contains dehydrated air or gas.
- C. Deterioration of Coated Glass: Defects developed from normal use that are attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in metallic coating.
- D. Deterioration of Insulating Glass: Failure of hermetic seal under normal use that is attributed to the manufacturing process and not to causes other than glass breakage and practices for 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.
- E. Deterioration of Laminated Glass: Defects developed from normal use that are attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.

1.3 SUBMITTALS

- A. Product Data: For each glass product and glazing material indicated.
- B. Qualification Data: For installers.
- C. Samples: For each glass product and glazing material.
- D. Product Certificates: Signed by manufacturers of glass and glazing products certifying that products furnished comply with the requirements
 - 1. For solar-control low-e-coated glass, provide documentation demonstrating that manufacturer of coated glass is certified by coating manufacturer.

- E. Glazing Schedule: Use same designations indicated on Drawings for glazed openings to prepare a schedule listing glass types and thicknesses for each size opening and location.
- F. Warranties: Special warranties specified in this Section.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed glazing similar in material, design, and extent to that indicated for this Project, whose work has resulted in glass installations with a record of successful in-service performance; and 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 Sputter-coated with Solar-Control Low-E Coatings: Where solar-control low-e coatings of a primary glass manufacturer that has established a certified fabricator program is specified, obtain sputter-coated solar-control low-e coated glass in fabricated units from a manufacturer that is certified by coated-glass manufacturer.
- C. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for the fire ratings indicated, based on testing according to NFPA 252.
- D. Fire-Rated Window Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspection agency acceptable to authorities having jurisdiction, for the fire ratings indicated, based on testing according to NFPA 257, Glazing shall be CPSC CAT II.
- E. Safety Glass: Category II materials complying with testing requirements in 16 CFR 1201 and ANSI Z97.1.
 - 1. Subject to compliance with requirements, permanently mark safety glass with certification label of Safety Glazing Certification Council or another certification agency acceptable to authorities having jurisdiction.
- F. 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 "Glazing Manual" and "Laminated Glass Design Guide".
 - 2. SIGMA Publications: SIGMA TM-3000 "Vertical Glazing Guidelines"
 - 3. SIGMA Publication for Insulating Glass: SIGMA TM-3000, "Glazing Guidelines for Sealed Insulating Glass Units".
- G. Insulating-Glass Certification Program: Permanently marked on either on spacers or on at least one component lite of units with appropriate certification label of the following inspecting and testing agency: Insulating Glass Certification Council.
- H. Safety Glazing Products: Comply with testing requirements 16CFR 1201.
- I. Glazing for Fire-Rated Door Assemblies: Glazing for assemblies that comply with NFPA 80 and that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 257. Glazing shall be CPSC CAT II.
- J. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination"

1.5 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.

1.6 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.

1.7 WARRANTY

- A. General Warranty: Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.
 - 1. Warranties specified in this Article or under other provisions of the Contract Documents shall not deprive Owner of other rights or remedies available to Owner under prevailing laws.
- B. Manufacturer's Special Warranty on Coated-Glass Products: Written warranty, made out to Owner and signed by coated-glass manufacturer agreeing to furnish replacements for those coated-glass units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.
 - 1. Warranty Period: 10 years from date of Substantial Completion.
- C. Manufacturer's Special Warranty on Laminated Glass: Manufacturer's standard form, made out to Owner and signed by laminated-glass manufacturer agreeing to replace laminated-glass units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.
 - 1. Warranty Period: 5 years from date of Substantial Completion.
- D. Manufacturer's Special Warranty on Insulating Glass: Written warranty, made out to Owner and signed by insulating-glass manufacturer agreeing to furnish replacements for insulating-glass units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.
 - 1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Provide glazing systems capable of withstanding normal thermal movement and wind and impact loads without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, and installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.
- B. Glass Design: Glass thickness designations indicated are minimums and are for detailing only. Confirm glass thicknesses by analyzing Project loads and in-service conditions. Provide glass lites in the thickness designations indicated for various size openings, but not less than thicknesses and in strengths (heat treated) required to meet or exceed the following criteria:
 - 1. Glass Thicknesses: Select minimum glass thicknesses to comply with ASTM E 1300, according to the following requirements:
 - a. Specified Design Wind Loads: As indicated or required by prevailing Building Code, but not less than winds loads applicable to Project as required by ASCE 7 "Minimum Design Loads for Buildings and Other Structures": Section 6.0 "Wind Loads".
 - b. Probability of Breakage for Vertical Glazing: 8 lites per 1000 for lites set vertically or not more than 15 degrees off vertical and under wind action.
 - 1) Load Duration: 3 seconds.

- c. Maximum Lateral Deflection: For the following types of glass supported on all 4 edges, provide thickness required that limits center deflection at design wind pressure to 1/50 times the short side length or 1 inch, whichever is less.
 - 1) For monolithic-glass lites heat treated to resist wind loads.
 - 2) For insulating glass.
 - 3) For laminated-glass lites.
 - d. Minimum Glass Thickness for Exterior Lites: Not less than 6.0mm.
 - e. Thickness of Tinted and Heat-Absorbing Glass: Provide the same thickness for each tint color indicated throughout Project.
- C. Thermal Movements: Provide glazing that allows for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures acting on glass framing members and glazing components. Base engineering calculation 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.
- D. Thermal and Optical Performance Properties: Provide glass with performance properties specified based on manufacturer's published test data, as determined according to procedures indicated below:
- 1. For monolithic-glass lites, properties are based on units with lites 6mm thick.
 - 2. For laminated-glass lites, properties are based on products of construction indicated.
 - 3. For insulating-glass units, properties are based on units of thickness indicated for overall unit for each lite.
 - 4. Center-of-Glass Values: Based on using LBL-44789 WINDOW 5.0 computer program for the following methodologies:
 - a. U-Factors: NFRC 100 expressed as Btu/sq. ft. x h x deg F.
 - b. Solar Heat Gain Coefficient: NFRC 200
 - c. Solar Optical Properties: NFRC 300

2.2 GENERAL

- A. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass lites in the thicknesses as needed to comply with requirements indicated.
- 1. Minimum Glass Thickness for Exterior Lites: Not less than 6.0 mm.
- B. Strength:
- 1. Where float glass is indicated, provide annealed float glass, Kind HS heat-treated float glass or Kind FT heat-treated float glass as needed to comply with "Performance Requirements" Article.
 - 2. Where heat-strengthened glass is indicated, provide Kind HS heat-treated float glass or Kind FT heat-treated float glass as needed to comply with "Performance Requirements" Article.
 - 3. 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 6.00 mm.
 - 2. For laminated-glass lites, properties are based on products of construction indicated.
 - 3. For insulating-glass units, properties are based on units of thickness indicated for overall unit for each lite.
 - 4. U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2 computer program, expressed in Btu/sq. ft. x h x deg F.
 - 5. 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.
 - 6. Visible Reflectance: Center-of glazing values, according to NFRC 300.

2.3 GLASS PRODUCTS

- A. Annealed Float Glass: ASTM C 1036, Type I (transparent glass, flat), Quality-Q3 (glazing select); Class I (clear) unless otherwise indicated.
- B. Heat-Treated Float Glass: ASTM C 1048; Type I (transparent flat glass); Quality-Q3; of class, 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.
 2. Provide Kind HS (heat-strengthened) float glass to resist thermal stresses induced by differential shading of individual glass lites and to comply with glass design requirements specified in Part 1 "Performance Requirements" Article.
 3. For uncoated glass, comply with requirements for Condition A.
 4. For coated vision glass, comply with requirements for Condition C (other uncoated glass).
 5. Provide Kind FT (fully tempered) float glass in place of annealed or Kind HS (heat-strengthened) float glass where safety glass is indicated.
 6. Provide 5/16" Kind FT (fully tempered) and Laminated clear safety glass where indicated on drawings.
- C. Sputter-Coated Float Glass: ASTM 1376, float glass with metallic-oxide or -nitride coating deposited by vacuum deposition process after manufacture and heat treatment (if any), and complying with other requirements specified.
1. PPG Solarban 70XL
 2. Guardian Sunguard SNX 70+
 3. Cardinal LoE i89
- D. Ceramic-Coated Spandrel Glass: ASTM C 1048, Type I, Condition B, Quality-Q3:
1. Fallout Resistance: Provide spandrel units identical to those passing the fallout-resistance test for spandrel glass specified in ASTM C 1048.
 2. 1/4 – in clear HS or FT glass with spandrel coating in color indicated on drawings.
- E. Sputter Coated Spandrel Glass: ASTM C 1048, Condition B (spandrel glass, one surface sputter coated), Type I (transparent flat glass), Quality-Q3, and complying with other requirements specified.
1. Fallout Resistance: Provide spandrel units identical to those passing the fallout-resistance test for spandrel glass specified in ASTM C 1048.
- F. Laminated Glass: ASTM C 1172, and complying with other requirements specified and with the following:
1. Interlayer: Polyvinyl butyral or cured resin of thickness indicated with a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after laminating glass lites and installation.
 - a. For polyvinyl butyral interlayers, laminate lites in autoclave with heat plus pressure.
 - b. For cured-resin interlayers, laminate lites with laminated-glass manufacturer's standard cast-in-place and cured-transparent-resin interlayer.
 - c. Where indicated, provide interlayer comparable to SG4 and SG5 Laminated Security Glass by School Guard Glass LLC
 2. Laminating Process: Fabricate laminated glass to produce glass free of foreign substances and air or glass pockets.
 3. Provide 5/16" Kind FT (fully tempered) and Laminated clear safety glass where indicated on drawings.
- G. Sound reducing Glass: Complying with requirements for laminated glass and as follows:
1. Interlayer: 0.060 Saflex clear acoustical PVB by Solutia Inc.
 2. Glass: 1 layer 1/8", 1 layer 1/8", Clear HS as scheduled.

- H. Double glazed panel with integral blind system: ASTM C 1048: Type I (transparent flat glass); Quality-Q3; of class, 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.
 2. For uncoated glass, comply with requirements for Condition A.
 3. Provide Kind FT (fully tempered) float glass.
 4. Overall Unit Thickness and Thickness of Each Lite: 1-inch and 1/8-inch.
 5. Interspace Content: Air and integral blind system.
 6. Outdoor Lite: Class 2 (clear) float glass Kind FT (fully tempered).
 7. Indoor Lite: Class 1 (clear) float glass Kind FT (fully tempered).
 8. Integral blinds: Provide integral blind system between indoor and outdoor as specified in Section 12 2115 Integral Horizontal Louver Blinds.

2.4 INSULATING-GLASS UNITS

- A. General: Preassembled units consisting of dual-sealed lites of glass separated by a dehydrated interspace, and complying with ASTM E 774 for Class CBA units and with requirements specified in this Article and as scheduled.
1. Provide Kind HS (heat-strengthened) float glass in place of annealed glass where needed to resist thermal stresses induced by differential shading of individual glass lites and to comply with glass design requirements specified in "Performance Requirements" Article.
 2. Provide Kind FT (fully tempered) glass lites where safety glass is indicated.
 3. Overall Unit Thickness and Thickness of Each Lite: Dimensions indicated in the Insulating-Glass Schedule are nominal and the overall thicknesses of units are measured perpendicularly from outer surfaces of glass lites at unit's edge.
 4. Sealing System: Dual seal, with primary and secondary sealants as follows:
 - a. Manufacturer's standard sealants.
 5. Spacer Specifications: Manufacturer's standard warm edge spacer material and construction.
- B. Insulated-Glass Units: Annealed or Kind HS (heat-strengthened) typical, or Kind FT (fully tempered) where indicated or required by authority having jurisdiction (AHJ).
1. Overall Unit Thickness and thickness of Each Lite:
 - a. Typical: 1-inch and 1/4-inch min.
 - 1) Laminated: 1/4-in nom. Outdoor lite – 5/16-in indoor lite.
 - b. Doors: 5/8-inch and 1/8-inch
 - 1) Laminated: 1/8-in nom. Outdoor lite – 5/16-in indoor lite.
 2. Interspace Content:
 - a. Exterior Low-E units: Argon
 - b. Interior units: Air
 3. Provide Class I (clear) float glass, both lites, all IG units. Provide Kind FT at all locations except as follows:
 - a. Provide Annealed or Kind HS only where scheduled and allowed by AHJ.
 4. Low-E Coating, surface 2 of exterior clear units. No coatings required on interior IG units.
 5. Spandrel IG:
 - a. Indoor and Outdoor Lite: Heat-strengthened float glass.
 - b. Low-E coating: Surface 2
 - c. Opaque Coating Location: Surface 4

- d. Insulation Panel: Mineral-Fiber Board, Foil-Faced, Min 6 lb/cf density, Min 4.1 per inch resistivity, Min 1-in thickness. Install tight against inside surface of IG unit with no gaps or leaks at butt joints or perimeter.
 - 1) Fibrex CW70 FS
 - 2) Owens Corning CW6 Curtain Wall Insulation/ MW FSP
 - 3) Thermafiber CW90 FSP
- 6. Minimum Required Performance Data for Clear Low-E Sealed IG units:
 - a. Visible Light:
 - 1) Transmittance: 64%
 - 2) Reflectance – Indoors: 14%
 - b. Solar Energy:
 - 1) Transmittance: 25%
 - 2) Reflectance – Outdoors: 52%
 - c. U.V. Light Transmittance: 6%
 - d. U-Values:
 - 1) Winter Nighttime (Argon): 0.24
 - 2) Summer Daytime (Argon): 0.23
 - e. Other Values:
 - 1) Solar Heat Gain Coefficient: 0.27
 - 2) Shading Coefficient: 0.32
- C. Low-E Insulated-Glass Units: Kind FT (fully tempered) where indicated or required by authority having jurisdiction
 - 1. Overall Unit Thickness and (Thickness of Each Lite): 1-inch and (1/4-inch)
 - 2. Interspace Content : Argon
 - 3. Outdoor Lites: Class I (clear) float glass
 - 4. Interior Lites: Class I (clear) float glass
 - 5. Low-E Coating: on surface 2
- D. Low-E Insulated-Laminated Glass Units: Kind FT(fully tempered) and Kind HS (heat-strengthened)
 - 1. Overall Unit Thickness and (Thickness of Each Lite): 1-inch and (1/4-inch, 5/16-inch)
 - 2. Interspace Content : Argon
 - 3. Outdoor Lites: Class I (clear) float glass Kind FT (1/4-inch)
 - 4. Indoor Lites: Laminated Glass; 2 layers 1/8 inch Kind HS with .06" PVB interlayer (5/16 inch)
 - 5. Low-E Coating : on surface 2
- E. Low-E Insulating-Laminated Glass Units for Exterior Doors: Kind FT (fully tempered) and Kind HS (heat-strengthened)
 - 1. Overall Unit Thickness and (Thickness of Each Lite): 5/8-inch and (1/8-inch, 5/16-inch)
 - 2. Interspace Content: Argon
 - 3. Outdoor Lites: Class I (clear) float glass Kind FT)(1/8-inch)
 - 4. Indoor Lites: Laminated Glass; 2 layers 1/8 inch Kind HS with .06" PVB interlayer (5/16-inch)
 - 5. Low-E Coating: on surface 2
- F. Insulating-Glass Spandrel Units: Kind HS (heat-strengthened) typical, where indicated or required by authority having jurisdiction.
 - 1. Overall Unit Thickness and (Thickness of Each Lite): 1-inch and (1/4-inch)
 - 2. Interspace Content: Argon
 - 3. Outdoor Lites: Class I (clear) float glass
 - 4. Indoor Lites: Class I (clear) float glass
 - 5. Low-E Coating: on surface 2

6. Spandrel Coating on surface 4
 - a. Architect shall select color from manufacturer's full range of colors.
7. Backer Panels: Provide smooth face aluminum composite backer panel
 - a. Location: Backer panels to be provided where interior face of spandrel panel is exposed to view.

2.5 MISCELLANEOUS GLAZING MATERIALS

- A. 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.
- B. Dense Compression Gaskets: Molded or extruded gaskets of material indicated below, complying with standards referenced with name of elastomer indicated below, and of profile and hardness required to maintain watertight seal;
 1. Neoprene, ASTM C 864
 2. EPDM, ASTM C 864
 3. Silicone, ASTM C 1115
 4. Thermoplastic polyolefin rubber.
 5. Any material indicated above.
- C. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned gaskets of material indicated above; complying with ASTM C 509, Type II, black; and of profile and hardness required to maintain watertight seal.
- D. General: Provide neutral-curing silicone glazing complying with the following requirements:
 1. Compatibility: Select 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 manufacturer's written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
 3. Comply with ASTM C 920 for liquid-applied chemically neutral-curing silicone sealant type S (single component) and NS (nonsag), and use related for NT (nontraffic) Exposure.
- E. Glazing Sealants for Fire-Resistive Glazing Products: Identical to products used in test assemblies to obtain fire-protection rating.
- F. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
- G. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
- H. Spacers: Elastomeric blocks or continuous extrusions with a Shore A durometer hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
- I. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).
- J. Miscellaneous Glazing Materials: 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.

2.6 FABRICATION OF GLASS AND OTHER GLAZING PRODUCTS

- A. Fabricate glass and other glazing products in sizes required to glaze 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 standard, to comply with system performance requirements.

2.7 MONOLITHIC FLOAT-GLASS UNITS

- A. For Glazed Interior Doors, Sidelites, Transoms and View Windows: Uncoated clear float-glass units Class I (clear), Kind FT (fully tempered), 1/4 –inch –thick.
 - 1. Provide specified fire-rated glazing where indicated on the Drawings or otherwise required by applicable code.
- B. For Smoke Baffle System: Uncoated low-iron ultraclear float-glass units Class I (clear), Kind FT (fully tempered), 1/2 – inch thick.
 - 1. Edgework: Pencil edge, polished where exposed.
- C. For Spandrel Float Glass: Kind HS (heat-strengthened) typical, or Kind FT (fully tempered) 1/4-inch-thick glazing where indicated on the Drawings.
- D. For Single Glazed Interior assemblies, where indicated: Kind FT (fully tempered) as scheduled or required of authority having jurisdiction.
 - 1. Lites: Uncoated clear or tinted, as scheduled.
 - a. Thickness: 1/4-inch min, or as required for size of opening.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:
 - 1. Manufacturing and installation tolerances, including those for size, squareness, 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.

3.3 GLAZING

- A. General: 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.
 - 1. Glazing channel dimensions, as indicated on Drawings, provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Adjust as required by Project conditions during installation.
 - 2. 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.
 - 3. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction sealant-substrate testing.
 - 4. 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 heal bead.
 - 5. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
 - 6. Provide spacers for glass lites where length plus width is larger than 50 inches.

7. Provide spacers for glass lites where the length plus width is larger than 50 inches as follows:
 - a. Locate spacers directly opposite of 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.
 - b. Provide 1/8-inch minimum bite of spacers on glass and use thickness equal to sealant width.
 8. 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.
 9. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.
- B. Gasket Glazing (Dry): Fabricate compression gaskets in lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.
1. 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.
 2. 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.
 3. Install gaskets so they protrude past face of glazing stops.

3.4 PROTECTION AND CLEANING

- 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, including weld splatter. If, despite such protection, contaminating substances do come into contact with glass, remove them immediately as recommended 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 build-up of dirt, scum, alkaline deposits, or stains; remove as recommended by glass manufacturer.
- D. Remove and replace glass that is broken, chipped, cracked, abraded, or damaged in any way, including 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 by glass manufacturer.

END OF SECTION 08 8000

SECTION 09 2116 - GYPSUM BOARD ASSEMBLIES

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes the following:
 - 1. Interior gypsum board.
 - 2. Tile backing panels.
 - 3. Non-structural steel framing members for the following applications:
 - a. Furring and partitions,
 - b. Framed and suspended soffits, bulkheads and ceilings.
 - 4. Sound attenuation insulation
 - 5. Acoustical sealing and devices
- B. Related Sections include the following:
 - 1. Division 06 Section "Miscellaneous Rough Carpentry" - Non-load bearing wood blocking and nailers integral with partition assemblies.
 - 2. Division 09 Section "Thinset Tiling" - Flatness requirements for large-format tile substrates.

1.02 DEFINITIONS

- A. Gypsum Board Terminology: Refer to ASTM C 11 for definitions of terms for gypsum board assemblies not defined in this Section or in other referenced standards.

1.03 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples: For the trim accessories products full-size Sample in 12-inch-long length for each trim accessory indicated.
- C. Evaluation Reports: Submit evaluation reports certified under an independent third party inspection program administered by an agency accredited by IAS to ICC-ES AC98, IAS Accreditation Criteria for Inspection Agencies.
- D. Manufacturer's Certification: Submit manufacturer's certification of product compliance with codes and standards along with product literature and data sheets for specified products.

1.04 QUALITY ASSURANCE

- A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by a testing and inspecting agency acceptable to authority having jurisdiction.
 - 1. Products used in the assembly shall carry a classification label from a testing laboratory acceptable to authority having jurisdiction.
 - 2. Fire-Resistance-Rated Assemblies: Indicated by design designations from FM's "Approval Guide, Building Products" or UL's "Fire Resistance Directory."
- B. Observe requirements of prevailing building code and SSMA technical recommendations in component selection, design, detailing and installation of metal stud construction

- C. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." Review methods and procedures for installing gypsum board assemblies including, but not limited to, the following:
1. Control and expansion joint requirements
 2. Fasteners proposed for anchoring nonstructural steel framing to building structure.
 3. Sprayed fire-resistive materials applied to structural steel framing.
 4. Bracing at terminations, transitions, and tall partition assemblies.
 5. Top of partition anchorage, deflection clearance, firestopping, and sound isolation.
 6. Supplementary framing, stiffening and blocking.
 7. Manufacturer's published installation recommendations for standard drywall studs, including load and span tables, and bracing, bridging, fastening and anchoring recommendations

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original packages, containers, or bundles bearing brand name and identification of manufacturer or supplier.
- B. Store materials inside under cover and keep them dry and protected against damage from weather, condensation, direct sunlight, construction traffic, and other causes. Stack panels flat to prevent sagging.
- C. Protect and store cold-formed metal framing from corrosion, deformation and other damage during delivery, storage and handling per requirements of AISI's "Code of Standard Practice".
- D. Stack panels flat on leveled supports off floor or slab to prevent sagging.

1.06 PROJECT CONDITIONS

- A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.
- B. Do not install interior products until installation areas are enclosed and conditioned.
- C. Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged.
1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E119 by an independent testing agency.
- B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E90 and classified according to ASTM E413 by an independent testing agency.
- C. Provide acoustical joint-sealant products that effectively reduce airborne sound transmission through perimeter joints and openings in building construction, as demonstrated by testing representative assemblies according to ASTM E90.

2.02 PANELS, GENERAL

- A. Size: Provide in maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.
 - 1. Manufacturers: Subject to compliance with requirements, provide gypsum products by one of the following:
 - a. American Gypsum
 - b. CertainTeed Corp
 - c. Georgia-Pacific Gypsum LLC
 - d. Continental.
 - e. Lafarge North America Inc.
 - f. National Gypsum Company
 - g. USG Corporation
 - 2. Metal Framing and Accessories:
 - a. ClarkDietrich Building Systems
 - b. MarinoWare.
 - c. The Steel Network

2.03 INTERIOR GYPSUM BOARD

- A. General: Complying with ASTM C 1396, as applicable to type of gypsum board indicated.
- B. Panel Size: Provide in maximum lengths and widths available that will minimize joints in each area and correspond with support system indicated.
- C. Regular Type:
 - 1. Thickness: 5/8 inch Type X, unless otherwise indicated.
 - 2. Long Edges: Tapered.
 - 3. Locations: Vertical surfaces, as indicated in Part 3 "Panel Application" Article, unless otherwise indicated.
- D. Type Firecode 'C':
 - 1. Thickness: 5/8 inch.
 - 2. Long Edges: Tapered.
 - 3. Location: Where required for fire-resistance-rated assembly.

2.04 TILE BACKING PANELS

- A. Water-Resistant Backing Board: 1/2-inch-thick, provide one of the following
 - 1. Complying with ASTM C 1278/ C 1178. Product: Subject to compliance with requirements, provide one of the following:
 - a. Gold Bond eXP Tile Backer by National Gypsum
 - b. DensShield Tile Guard by G-P Gypsum
 - c. Durock Brand Glass-Mat Tile Backerboard by USG.
 - d. Fiberock Aquatough Interior Panels by USG.
 - 2. Complying with ASTM C 1177. Product: Subject to compliance with requirements, provide "DensArmor Plus Interior Guard" by G-P Gypsum.
- B. Board Size: Provide in maximum lengths and widths available that will minimize joints in each area and correspond with support system indicated.

2.05 TRIM ACCESSORIES

- A. Subject to compliance with requirements, provide drywall trims and accessories by manufacturer specified in Article 2.01, except as otherwise indicated.
- B. Interior Trim: ASTM C 1047.
 - 1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized steel sheet.
 - 2. Shapes:
 - a. Cornerbead, metal.
 - b. Curved-Edge Cornerbead: With notched or flexible flanges, metal.
 - c. Bullnose bead, metal.
 - d. LC-Bead: J-shaped; exposed long flange receives joint compound, plastic.
 - e. U-Bead: J-shaped; exposed short flange does not receive joint compound, plastic.
 - f. Expansion (control) joint, plastic.

2.06 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C 475.
- B. Joint Tape:
 - 1. Interior Gypsum Wallboard: Paper.
 - 2. Tile Backing Panels: As recommended by panel manufacturer.
- C. Joint Compound for Interior Gypsum Wallboard: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.
 - 1. Prefilling: At open joints, rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.
 - 2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.
 - a. Use setting-type compound for installing paper-faced metal trim accessories.
 - 3. Fill Coat: For second coat, use drying -type, sandable topping compound.
 - 4. Finish Coat: For third coat, use drying -type, sandable topping compound.
 - 5. Skim Coat: For final coat of Level 5 finish, use drying-type, sandable all-purpose joint compound and/or high-build interior coating product designed for application by airless sprayer and to be used instead of skim coat to produce Level 5 finish, to thickness as recommended by manufacturer.
- D. Joint Compound for Tile Backing Panels: As recommended by backing panel manufacturer.

2.07 ACOUSTICAL SEALANT

- A. Acoustical Sealant for Exposed Joints: Manufacturer's standard nonsag, paintable, nonstaining latex acoustical sealant complying with ASTM C834.
 - 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. Accumetric LLC.
 - b. Everkem Diversified Products, Inc.
 - c. Franklin International.
 - d. GE Construction Sealants; Momentive Performance Materials Inc.
 - e. Grabber Construction Products.
 - f. Hilti, Inc.

- g. Pecora Corporation.
 - h. Specified Technologies, Inc.
 - i. Tremco Incorporated.
 - j. USG Corporation.
2. Colors of Exposed Acoustical Joint Sealants: As selected by Architect from manufacturer's full range of colors.
- B. Acoustical Sealant for Concealed Joints: Manufacturer's standard nonsag, nondrying, nonhardening, nonskinning, nonstaining, gunnable, synthetic-rubber acoustical sealant.
- 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. Pecora Corporation.
 - b. Serious Energy Inc.
- C. Primer: Material recommended by acoustical-joint-sealant manufacturer where required for adhesion of sealant to joint substrates.
- D. 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.
- E. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.
- F. Junction Box Sound Proofing: Soundproofing Putty Pad compressible gasket pad by Acoustimac.

2.08 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.
- 1. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten metal members to substrates.
- B. Fire Blocking: Mineral fiber tested in accordance with ASTM E 119 for up to 3 hour rating, having a density of 2.5 – 3.0 lbs/cu.ft. Provide Thermafiber Insulation by Thermafiber LLC.
- C. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.
- 1. Use adhesives that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- D. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.
- 1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch thick.
- E. Track Fasteners: Power-driven fasteners of size and material required to withstand loading conditions imposed on partition or shaftwall assemblies without exceeding allowable design stress of track, fasteners, or structural substrates in which anchors are embedded.
- 1. Expansion Anchors: Fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 5 times design load, as determined by testing per ASTM E 488 conducted by a qualified testing agency.

2. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 10 times design load, as determined by testing per ASTM E 1190 conducted by a qualified testing agency.
- F. Isolation Strip at Exterior Walls: Premolded filler gasket complying with ASTM D1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated, full height of wall; formulated from neoprene.
- G. Thermal Insulation: As specified in Division 07 Section "Thermal Insulation."

2.09 SOUND ATTENUATION INSULATION

- A. Provide unfaced mineral-fiber or fiberglass batt/blanket, providing an STC 49 rating and defined as "noncombustible" by NFPA Standard 220 when tested according to ASTM E 136.
- B. Sound Attenuation Blankets: ASTM C 665 unfaced, slag-wool-fiber/rock-wool-fiber blanket insulation: Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool, with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.
 1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.
 - a. Thermafiber Sound Attenuation Fire Blankets by Thermafiber.
 - b. NRS 2t by Paroc.
 2. Non-Rated-Interior partitions:
 - a. CertainTeed; Fiber Glass Sound Control Batts.
 - b. John Manville; Sound-Shield.
 - c. Owens Corning Interiors, Inc; Sound Attenuation Batts.
 3. Adhesive for Bonding Insulation: Product with demonstrated capability to bond insulation securely to substrates indicated without damaging insulation and substrates.
 4. Insulation Fasteners: Adhesively Attached, Spindle-Type Anchors:
 - a. Plate formed from perforated galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square, welded to projecting copper-coated steel spindle 0.105 inch in diameter and of length capable of holding insulation of thickness indicated securely in position with 1-1/2-inch-square or diameter self-locking washers complying with the following requirements:
 5. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch-thick galvanized steel sheet, with beveled edge for increased stiffness.
 - a. Anchor Adhesive: Product with demonstrated capability to bond insulation anchors securely to substrates indicated without damaging insulation, fasteners, and substrates.

2.10 NON-STRUCTURAL STEEL FRAMING, GENERAL

- A. Framing Members, General: Comply with ASTM C 645 for conditions indicated.
 1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal, unless otherwise indicated.
 2. Protective Coating: Comply with ASTM C 645; roll-formed from hot-dipped galvanized steel; complying with ASTM A 653 G40 or having a coating that provides equivalent corrosion resistance. A40 galvanized products are not acceptable.
 - a. Coatings shall demonstrate equivalent corrosion resistance with an evaluation report acceptable to the authority having jurisdiction.

2.11 SUSPENSION SYSTEM COMPONENTS

- A. Tie Wire: ASTM A 641, Class 1 zinc coating, soft temper, 0.0625-inch-diameter wire, or double strand of 0.0475-inch-diameter wire.
- B. Hanger Attachments to Concrete:
 - 1. Anchors: Fabricated from corrosion-resistant materials with holes or loops for attaching wire hangers and capable of sustaining, without failure, a load equal to 5 times that imposed by construction as determined by testing according to ASTM E 488 by an independent testing agency.
 - a. Type: Postinstalled, chemical anchor and/or postinstalled, expansion anchor.
 - 2. Powder-Actuated Fasteners: Suitable for concrete attachment, fabricated from corrosion-resistant materials with clips or other devices for attaching hangers of type indicated, and capable of sustaining, without failure, a load equal to 10 times that imposed by construction as determined by testing according to ASTM E 1190 by an independent testing agency.
- C. Hangers:
 - 1. Wire Hangers: ASTM A 641, Class 1 zinc coating, soft temper, 0.162-inch diameter.
 - 2. Rod Hangers: ASTM A 510, mild carbon steel.
 - a. Diameter: 1/4-inch.
 - b. Protective Coating: ASTM A 153, hot-dip galvanized.
 - 3. Flat Hangers: steel sheet ASTM A 653, G60, hot-dip galvanized.
 - a. Size: 1 by 3/16 inch by length required. Angle hangers may be required for exterior soffits subject to exceptional uplifts.
 - 4. Angle Hangers: ASTM A 653, G60, hot-dip galvanized steel sheet.
 - a. Minimum Base Metal Thickness: 0.0312 inch.
 - b. Size: 7/8 by 1-3/8 inches.
- D. Carrying Channels: steel sheet with a base-metal thickness of 0.0538 inch and minimum 1/2-inch-wide flanges with manufacturer's standard corrosion-resistant zinc coating.
 - 1. Depth 1-1/2 inches.
- E. Furring Channels (Furring Members): Commercial-steel sheet with manufacturer's standard corrosion-resistant zinc coating.
 - 1. Channels: 0.0538-inch bare-steel thickness, with minimum 1/2-inch-wide flanges, 3/4 inch deep.
 - 2. Hat-Shaped, Rigid Furring Channels: ASTM C 645-07, 7/8 inch deep.
 - a. Basis-of-Design product: Dietrich Metal Framing UltraSTEEL 20 gauge equivalent.
 - b. Minimum Base Metal Thickness: 0.0296 inch. or members that can show independently verified test performance per ASTM C645-07 Section 9.2.
- F. Grid Suspension System for Ceilings: ASTM C 645-07, direct-hung heavy duty system composed of main beams and cross-furring members that interlock.
 - 1. Drywall Grid Systems by Armstrong World Industries
 - 2. 660-C Drywall Furring System by Chicago Metallic
 - 3. Drywall Suspension System by USG

2.12 STEEL FRAMING FOR PARTITION ASSEMBLIES

- A. Steel Studs and Runners: ASTM C 645.
1. Minimum Base Metal Thickness:
 - a. For Applying One Layer of Gypsum: 0.0179-inch (25 gage) or members that can show certified third party testing with gypsum board in accordance with ICC ES AC86 (Approved May 2012). The submission of a recognized evaluation report is acceptable to show conformance to this requirement.
 - b. For Applying Two Layers of Gypsum: 0.0296 inch (20 gage). For Applying Abuse Resistant Gypsum and Tile Backer Board, or plywood backer for gypsum board finish: 0.0296 inch (20 gage) or members that can show certified third party testing with gypsum board in accordance with ICC ES AC86 (Approved May 2012). The submission of a recognized evaluation report is acceptable to show conformance to this requirement.
 - c. Provide min 0.0478 inch (18 gage) stud where indicated by Partition Type on Drawings
 2. Depth: As indicated, or as otherwise approved by Architect.
 3. Acceptable products: ClarkDietrich Building Systems ProSTUD 25 or 20 gauge equivalent, as indicated. Not acceptable where required base metal thickness exceeds 0.0296 inch.
 4. Curved track where required.
 - a. Basis-of-Design product - ClarkDietrich Building Systems Contour Track
- B. Deep-Leg Deflection Track: ASTM C 645 top runner with 2-inch-deep flanges.
1. Steel sheet top runner manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.
 - a. Designed to be installed with studs friction fit into top runner and with continuous bridging located within 12 inches of the top of studs to provide lateral bracing.
 2. Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, same manufacturer as steel studs or the following:
 - a. Steel Network Inc.; VertiClip SLD or VTD Series, as appropriate for application.
 - b. ClarkDietrich Building Systems Fast Top Clip.
- C. Deflection Track Slotted: Manufacturer's single, deep-leg, U-shaped steel track: punched with vertical slots in both legs.
1. Basis-of-Design: MaxTrak Slotted Deflection Track by ClarkDietrich Building Systems .
 2. Verticlip SLD Series by The Steel Network Inc
 3. Trim Flex Track System (SFT) by Superior Metal
- D. Firestop Tracks: Top runner manufactured to allow partition heads to expand and contract with movement of the structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.
1. Fire Trak attached to studs with Fire Trak Slip Cli by Fire Trak Corp
 2. The System by Metal-Lite, Inc
 3. BlazeFrame Firestop Track by ClarkDietrich Building Systems
 1. FlameSafe FlowTrak System by GCP Construction Products
- E. Backup Clip at Structural Steel Framing: Shaped galvanized flange clips.
1. The Claw
- F. Backing Plate: Sheet for blocking and bracing in length and width indicated.
1. Basis-of-Design: Danback Fire Treated Wood Backing Plate D16F or D24F by ClarkDietrich Building Systems.

- G. Channel Bridging: 0.0538-inch bare-steel thickness, with minimum 1/2-inch-wide flanges.
1. Depth: 1-1/2 inches.
 2. Clip Angle: Not less than 1-1/2 by 1-1/2 inches, 0.068-inch thick, galvanized steel.
 3. Basis-of-Design products:
 - a. Spazzer 9200 Bridging and Bracing Bar by ClarkDietrich Building Systems
 - b. U-Channel Assembly: Size as recommended by manufacturer for specific application, with EasyClip U-Series Clip Angle or equivalent.
- H. Hat-Shaped, Rigid Furring Channels: ASTM C 645.
1. Minimum Base Metal Thickness: 0.0296 inch, or members that can show certified third party testing with gypsum board in accordance with ICC ES AC86 (Approved May 2012). The submission of a recognized evaluation report is acceptable to show conformance to this requirement.
 2. Depth: 7/8 inch, or as indicated
 3. Basis-of-design: ProSTUD 20 gauge equivalent by ClarkDietrich Building Systems
- I. Furring Channels: 0.0538-inch bare-steel thickness, with minimum 1/2-inch-wide flanges.
1. Depth: 3/4 inch.
 2. Furring Brackets: Adjustable, corrugated-edge type of steel sheet with minimum bare-steel thickness of 0.0296 inch.
 3. Tie Wire: ASTM A 641, Class 1 zinc coating, soft temper, 0.0625-inch-diameter wire, or double strand of 0.0475-inch-diameter wire.
- J. Resilient Furring Channels: 1/2-inch-deep, steel sheet members designed to reduce sound transmission.
1. Configuration: Asymmetrical or hat shaped.
 2. Subject to compliance with requirements, suggested product - RC Deluxe Resilient Channel (RCSD) by ClarkDietrich Building Systems.
- K. Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4 inches, wall attachment flange of 7/8 inch, minimum bare-metal thickness of 0.0179 inch, and depth as indicated.
1. Z-Furring Channel by ClarkDietrich Building Systems.
- L. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames and framing, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance.
- B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- C. Examine joints indicated to receive acoustical joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting performance of the Work.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.
 - 1. Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.

3.03 INSTALLING STEEL FRAMING, GENERAL

- A. Installation Standard: ASTM C 754.
 - 1. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.
- B. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.
 - 1. Comply with details indicated and with gypsum board manufacturer's written recommendations or with United States Gypsum's "Gypsum Construction Handbook."
- C. Install bracing at terminations in assemblies.
- D. Isolate steel framing from building structure at locations indicated to prevent transfer of loading imposed by structural movement.
 - 1. Isolate ceiling assemblies where they abut or are penetrated by building structure.
 - 2. Isolate partition framing and wall furring where it abuts structure, except at floor. Install slip-type joints at head of assemblies that avoid axial loading of assembly and laterally support assembly.
- E. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.04 INSTALLING SUSPENSION SYSTEMS

- A. Install suspension system components in sizes and spacings indicated on Drawings, but not less than those required by referenced steel framing installation standards for assembly types and other assembly components indicated.
- B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.
- C. Grid Suspension System: Attach perimeter wall track or angle where grid suspension system meets vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.
- D. Suspend hangers from building structure as follows:
 - 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.
 - a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 - 2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.
 - a. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards and deflection.

3. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
 4. Secure rod, flat, and angle hangers to structure, including intermediate framing members, by attaching to inserts, eyescrews, or other devices and fasteners that are secure and appropriate for structure and hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.
 5. Do not attach hangers to steel roof deck.
 6. Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
 7. Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.
 8. Do not connect or suspend steel framing from ducts, pipes, or conduit.
- E. Fire-Resistance-Rated Assemblies: Wire tie or clip furring channels to supports, as required to comply with requirements for assemblies indicated.
- F. Grid Suspension Systems: Attach perimeter wall track or angle where grid suspension systems meet vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.
- G. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

3.05 INSTALLING STEEL PARTITION ASSEMBLIES

- A. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.
- B. Install steel studs so flanges point in the same direction and leading edge or end of each panel can be attached to open (unsupported) edges of stud flanges first.
- C. Install tracks (runners) at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts penetrating partitions above ceiling.
1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
- D. Door Openings:
1. Comply with GA-600 and with gypsum board manufacturer's applicable written recommendations.
 2. Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.
 3. Install two studs at each jamb, unless otherwise indicated.
 4. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch clearance from jamb stud to allow for installation of control joint in finished assembly.
 5. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.
- E. Other Framed Openings: Frame openings other than door openings the same as required for door openings, unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
- F. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.
- G. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated

- H. Direct Furring:
1. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.
- I. Z-Furring Members:
1. Erect insulation (specified in Division 07 Section "Building Insulation") vertically and hold in place with Z-furring members spaced 24 inches o.c.
 2. Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.
 3. At exterior corners, attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw-attach short flange of furring channel to web of attached channel. At interior corners, space second member no more than 12 inches from corner and cut insulation to fit.
- J. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch in 20-feet.

3.06 INSTALLING TRIM ACCESSORIES

- A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
- B. At exposed edges of gypsum board and edges abutting dissimilar materials install 'Mud on J-mold' and finish exposed surfaces with joint compound.
- C. Control Joints: Install control joints according to ASTM C 840. Install control joints at locations indicated on Drawings, in specific locations approved by Architect for visual effect, and at the following locations:
1. Form control and expansion joints in gypsum board above doors, and above and below windows. Form joints even with both edges of door and window jambs.
 2. Form control and expansion joints at L-, T- or U- intersections, where gypsum finish abuts dissimilar materials, or where dissimilar gypsum types abut.
 3. Form control and expansion joints 20-feet on center or less to evenly space joints on any single wall; e.g. if wall is 32-lineal-feet, place control joint near center of the wall at approx.16-feet, or locate center of 20-foot panel near centerline of wall, with approval of Architect.
- D. Interior Trim: Install in the following locations:
1. Cornerbead: Use at outside corners.
 2. L-Bead: Use where indicated.
 3. U-Bead: Use at exposed panel edges.

3.07 APPLYING AND FINISHING PANELS, GENERAL

- A. Gypsum Board Application and Finishing Standards: ASTM C 840 and GA-216.
- B. Install sound attenuation blankets before installing gypsum panels, unless blankets are readily installed after panels have been installed on one side.
- C. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
- D. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.
- E. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger

vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.

- F. Attach gypsum panels to metal studs so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.
- G. Attach gypsum panels to framing provided at openings and cutouts.
- H. Form control and expansion joints with space between edges of adjoining gypsum panels.
- I. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
 - 1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
 - 2. Fit gypsum panels around ducts, pipes, and conduits.
 - 3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch-wide joints to install sealant.
- J. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.
- K. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch-wide spaces at these locations, and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- L. Space fasteners in panels that are tile substrates a maximum of 8 inches o.c.

3.08 PANEL APPLICATION

- A. Install interior gypsum board in the following locations, except as otherwise indicated:
 - 1. Regular Type, Type X: Vertical surfaces typically, including above suspended ceilings, concealed spaces, closets.
 - 2. Firecode 'C': Where required for fire-resistance-rated assembly.
 - 3. Ceiling Type: Ceiling surfaces.
- B. Single-Layer Application:
 - 1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing, unless otherwise indicated.
 - 2. On partitions/walls, apply gypsum panels vertically (parallel to framing) or horizontally (perpendicular to framing), unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
 - a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
 - b. At stairwells and other high walls, install panels horizontally, unless otherwise indicated or required by fire-resistance-rated assembly.
 - 3. On Z-furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
 - 4. Fastening Methods: Apply gypsum panels to supports with steel drill screws.
- C. Multilayer Application:
 - 1. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.

2. On Z-furring members, apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over furring members.
 3. Fastening Methods: Fasten base layers and face layers separately to supports with screws.
- D. Curved Applications:
1. Install panels horizontally and unbroken, to the extent possible, across curved surface plus 12-inch-long straight sections at ends of curves and tangent to them.
 2. Wet gypsum panels on surfaces that will become compressed where curve radius prevents using dry panels. Comply with gypsum board manufacturer's written recommendations for curve radii, wetting methods, stacking panels after wetting, and other preparations that precede installing wetted gypsum panels.
 3. On convex sides of partitions, begin installation at one end of curved surface and fasten gypsum panels to studs as they are wrapped around curve. On concave side, start fastening panels to stud at center of curve and work outward to panel ends. Fasten panels to framing with screws spaced 12 inches o.c.
 4. For double-layer construction, fasten base layer to studs with screws 16 inches o.c. Center gypsum board face layer over joints in base layer, and fasten to studs with screws spaced 12 inches o.c.
 5. Allow wetted gypsum panels to dry before applying joint treatment.
- E. Laminating to Substrate: Where gypsum panels are indicated as directly adhered to a substrate (other than studs, joists, furring members, or base layer of gypsum board), comply with gypsum board manufacturer's written recommendations and temporarily brace or fasten gypsum panels until fastening adhesive has set.

3.09 APPLYING TILE BACKING PANELS

- A. Substrates for large-format ceramic tile: Comply with flatness requirements of NTCA Reference Manual, and ANSI A108.1 and .11. Refer to Section 09 3000.
- B. Glass-Mat, Water-Resistant Backing Panel: Comply with manufacturer's written installation instructions and install in areas where tile finish is indicated. Install with 1/4-inch gap where panels abut other construction or penetrations.
- C. Where tile backing panels abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.
- D. Areas Not Subject to Wetting and Moisture: Install regular-type gypsum wallboard panels to produce a flat surface indicated to receive decorative ceramic tile patterns.
- E. Provide water-resistant panels on vertical surfaces of gypsum assemblies adjacent to sinks, lavatories, water coolers and similar plumbing fixtures.

3.10 INSTALLING ACOUSTICAL JOINT SEALANTS

- A. Comply with acoustical joint-sealant manufacturer's written installation instructions unless more stringent requirements apply.
1. Surface Cleaning of Joints: Clean out joints immediately before installing acoustical joint sealants to comply with joint-sealant manufacturer's written instructions.
 2. Joint Priming: Prime joint substrates where recommended by acoustical-joint-sealant manufacturer. 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. 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.

- B. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical joint sealant. Install acoustical joint sealants at both faces of partitions, at perimeters, and through penetrations. Comply with ASTM C919, ASTM C1193, and manufacturer's written recommendations for closing off sound-flanking paths around or through assemblies, including sealing partitions to underside of floor slabs above acoustical ceilings.
 - 1. Install fiberglass partition isolation mat per Manufacturer's instructions to comply with performance requirements.
- C. Junction Box Soundproofing: Install Putty Pads after the gypsum board is applied to one side of the wall and before it is closed in on the other side. Applied to the box and lap over the front of the tile plate or work excess material toward the front of the box, built up into a compressible gasket per manufacturer's instructions.
- D. Acoustical Ceiling Areas: Apply acoustical joint sealant at perimeter edge moldings of acoustical ceiling areas in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.

3.11 FINISHING GYPSUM BOARD ASSEMBLIES

- A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
- B. Prefill open joints, rounded or beveled edges, and damaged surface areas.
- C. Apply joint tape over gypsum board joints, except those with trim having flanges not intended for tape.
- D. Gypsum Board Finish Levels: Finish panels to levels indicated below, according to ASTM C 840, for locations indicated:
 - 1. Level 1: Embed tape at joints; panel surfaces free of excess joint compound; tool marks and ridges are acceptable, unless a higher level of finish is required for fire-resistance-rated assemblies and sound-rated assemblies. Provide Level 1 finish at gypsum surfaces in the following areas:
 - a. Temporary partitions
 - b. Where indicated.
 - 2. Level 2: Embed tape and immediately apply separate first coat of joint compound to tape, fasteners, and trim flanges; panel surfaces free of excess joint compound; tool marks and ridges are acceptable. Provide Level 2 finish at gypsum surfaces as follows:
 - a. Ceiling plenum areas
 - b. Concealed areas
 - c. Where panels are substrate for tile
 - d. Where indicated.
 - 3. Level 3: Not used.
 - 4. Level 4: Embed tape and apply separate first, fill, and finish coats of joint compound to tape, fasteners, and trim flanges; panel surfaces and joint compound surfaces smooth and free of tool marks and ridges; primer coat applied to entire surface. Provide Level 4 finish as follows:
 - a. at surfaces that will be exposed to view inside closets, storage spaces, and janitor washrooms,
 - b. surfaces that will be finished with wallcoverings
 - c. surfaces scheduled for paint finish
 - d. surface not otherwise indicated to receive Level 1 or 2 finish.
 - 5. Level 5: Not Used.
- E. Primer and its application to surfaces are specified in other Division 09 Sections.

- F. Glass-Mat, Water-Resistant Backing Panels: Finish according to manufacturer's written instructions.

3.12 PROTECTION

- A. Protect acoustical 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, remove, and repair damaged or deteriorated acoustical joint sealants immediately so installations with repaired areas are indistinguishable from original work.
- B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- C. Remove and replace panels that are wet, moisture damaged, and mold damaged.
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 09 2116

SECTION 09 3113 – THINSET TILING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Ceramic floor and wall tile
 - a. Porcelain and glazed non-porcelain wall tile.
 - b. Porcelain floor tile.
 - c. Base tile, shapes and accessories.
 - 2. Metal trim and edging installed as part of tile installations
 - 3. Installation accessories and materials
 - a. Waterproofing and crack-suppression membrane for thin-set tile installations.
 - b. Underlayment and patching materials
 - c. Portland Cement and Urethane Grout
 - 4. Protection and maintenance
- B. Related Sections include the following:
 - 1. Division 03 Section "Cast-in-Place Concrete" for monolithic slab finishes specified for tile substrates and for cementitious underlayment and repair.
 - 2. Division 07 Section "Elastomeric Joint Sealants" for sealing of expansion, contraction, control, and isolation joints in tile surfaces.
 - 3. Division 09 Section "Gypsum Board Assemblies" for tile backing panels.

1.2 DEFINITIONS

- A. General: Definitions in the ANSI A108 series of tile installation standards and in ANSI A137.1 apply to Work of this Section unless otherwise specified.
- B. ANSI A108 Series: ANSI A108.01, ANSI A108.02, ANSI A108.1A, ANSI A108.1B, ANSI A108.1C, ANSI A108.4, ANSI A108.5, ANSI A108.6, ANSI A108.8, ANSI A108.9, ANSI A108.10, ANSI A108.11, ANSI A108.12, ANSI A108.13, ANSI A108.14, ANSI A108.15, ANSI A108.16, and ANSI A108.17, which are contained in "American National Standard Specifications for Installation of Ceramic Tile."
- C. Module or Nominal Size: Actual tile size plus joint width indicated.
- D. Face Size: Actual tile size, excluding spacer lugs.
- E. TCNA: Tile Council of North America

1.3 PERFORMANCE REQUIREMENTS

- A. Static Coefficient of Friction: For tile installed on walkway surfaces, provide products with the following values as determined by testing identical products per ASTM C 1028:
 - 1. Level Surfaces: Minimum 0.6.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated, including material test reports.
- B. Shop Drawings: Show locations of each type of tile and tile pattern. Show widths, details, and locations of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces.
- C. Samples for Verification:
 - 1. Full-size units of each type and composition of tile and for each color and finish required. For porcelain and glass mosaic tile in color blend patterns, provide full sheets of each color blend.
 - a. Samples will be returned to Contractor.
 - 2. Metal edge, corner, and inside corner pieces in 6-inch lengths.
- D. Qualification Data: For qualified Installer.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match and are from same production runs as products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Tile and Trim Units: Furnish quantity of full-size units equal to 1 (one) percent of amount installed for each type, composition, color, pattern, and size indicated.

1.6 QUALITY ASSURANCE

- A. Source Limitations for Tile: Obtain tile of each type from one source or producer.
 - 1. Obtain tile of each type and color or finish from same production run and of consistent quality in appearance and physical properties for each contiguous area.
- B. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from one manufacturer and each aggregate from one source or producer.
- C. Source Limitations for Other Products: Obtain each of the following products specified in this Section from a single manufacturer for each product:
 - 1. Stone thresholds.
 - 2. Waterproof / crack isolation membrane.
 - 3. Metal edge strips.
- D. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review requirements in ANSI A108.01 for substrates and for preparation by other trades.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirements in ANSI A137.1 for labeling tile packages.
- B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination can be avoided.

- D. Store liquid materials in unopened containers and protected from freezing.
- E. Handle tile that has temporary protective coating on exposed surfaces to prevent coated surfaces from contacting backs or edges of other units. If coating does contact bonding surfaces of tile, remove coating from bonding surfaces before setting tile.

1.8 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

PART 2 - PRODUCTS

2.1 PRODUCTS, GENERAL

- A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.
- B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TCNA installation methods specified in tile installation schedules, and other requirements specified.
- C. Low-Emitting Materials: Tile flooring systems 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. Factory Blending: For tile exhibiting color variations within ranges, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.
- E. Mounting: For factory-mounted tile, provide back- or edge-mounted tile assemblies as standard with manufacturer unless otherwise indicated.
 - 1. Where tile is indicated for installation in shower stalls, do not use back- or edge-mounted tile assemblies unless tile manufacturer specifies in writing that this type of mounting is suitable for installation indicated and has a record of successful in-service performance.
- F. Factory-Applied Temporary Protective Coating: Where indicated under tile type, or as furnished by manufacturer, protect exposed surfaces of tile against adherence of mortar and grout by pre-coating with continuous film of petroleum paraffin wax, applied hot. Do not coat unexposed tile surfaces.

2.2 FLOOR AND WALL TILE PRODUCTS

- A. Subject to compliance with requirements, provide scheduled floor and wall tiles by Crossville Inc., Daltile, and Fireclay Tile, or, subject to Architect approval, equivalent compatible products by approved substitute manufacturer.

2.3 WATERPROOF MEMBRANE

- A. General: Manufacturer's standard product for use on walls that complies with ANSI A118.10 and is recommended by the manufacturer for the application indicated. Include primer reinforcement and accessories recommended by

manufacturer for a complete installation. Contractor may select from the following which must be compatible with the floor, crack-suppressant and wall and floor setting materials, as part of a complete system.

1. Polyethylene Sheet: Polyethylene faced on both sides with fleece webbing; 0.008-inch nominal thickness.
 - a. Products: Subject to compliance with requirements, provide one of the following:
 - 1) Schluter Systems L.P.; KERDI
 - 2) Wedi Corporation; Subliner Dry
2. Self-adhering sheet with woven reinforcement facing; 0.040-inch (50 mil) nominal thickness.
 - a. Products: Subject to compliance with requirements, provide one of the following:
 - 1) National Applied Construction Products, Inc.; Strataflex.
 - 2) Wedi® Corporation "Subliner Dry and Flex PRO."

2.4 WATERPROOFING/CRACK ISOLATION MEMBRANE FOR FLOORS

- A. General: Manufacturer's standard product, selected from the following that complies with ANSI A118.12 for high performance and is recommended by the manufacturer for the application indicated. Include primer, reinforcement and accessories recommended by manufacturer.
 1. Corrugated Polyethylene: Corrugated polyethylene with dovetail-shaped corrugations and with anchoring webbing on the underside; 3/16-inch nominal thickness.
 - a. Products: Subject to compliance with requirements, provide the following:
 - 1) Schluter Systems L.P.; DITRA.

2.5 SETTING MATERIALS

- A. Fast-setting preblended underlayment specifically designed as a flexible bonding substrate for thinset ceramic tile, capable of bridging cracks and trowelable to a feather edge.
 1. MegaFlex Crack Prevention Mortar by Custom Building Products.
- B. Dry-Set Portland Cement Mortar (Thin Set): ANSI A118.1.
 1. Use un-modified thinset with Schluter Ditra and Schluter KERDI, using product recommended.
 2. Basis-of-Design Product: Subject to compliance with requirements, provide Schluter, which is Bostik Durabond D-25™ Thinset or comparable product by one of the following:
 - a. Bostik, Inc.
 - b. Custom Building Products.
 - c. Laticrete International, Inc.
 - d. MAPEI Corporation.
 3. For wall applications when recommended by tile manufacturer for large format tiles, provide mortar that complies with requirements for non-sagging mortar in addition to the other requirements in ANSI A118.1.
- C. Latex-Portland Cement Mortar (Thin Set): ANSI A118.4.
 1. Basis-of-Design Product: Subject to compliance with requirements, provide Bostik Durabond D-70 ProFlex or comparable product by one of the following:
 - a. C-Cure.
 - b. Custom Building Products.
 - c. Laticrete International, Inc.
 - d. MAPEI Corporation.

2. For wall applications, provide mortar that complies with requirements for nonsagging mortar in addition to the other requirements in ANSI A118.4 for large format tiles.

2.6 GROUT MATERIALS

- A. Standard Un-Sanded Cement Grout: ANSI A118.6
 1. Basis-of-Design Product: Subject to compliance with requirements, provide Bostik "Hydroment Dry Tile Grout" or comparable product by one of the following:
 - a. Custom Building Products.
 - b. Laticrete International, Inc.
 - c. MAPEI Corporation.
 2. Colors: As selected by Architect from manufacturer's full range.
 3. Provide product capable of withstanding continuous and intermittent exposure to temperatures of up to 140 deg F and 212 deg F, respectively, and certified by manufacturer for intended use.
 4. Sealing required.
- B. Polymer-Modified Tile Grout: ANSI A118.7.
 1. Precoat porous tile surfaces with manufacturer's recommended temporary protective coating prior to grouting.
 2. Basis of Design Product: Prism SureColor Grout by Custom Building Products.
- C. Urethane Grout Materials: Chemical-Resistant, Water-Cleanable, Tile-Setting and Grouting, as specified below. All urethane grout applications shall be considered as Stain Resistant and Wet applications when determining the manufacturer's installation requirements.
 1. Pre-mixed, single -part, pigment-free grout.
 - a. Basis of Design Product: Quartz-Lock Grout by StarQuartz Industries, Inc., 866-220-4500.
 2. Physical and chemical properties: Per manufacturer's standard product component specifications.
 3. Accelerators: StarCure Accelerator for wet and stain resistant applications, and where required for accelerated curing.
 4. Shelf Life: Do not use epoxy components after 3 years from manufacturing date
 5. Disposal: Dispose of waste in accordance with all manufacturer's recommendations, MSDS requirements, and applicable laws.
 6. Cure Time: Do not apply grout when temperature is below 40 degrees F. Allow grout to cure as follows or as otherwise required by the manufacturer at the time of the application of the product:
 - a. Working time: 4hrs.
 - b. Light and heavy foot traffic: 48 hrs.
 - c. For stain-resistant applications, 72 hrs.
 - d. For wet areas: 168 hours.
 7. Colors: per Color Scheme on Drawings.

2.7 ELASTOMERIC SEALANTS

- A. General: Provide sealants, primers, backer rods, and other sealant accessories that comply with the following requirements and with the applicable requirements in Section 07 9200 "Joint Sealants."

2.8 MISCELLANEOUS MATERIALS

- A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.
- B. Metal Edge Strips: Height to match tile and setting-bed thickness, metallic, designed specifically for wall applications. See drawings for locations.
 - 1. Schluter-Jolly and Accessories: Straight edge for wall applications, anodized aluminum located at all wainscot caps.
 - 2. Schluter-Quadec, at outside corner accessories: anodized aluminum, squared profile at corners.
- C. Temporary Protective Coating: Either product indicated below that is formulated to protect exposed surfaces of tile against adherence of mortar and grout; compatible with tile, mortar, and grout products; and easily removable after grouting is completed without damaging grout or tile. Select product approved by tile manufacturer for each type of tile.
 - 1. Petroleum paraffin wax fully refined and odorless containing at least 0.5 percent oil with a melting point of 120 to 140 deg F per ASTM D 87.
 - 2. Grout release in form of manufacturer's standard proprietary liquid coating that is specially formulated and recommended for use as temporary protective coating for tile.
- D. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.

2.9 MIXING MORTARS AND GROUT

- A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.
- B. Add materials, water, and additives in accurate proportions.
- C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

PART 3 - EXECUTION

3.1 ACCEPTANCE

- A. Prior to ordering materials or starting Work, verify acceptance with local authority having jurisdiction, of products and application methods for tile-setting waterproofing compounds used at elevated slabs where clamping membrane into drains.

3.2 EXAMINATION

- A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.
 - 1. Verify that substrates for setting tile are firm, dry, clean, free of coatings that are incompatible with tile-setting materials including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.
 - 2. Verify that concrete substrates for tile floors installed with thin-set mortar comply with surface finish requirements in ANSI A108.01 for installations indicated.
 - a. Verify that surfaces that received a steel trowel finish have been mechanically scarified.
 - b. Verify that protrusions, bumps, and ridges have been removed by sanding or grinding.

3. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed.
 4. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.
- B. Where concrete floors are poured, slope concrete to drains.
1. Where an existing flat concrete floor is to have a drain installed, use a thick-set mortar bed sloped to the new drains.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

- A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with thin-set mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.
- B. Provide trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer to level floor at floor transition locations.
- C. Where indicated, prepare substrates to receive waterproofing as required by waterproofing manufacturer and is sloped 1/4 inch per foot toward drains. Where walls and floors are waterproofed, seal the joint as detailed by system manufacturer. Carry waterproofing 6" up the wall where floor is waterproofed but wall is not.
- D. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.
- E. Field-Applied Temporary Protective Coating: If indicated under tile type or needed to prevent grout from staining or adhering to exposed tile surfaces, pre-coat them with continuous film of temporary protective coating, taking care not to coat unexposed tile surfaces.

3.4 TILE INSTALLATION

- A. Comply with TCNA's 2024 "Handbook for Ceramic, Glass, and Stone Tile Installation" for TCNA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108-A118-A136.1 January 2024 Series "Specifications for Installation of Ceramic Tile" that are referenced in TCNA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.
 1. For the following installations, follow procedures in the ANSI A108 Series of tile installation standards for providing 95 percent mortar coverage:
 - a. Tile floors in wet areas.
 - b. Tile floors composed of tiles 8 by 8 inches or larger.
 - c. Tile floors composed of rib-backed tiles.
- B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
- C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile. When cutting tile to size, provide a beveled edge to match other beveled edges for a factory finished appearance.
- D. Provide manufacturer's standard trim shapes where necessary to eliminate exposed tile edges.

- E. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated on pattern Drawings. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.
1. For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets so joints between sheets are not apparent in finished work.
 2. Where adjoining tiles on floor, base, walls, or trim are specified or indicated to be same size, align joints.
 3. Where tiles are specified or indicated to be whole integer multiples of adjoining tiles on floor, base, walls, or trim, align joints unless otherwise indicated.
- F. Joint Widths:
1. Refer to paragraphs above describing each tile.
- G. Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated.
- H. Expansion Joints: Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated. Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.
1. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.
 2. Use expansion joint details EJ171 in TCNA Installation Guide appropriate for substrate.
 3. Joints must be installed at 20' intervals each direction except where tile is exposed to direct sunlight or moisture, where the maximum distance is 12' in each direction. Install joint where tilework abuts restraining surfaces such as perimeter walls, dissimilar floors, curbs, columns, pipes, ceilings, and where changes occur in backing materials except at drain strainers.
- I. Stone Thresholds: Install stone thresholds in same type of setting bed as adjacent floor unless otherwise indicated.
1. At locations where mortar bed (thickset) would otherwise be exposed above adjacent floor finishes, set thresholds in latex-portland cement mortar (thin set).
 2. Do not extend cleavage membrane, waterproofing or crack isolation membrane under thresholds set in dry-set portland cement or latex-portland cement mortar. Fill joints between such thresholds and adjoining tile set on cleavage membrane, waterproofing or crack isolation membrane with elastomeric sealant.
- J. Metal Edge Strips: Install where indicated at vertical outside corners, floor/wall joints or where tile meets other types of flooring.
- K. Grout tile to comply with requirements of the following tile installation standards:
1. For ceramic tile grouts (sand-portland cement; commercial portland cement; latex-portland cement grouts, and urethane grouts), comply with ANSI A108.10.
 2. Install Urethane Grout in strict compliance with manufacturer's published instructions, as submitted.
- L. Grout Sealer: Apply grout sealer to cementitious grout joints in tile floors according to grout-sealer manufacturer's written instructions. As soon as grout sealer has penetrated grout joints, remove excess sealer and sealer from tile faces by wiping with soft cloth.

3.5 TILE BACKING PANEL INSTALLATION

- A. Install cementitious backer units, concrete block or gypsum board and treat joints according to ANSI A108.11 and manufacturer's written instructions for type of application indicated. Use latex-portland cement mortar for bonding material unless otherwise directed in manufacturer's written instructions, and where Schluter uncoupling or waterproofing membrane is used.

3.6 WATERPROOFING / CRACK ISOLATION MEMBRANE INSTALLATION

- A. Install waterproofing/crack isolation membrane to comply with ANSI A108.13 and manufacturer's written instructions to produce waterproof membrane of uniform thickness and bonded securely to substrate.
- B. Do not install tile or setting materials over membrane until it has cured and been tested to determine that it is watertight.
- C. Do not grout for 24 hours after setting.

3.7 CRACK ISOLATION MEMBRANE INSTALLATION

- A. Install crack isolation membrane to comply with ANSI A108.17 and manufacturer's written instructions to produce membrane of uniform thickness and bonded securely to substrate.
- B. Do not install tile or setting materials over crack isolation membrane until membrane has cured.
- C. Use crack isolation membrane where waterproofing is not required.

3.8 CLEANING AND PROTECTING

- A. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.
 - 1. Remove epoxy and latex-portland cement grout residue from tile as soon as possible.
 - 2. Clean grout, smears and haze from tile according to tile and grout manufacturer's written instructions but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.
 - 3. Remove temporary protective coating by method recommended by coating manufacturer and that is acceptable to tile and grout manufacturer. Trap and remove coating to prevent drain clogging.
- B. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. If recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors.
- C. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.
- D. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

3.9 INTERIOR TILE INSTALLATION SCHEDULE

- A. Interior Floor Installations, Concrete Subfloor:
 - 1. Tile Installation F125A: Thin-set mortar on crack isolation membrane; TCA F125A.
 - a. Tile Type: Use on all floors that are not to be waterproofed.
 - b. Thin-Set Mortar: Latex-portland cement mortar.
 - c. Grout: Urethane grout.
- B. Interior Wall Installations on Clean, Sound, Dimensionally Stable Masonry or Concrete in areas not subject to moisture:
 - 1. Tile Installation W202: Thin-set mortar; TCA W202.
 - a. Tile Type: Where shown on drawings.
 - b. Thin-Set Mortar: Latex-portland cement mortar. Use white with glass tiles.
 - c. Grout: Urethane grout.

- C. Interior Wall Installations, Metal Studs or Furring: In areas not subject to moisture.
1. Tile Installation W243: Thin-set mortar on gypsum board; TCA W243.
 - a. Tile Type: As shown on drawings.
 - b. Thin-Set Mortar: Latex-portland cement mortar.
 - c. Grout: Urethane grout.
 2. Tile Installation W245: Thin-set mortar on coated glass-mat, water-resistant gypsum backer board; TCA W245.
 - a. Locations: On restroom walls where sinks or lavs or toilets are located.
 - b. Tile Type: As shown on drawings.
 - c. Thin-Set Mortar: Latex-portland cement mortar.
 - d. Grout: Urethane grout.

END OF SECTION 09 3113

SECTION 09 5113 - ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes acoustical mineral fiber and metal panels and exposed suspension systems for ceilings.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of size indicated below.
 - 1. Acoustical Panel: One 6-inch-square Samples of each type, color, pattern, and texture.
 - 2. Exposed Suspension-System Members, Moldings, and Trim: One 6-inch-long Samples of each type, finish, and color.
- C. 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. Suspended ceiling components (panel name and grid type).
 - 2. Structural members to which suspension systems will be attached.
 - 3. Size and location of initial access modules for acoustical panels.
 - 4. Items penetrating finished ceiling including the following:
 - a. Lighting fixtures.
 - b. Air outlets and inlets.
 - c. Speakers.
 - d. Sprinklers.
 - e. Access panels.
 - f. Projectors and/or television mounts.
 - g. Roller shade ceiling mounts.
 - 5. Perimeter moldings.

1.3 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For finishes to include in maintenance manuals.

1.4 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Acoustical Ceiling Panels
 - a. Full-sized panels equal to two percent of quantity installed, but no less than 2 full boxes of each type of panel used on the Project, unless noted otherwise – Turn over to Owner
 - 2. Suspension-System Components: Quantity of each exposed component equal to two percent of quantity installed.
 - 3. Retention Clips: Equal two (2) percent of quantity installed.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver acoustical panels, suspension-system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.
- B. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.
- C. Handle acoustical panels carefully to avoid chipping edges or damaging units in any way.

1.6 FIELD CONDITIONS

- A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
 - 1. Pressurized Plenums: Operate ventilation system for not less than 48 hours before beginning acoustical panel ceiling installation.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Acoustical ceiling shall withstand the effects of earthquake motions determined according to ASCE/SEI 7 for Seismic zones 0-2.
- B. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: Twenty-Five (25) or less. Comply with ASTM E 1264 for Class A materials.
 - 2. Smoke-Developed Index: Fifty (50) or less.

2.2 ACOUSTICAL PANELS, GENERAL

- A. Low-Emitting Materials: Acoustical panel ceilings 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."
- B. Source Limitations:
 - 1. Acoustical Ceiling Panel: Obtain each type from single source from single manufacturer.
 - 2. Suspension System: Obtain each type from single source from single manufacturer.
- C. Glass-Fiber-Based Panels: Made with binder containing no urea formaldehyde.
- D. Acoustical Panel Standard: Provide manufacturer's standard panels of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectances unless otherwise indicated.
 - 1. Mounting Method for Measuring NRC: Type E-400; plenum mounting in which face of test specimen is 15-3/4 inches away from test surface according to ASTM E 795.

- E. Acoustical Panel Colors and Patterns: Match appearance characteristics indicated for each product type as shown on Drawings.
- F. Broad Spectrum Antimicrobial Fungicide and Bactericide Treatment: Provide acoustical panels treated with manufacturer's standard antimicrobial formulation that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria and showing no mold, mildew, or bacterial growth when tested according to ASTM D 3273 and evaluated according to ASTM D 3274 or ASTM G 21.

2.3 ACOUSTICAL PANEL PRODUCTS

- A. Refer to Drawings for the Basis-of-Design acoustical Lay-In Ceiling Panels, edge conditions and Suspension Systems.
- B. Refer to Reflected Ceiling Drawings for representation of grid dimension.
- C. Subject to compliance with requirements, provide Basis-of-Design products indicated on the Drawings manufactured by **Armstrong World Industries, Inc.**, or comparable products manufactured by the following:
 - 1. USG Interiors, Inc.
 - 2. CertainTeed Architectural

2.4 METAL SUSPENSION SYSTEMS, GENERAL

- A. Metal Suspension-System Standard: Provide manufacturer's standard direct-hung metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable requirements in ASTM C 635/C 635M.
- B. Attachment Devices: Size for five times the design load indicated in ASTM C 635/C 635M, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.
 - 1. Anchors in Concrete: Anchors of type and material indicated below, with holes or loops for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to five (5) times that imposed by ceiling construction, as determined by testing according to ASTM E 488 or ASTM E 1512 as applicable, conducted by a qualified testing and inspecting agency.
 - a. Type: Cast-in-place anchors or post-installed threaded anchors.
 - b. Corrosion Protection: Stainless-steel components complying with ASTM F 593 and ASTM F 594, Group 1 Alloy 304 or 316 for bolts; Alloy 304 or 316 for anchor.
 - 2. Power-Actuated Fasteners in Concrete: Not Permitted
- C. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:
 - 1. Zinc-Coated, Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
 - 2. Size: Select wire diameter so its stress at three times hanger design load (ASTM C 635/C 635M, Table 1, "Direct Hung") will be less than yield stress of wire, but provide not less than 0.106-inch diameter wire.
- D. Hold-Down or Retention Clips: Where indicated, provide manufacturer's standard hold-down clips spaced 24 inches o.c. on all cross tees.

2.5 METAL EDGE MOLDINGS AND TRIM

- A. Manufacturers: Subject to compliance with requirements, provide products by the manufacturer of the suspension system.

- B. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, suspension system manufacturer's standard moldings for edges and penetrations that comply with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension-system runners.
1. Provide manufacturer's standard edge moldings that fit acoustical panel edge details and suspension systems indicated and that match width and configuration of exposed runners unless otherwise indicated.
 2. For lay-in panels with reveal edge details, provide stepped edge molding that forms reveal of same depth and width as that formed between edge of panel and flange at exposed suspension member.
 3. For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit penetration exactly.
 4. For narrow-face suspension systems, provide suspension system and manufacturer's standard edge moldings that match width and configuration of exposed runners.
 5. For ceiling systems adjacent to masonry walls, provide stepped edge molding that forms 3/4- by 3/4-inch (19- by 19-mm) reveal at masonry.

2.6 ACOUSTICAL SEALANT, MATERIALS, AND DEVICES

- A. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
1. Acoustical Sealant for Exposed and Concealed Joints:
 - a. Pecora Corporation; AC-20 FTR Acoustical and Insulation Sealant.
 - b. USG Corporation; SHEETROCK Acoustical Sealant.
 2. Acoustical Sealant for Concealed Joints:
 - a. Henkel Corporation; OSI Pro-Series SC-175 Acoustical Sound Sealant.
 - b. Pecora Corporation; AIS-919.
 - c. Tremco, Inc.; Tremco Acoustical Sealant.
 3. Sound-Attenuation Insulation: ASTM C 665 unfaced, slag-wool-fiber/rock-wool-fiber/glass fiber blanket insulation: Type I (blankets without membrane facing), with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively. Provide unfaced blanket defined as "noncombustible" by NFPA Standard 220 when tested according to ASTM E 136.
 - a. Thermafiber Sound Attenuation Fire Blankets by Thermafiber.
 - b. NRS 2t by Paroc.
 - c. CertainTeed; Fiber Glass Sound Control Batts.
 - d. John Manville; Sound-Shield.
 - e. Owens Corning Interiors, Inc; Sound Attenuation Batts.
 4. Sound and Vibration Isolation Hangers for supporting suspension system: Resilient isolation device to decouple hanger assembly and reduce structure-borne vibration at ceiling suspension system to reduce noise transmission through the floor/ceiling assembly.
 - a. Kinetics Noise Control, Inc; MUTA Spring Wire-Tie Ceiling Hanger or AF Fiberglass Pad Wire-Tie Hanger.
 5. Mass-Loaded Vinyl Sheet: Non-reinforced dense flexible sheet designed to reduce noise transmission in ceiling and wall cavities.
 - a. Acoustical Surfaces, Inc; Noise S.T.O.P. Vinyl Noise Barrier, 1 lb per sq ft.
 - b. Soundproof Cow; Quiet Barrier MD
 - c. Acoustical Solutions; AudioSeal MLV Barrier, 1 lb per sq ft.
- B. Acoustical Sealant: Manufacturer's standard sealant complying with ASTM C 834 and effective in reducing airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
1. Exposed and Concealed Joints: Non-sag, paintable, non-staining latex sealant.

2. Concealed Joints: Nondrying, non-hardening, non-skinning, non-staining, gunnable, synthetic-rubber sealant.
3. Acoustical sealants shall comply with the VOC limits for this product used within the Commonwealth of Pennsylvania.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.
- B. Examine acoustical panels before installation. Reject acoustical panels that are wet, moisture damaged, or mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders, and comply with layout shown on reflected ceiling plans.

3.3 INSTALLATION

- A. General: Install acoustical panel ceilings to comply with ASTM C 636/C 636M and seismic design requirements indicated, according to manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."
- B. Suspend ceiling hangers from building's structural members and as follows:
 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
 2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension-system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
 4. Secure wire hangers to ceiling-suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
 5. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for both the structure to which hangers are attached and the type of hanger involved. Install hangers in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.
 6. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, post-installed mechanical or adhesive anchors.
 7. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
 8. Do not attach hangers to steel roof deck by piercing the deck or to steel deck tabs. Attach hangers to structural members.

9. Space hangers a maximum of 48 inches o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.
 10. Size supplemental suspension members and hangers to support light fixtures, access panels, speakers and other ceiling loads within performance limits established by referenced standards and publications.
- C. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers, without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or post-installed anchors.
- D. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.
1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
 2. Screw attach moldings to substrate at intervals not more than 16 inches o.c. and not more than 3 inches from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet. Miter corners accurately and connect securely.
 3. Do not use exposed fasteners, including pop rivets, on moldings and trim.
- E. Install suspension-system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
- F. Install acoustical panels with undamaged edges and fit accurately into suspension-system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.
1. Arrange directionally patterned acoustical panels as follows:
 - a. As indicated on reflected ceiling plans.
 2. For square-edged panels, install panels with edges fully hidden from view by flanges of suspension-system runners and moldings.
 3. For reveal-edged panels on suspension-system runners, install panels with bottom of reveal in firm contact with top surface of runner flanges.
 4. Paint cut edges of panel remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.
 5. Install hold down or impact clips in areas indicated. Space as recommended by panel manufacturer's written instructions unless otherwise indicated.
 6. Protect lighting fixtures and air ducts to comply with requirements indicated for fire-resistance-rated assembly.

3.4 CLEANING

- A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension-system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 09 5113

SECTION 09 6513 - RESILIENT WALL BASE AND FLOORING ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Resilient wall base.
 - 2. Flooring transitions

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Verification: For each type of product indicated, in manufacturer's standard-size Samples but not less than 12 inches long, of each resilient product color, texture, and pattern required.
- C. Product Schedule: For resilient products. Use same designations indicated on Drawings.

1.3 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Furnish not less than 10 lineal feet for every 500 lineal feet or fraction thereof, of each type, color, pattern, and size of resilient product installed.

1.4 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
 - 1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.
- B. Source Limitations: Obtain stair riser/tread/nosings and sheet flooring for stair landings from one manufacturer and source with resources to provide products of consistent quality in appearance and physical properties without delaying the Work.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F.

1.6 PROJECT CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive resilient products during the following time periods:
 - 1. 48 hours before installation.
 - 2. During installation.
 - 3. 48 hours after installation.
- B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.

- C. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 RESILIENT WALL BASE (RB-1, 2)

- A. Resilient Cove Base:
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide **Johnsonite Traditional Wall Base** or approved product by one of the following:
 - a. Roppe Corporation.
 - b. R. C. Musson Rubber Co.
 - c. Nora by Interface.
 - d. Burke Flooring/ Mannington
 - e. Flexco, Inc.
- B. Resilient Base Standard: ASTM F 1861.
 - 1. Material Requirement: Type TS (rubber, vulcanized thermoset)
 - 2. Manufacturing Method: Group I (solid, homogeneous).
 - 3. Style: Cove (base with toe).
- C. Minimum Thickness: Per manufacturer.
- D. Height: 4 inches.
- E. Lengths: Coils in manufacturer's standard length.
- F. Outside Corners: Job formed.
- G. Inside Corners: Job formed.
- H. Colors: As indicated on Drawings.

2.2 VINYL REDUCERS AND SUB-FLOOR LEVELING

- A. Subfloor leveling system, at carpet to resilient joiner conditions.
- B. Description: Edge for glue-down applications, reducer strip for resilient floor covering, joiner for (all types specified for this Project) tile and resilient floorings, and joiner for any other transition not mentioned herein.
 - 1. Basis-of-Design Manufacturer: Subject to compliance with requirements, provide product by one of the following:
 - a. Johnsonite-Tarkett
 - b. Foppe Corp.,
 - c. Marley Flexco (USA), Inc.
 - d. Schluter Systems.
 - e. Moduleo Design Floors
- C. Profile and Dimensions: As indicated, or if not indicated, as required to create smooth transitions between surfaces and meeting "Americans with Disabilities Act Accessibility Guidelines (ADAAG)" and applicable provisions of ICC/ANSI A117.1 as referenced by PA Uniform Construction Code.
- D. Reducer Strip for 1/4-inch to 1/8-inch resilient.
 - 1. Roppe; #65 rolling traffic transition.
 - 2. Material: Rubber

3. Profile and Dimensions: Wheeled Traffic; 10:1 slope; 2-13/16 inch.
 4. Colors: As selected by Architect from full range of industry colors.
- E. Subfloor leveling system.
1. Johnsonite; Subfloor Leveler System.
 2. Roppe Corporation; Subfloor Leveling Products.
 3. Material: Vinyl.
 4. Profile and Dimensions: Wedge shaped; 1/8 inch by 12 inches ; 1/4 inch by 12 inches ; 3/8 inch by 12 inches ; 1/2 inch by 12 inches; 3/8 inch to 1/4 inch by 6 inches; 1/2 inch to 3/8 inch by 6 inches.

2.3 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated. Compressive strength not less than 4,000 psi at 28 days.
- B. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.
1. Adhesives shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24), except that adhesive for rubber stair treads shall have a VOC content of 60 g/L or less.
 2. Adhesives 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."
- C. Stair-Tread-Nose Filler: Two-part epoxy compound recommended by resilient tread manufacturer to fill nosing substrates that do not conform to tread contours.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.
- B. Concrete Substrates for Resilient Stair Treads and Accessories: Prepare according to ASTM F 710.
1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
 3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer.
 4. Moisture Testing: Perform tests recommended by manufacturer and as follows. Proceed with installation only after substrates pass testing.
 - a. Perform relative humidity test using in situ probes, ASTM F 2170. Proceed with installation only after substrates have maximum 75 percent relative humidity level measurement.

- C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.
- D. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
- E. Do not install resilient products until they are same temperature as the space where they are to be installed.
 - 1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.
- F. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.
- G. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, and dust. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 RESILIENT BASE INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient base.
- B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
- C. Install resilient base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.
- D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
- E. Do not stretch resilient base during installation.
- F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.
- G. Job-Formed Corners:
 - 1. Outside Corners: Use straight pieces of maximum lengths possible. Form without producing discoloration (whitening) at bends. Shave back of base at points where bends occur and remove strips perpendicular to length of base that are only deep enough to produce a snug fit without removing more than half the wall base thickness.
 - 2. Inside Corners: Use straight pieces of maximum lengths possible. Form by cutting an inverted V-shaped notch in toe of wall base at the point where corner is formed. Shave back of base where necessary to produce a snug fit to substrate.

3.4 RESILIENT ACCESSORY INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient accessories.
- B. Resilient Stair Accessories:
 - 1. Use stair-tread-nose filler to fill nosing substrates that do not conform to tread contours.
 - 2. Tightly adhere to substrates throughout length of each piece.
 - 3. For treads installed as separate, equal-length units, install to produce a flush joint between units.
 - 4. Install stringer covers in maximum lengths possible.
- C. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of carpet or resilient floor covering that would otherwise be exposed. Use metal transitions at edge of ceramic tile meeting carpet or resilient flooring.

3.5 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protection of resilient products.
- B. Perform the following operations immediately after completing resilient product installation:
 - 1. Remove adhesive and other blemishes from exposed surfaces.
 - 2. Sweep and vacuum surfaces thoroughly.
 - 3. Damp-mop surfaces to remove marks and soil.
- C. Protect resilient products from marks, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- D. Cover resilient products until Substantial Completion.

END OF SECTION 09 6513

SECTION 09 6519 - RESILIENT TILE FLOORING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Homogenous vinyl resilient floor tile (RTF).

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For each type of floor tile. Include floor tile layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
 - 1. Show details of special patterns.
- C. Samples for Verification: Full-size units of each color and pattern of floor tile required.
- D. Product Schedule: For floor tile. Use same designations and room names and numbers as indicated on Drawings.

1.3 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of floor tile to include in maintenance manuals.

1.5 MATERIALS MAINTENANCE SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Floor Tile: Furnish 1 box for every 50 boxes or fraction thereof, of each type, color, and pattern of floor tile installed.

1.6 MATERIALS MAINTENANCE SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Floor Tile: Furnish 1 box for every 50 boxes or fraction thereof, of each type, color, and pattern of floor tile installed.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs workers for this Project who are competent in techniques required by manufacturer for floor tile installation indicated.
 - 1. Engage an installer who employs workers for this Project who are trained or certified by manufacturer for installation techniques required.
- B. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
 - 1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Store floor tile and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F. Store floor tiles on flat surfaces.

1.9 PROJECT CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive floor tile during the following time periods:
 - 1. 48 hours before installation.
 - 2. During installation.
 - 3. 48 hours after installation.
- B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.
- C. Close spaces to traffic during floor tile installation.
- D. Close spaces to traffic for 48 hours after floor tile installation.
- E. Install floor tile after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 HOMOGENEOUS VINYL TILE (RTF-1 and 2)

- A. Homogeneous Vinyl Tile: Tarkett:
 - 1. Style: IQ Optima Tile.
- B. Tile Standard: ASTM F 1700, Class 1, Type A.
- C. Wearing Surface: Smooth.
- D. Thickness: 0.080 inch (2.0 mm).
- E. Size: 24 by 24 inches.
- F. Colors: As selected by Architect from manufacturer's full range.

- G. Colors:
 - 1. Basis of Design: As scheduled on Drawings
 - 2. Other accepted Manufacturer: As selected by Architect from manufacturer's full range to match existing conditions.
- H. Install Pattern: monolithic.

2.2 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by manufacturer to suit floor tile and substrate conditions indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of floor tile.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.
- B. Concrete Substrates: Prepare according to ASTM F 710.
 - 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 - 2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
 - 3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
 - 4. Moisture Testing: Perform tests recommended by manufacturer and as follows. Proceed with installation only after substrates pass testing.
 - a. Perform relative humidity test using in situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75% relative humidity level measurement.
- C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.
- D. Do not install floor tiles until they are same temperature as space where they are to be installed.
 - 1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.
- E. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

3.3 FLOOR TILE INSTALLATION

- A. Comply with manufacturer's written instructions for installing floor tile.
- B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.
 - 1. Lay tiles orthogonal with walls.
- C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.
 - 1. Lay tiles in monolithic direction unless noted otherwise.
- D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.
- E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.
- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent, nonstaining marking device.
- G. Install floor tiles on covers for telephone and electrical ducts, building expansion-joint covers, and similar items in finished floor areas. Maintain overall continuity of color and pattern between pieces of tile installed on covers and adjoining tiles. Tightly adhere tile edges to substrates that abut covers and to cover perimeters.
- H. Adhere floor tiles to flooring substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.
- I. Roll floor in both directions with a 100lb. 3-section roller. Roll again an hour later. Inspect floor 2-1/2 hours later and roll again if necessary. Remove any adhesive from between seams.

3.4 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protection of floor tile.
 - 1. Wait 72 hours after installation before initial cleaning.
- B. Perform the following operations immediately after completing floor tile installation:
 - 1. Remove adhesive and other blemishes from exposed surfaces.
 - 2. Sweep and vacuum surfaces thoroughly.
 - 3. Damp-mop surfaces to remove marks and soil.
 - 4. Do not use mechanical polishers which exceed 350 RPM.
- C. Protect floor tile products from marks, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- D. Cover floor tile until Substantial Completion.

END OF SECTION 09 6519

SECTION 09 6813 - TILE CARPETING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes:
 - 1. Modular, tufted carpet tile.
 - 2. Fusion Bonded Modular Entrance Floor Mat Tile Carpeting

1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review methods and procedures related to flooring tile installation including, but not limited to, the following:
 - a. Review delivery, storage, and handling procedures.
 - b. Review ambient conditions and ventilation procedures.
 - c. Review Manufacturer installation and warranty requirements
 - d. Review subfloor preparation procedures.
- B. Related Preinstallation meetings: Require attendance by flooring installer and representative of flooring manufacturer at pre-installation conferences of the related systems, to review manufacturer's recommendations for sequencing, environmental tolerances, substrate installation tolerances, testing and general quality of substrate finish. Review manufacturer's and installer's recommendations for remedial measures where substrate or environmental conditions are not suitable.
 - 1. Slab on grade where carpeting is scheduled.
 - 2. Elevated slabs on deck and structures where carpeting is scheduled.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include manufacturer's written data on physical characteristics, durability, and fade resistance.
 - 2. Include installation recommendations for each type of substrate.
- B. Shop Drawings: Show the following:
 - 1. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet tiles.
 - 2. Substrate type.
 - 3. Carpet tile type, color, and dye lot.
 - 4. Pattern of installation
 - 5. Type, color, and location of edge, transition, and other accessory strips.
 - 6. Transition details to other flooring materials.
- C. Samples: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.
 - 1. Modular flooring tile: Full-size Sample.
 - 2. Exposed Edge, Transition Stripping and Accessory: 12-inch-long Samples.

- D. Product Schedule: For carpet tile. Use same designations, room names and room numbers as indicated on Drawings.
- E. Sustainability: Provide the Statement of the Achievement Level the carpet has attained Silver certification based on specific Sustainable Attribute Performance for all product stages according to ANSI/NSF 140.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: For modular tile flooring, for tests performed by a qualified testing agency.
- C. Sample Warranty: For special warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For flooring tiles to include in maintenance manuals. Include the following:
 - 1. Methods for maintaining carpet textile composite tile, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
 - 2. Precautions for cleaning materials and methods that could be detrimental to tile.
- B. Executed Warranty.

1.6 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. Modular Flooring Tile: Full-size units equal to 5 percent of amount installed for each type indicated, but not less than 10 sq. yd.
- B. Deliver specified stock to Owner's designated storage space, properly packaged and identified. Redirect small pieces of waste to be appropriately recycled.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who is certified by the International Certified Floorcovering Installers Association at least at the Commercial II certification level, and direct supervisory personnel at the Master II certification level.
- B. Fire-Test-Response Ratings: Where indicated, provide carpet tile identical to those of assemblies tested for fire response according to NFPA 253 by a qualified testing agency.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Comply with CRI 104, Section 5, "Storage and Handling".

1.9 FIELD CONDITIONS

- A. Comply with CRI 104 for temperature, humidity, and ventilation limitations.
- B. Environmental Limitations: Do not deliver or install carpet tiles until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at occupancy levels during the remainder of the construction period.
- C. Do not install flooring over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended by carpet tile manufacturer.
- D. Where demountable partitions or other items are indicated for installation on top of flooring, install flooring tiles before installing these items.

1.10 WARRANTY

- A. Manufacturer agrees to repair or replace components of carpet tile installation that fail in materials or workmanship within specified warranty period.
 - 1. Warranty does not include deterioration or failure of carpet tile due to unusual traffic, failure of substrate, vandalism, or abuse.
 - 2. Failures include, but are not limited to, more than 10 percent edge raveling, snags, runs, dimensional stability, excess static discharge, loss of tuft bind strength, loss of face fiber, and delamination.
 - 3. Warranty Period: Lifetime Commercial Limited from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CARPET TILE (CPT-1)

- A. Basis-of-Design Product: Subject to compliance with requirements, provide products by **Milliken**, as scheduled on Drawings.
 - 1. Collection, patterns, colors as scheduled
 - 2. Size: 25cm x 1m
- B. Install pattern as detailed

2.2 ENTRANCE WALK-OFF CARPET TILE (CPT-2)

- A. Manufacturer: **Shaw Contract Group**, as scheduled on Drawings,
 - 1. **Steppin Out Collection**; style, color and pattern as scheduled and indicated on the Drawings.
 - 2. Tile Size: as scheduled.
 - 3. Tuft Bind: 20 lb. Avg. tuft bind wet or dry per ASTM D-1335-67.
 - 4. Indoor Air Quality: Comply with ASTM D 5116 and CRI Certified for low VOC emissions.
 - 5. Coefficient of Friction: 0.8

2.3 INSTALLATION ACCESSORIES

- A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer, with a compressive strength not less than 4000 psi at 28 days.

- B. Adhesives:
 - 1. Water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet tile and is recommended by carpet tile manufacturer for releasable installation.
- C. Edge/Transition Strips: Of height required to protect exposed edge of carpet, and of maximum lengths to minimize running joints.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine and verify that sub-floor surfaces are smooth and flat within tolerances specified for that type of work and are ready to receive installation of modules.
- B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive installation of modules.
- C. Verify that sub-floor surfaces are dust-free and free of substances that could impair bonding of adhesive materials to sub-floor surfaces.
- D. Verify that concrete sub-floor surfaces are dry enough and ready for flooring installation by testing for moisture emission rate and alkalinity in accordance with ASTM F 710; obtain instructions if test results are not within limits recommended by Manufacturer.

3.2 PREPARATION

- A. Starting installation constitutes acceptance of sub-floor conditions.
- B. Surface Preparation- Dust, dirt, debris and non-compatible adhesive must be removed before the installation begins. Surfaces must be smooth and level with all holes and cracks filled with portland cement-based patch reinforced with polymers.
- C. Concrete Moisture Testing and pH Testing - Substrate surfaces must be tested for moisture emission. It is the responsibility of the Contractor to perform moisture testing prior to starting the installation. ASTM-F 2170-2 relative humidity probe moisture testing is required. Acceptable relative humidity probe testing results are up to 95% RH. Alkalinity tests should also be performed per ASTM F 710. The maximum acceptable pH is 9.0.
- D. If moisture readings or pH readings are exceeded, provide an acceptable concrete moisture sealer as required by manufacturer.

3.3 INSTALLATION

- A. General: Comply with CRI 104, Section 14, "Carpet Modules," and with carpet tile manufacturer's written installation instructions.
- B. Installation Method: Glue down; install every tile with full-spread, releasable, pressure-sensitive adhesive.
 - 1. Maintain dye lot integrity. Do not mix dye lots in same area.

2. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.
- C. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
- D. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use nonpermanent, nonstaining marking device.
- E. Install pattern parallel to walls and borders.

3.4 CLEANING AND PROTECTION

- A. Perform the following operations immediately after installing carpet tile:
 1. Remove excess adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet tile manufacturer.
 2. Remove yarns that protrude from carpet tile surface.
 3. Vacuum carpet tile using commercial machine with face-beater element.
- B. Protect installed carpet tile to comply with CRI 104, Section 16, "Protecting Indoor Installations."
- C. Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet tile manufacturer.

END OF SECTION 09 6813

SECTION 09 9123 - PAINTING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes surface preparation and the application of paint systems on the following substrates:
 - 1. Concrete Masonry
 - 2. Steel and galvanized metal.
 - 3. Gypsum board.
- B. Related Requirements:
 - 1. Division 05 Section "Metal Fabrications" for shop priming ferrous metal.
 - 2. Division 08 Section "Hollow Metal Frames" for factory priming steel frames.
 - 3. Division 09 Section "Gypsum Board Assemblies" for surface preparation of gypsum board.

1.2 DEFINITIONS

- A. Definitions of gloss levels below are from "MPI Architectural Painting Specification Manual"
 - 1. Gloss Level 1: (Flat, Matte) Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.
 - 2. Gloss Level 2: (Flat, Velvet-like) Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
 - 3. Gloss Level 3: (Eggshell) 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
 - 4. Gloss Level 4: (Satin) 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.
 - 5. Gloss Level 5: (Semi-Gloss) 35 to 70 units at 60 degrees, according to ASTM D 523.
 - 6. Gloss Level 6: (Gloss) 70 to 85 units at 60 degrees, according to ASTM D 523.
- B. MPI: Master Painters Institute
- C. PDCA: Painting Contractors Association, 2316 Millpark Drive, Maryland Heights, MO 63043

1.3 DEFINITIONS

- A. General: Standard coating terms defined in ASTM D 16 apply to this Section.
 - 1. Eggshell refers to low-sheen finish with a gloss range between 20 and 35 when measured at a 60-degree meter.
 - 2. Semigloss refers to medium-sheen finish with a gloss range between 35 and 70 when measured at a 60-degree meter.
 - 3. Flat refers to a lusterless or matte finish with a gloss range below 15 when measured at an 85-degree meter.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product and each painting system indicated. Include preparation requirements and application instructions.
 - 1. Material List: An inclusive list of required coating materials. Indicate each material and cross-reference specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification.
- B. Provide a schedule of each paint system for each substrate listing primer, intermediate and top coat, along with level of gloss and sheen and VOC content.
- C. Samples for Initial Selection: For each type of topcoat product.
- D. Samples for Verification: For each color and gloss level of topcoat.
 - 1. Submit Samples, 8 inches square minimum.
 - 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.
- E. 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.

1.5 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. Quantity: Furnish Owner with extra paint materials in new unopened containers, in quantities indicated below:
 - a. Exterior finish coats: 1 gal. of each type and color applied.
 - b. Interior finish coats: 1 gal. of each type and color applied.

1.6 QUALITY ASSURANCE

- A. Applicator Qualifications: A firm or individual experienced in applying paints and coatings similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.
- B. Performance Standards: Comply with applicable standards as published in PDCA *Industry Standards*.
- C. Benchmark Samples (Mockups): Provide a full-coat benchmark finish sample for each type of coating and substrate required. Comply with procedures specified in PDCA P5. Duplicate finish of approved sample Submittals.
 - 1. Architect will select one room or surface to represent surfaces and conditions for application of each type of coating and substrate.
 - a. Wall Surfaces: Provide samples on at least 100 sq. ft.
 - b. Small Areas and Items: Architect will designate items or areas required.
 - 2. Apply benchmark samples, according to requirements for the completed Work, after permanent lighting and other environmental services have been activated. Provide required sheen, color, and texture on each surface.
 - a. After finishes are accepted, Architect will use the room or surface to evaluate coating systems of a similar nature.
 - 3. Final approval of colors will be from benchmark samples.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label and the following information:
 - 1. Product name or title of material.
 - 2. Product description (generic classification or binder type).
 - 3. Manufacturer's stock number and date of manufacture.
 - 4. Contents by volume, for pigment and vehicle constituents.
 - 5. Thinning instructions.
 - 6. Application instructions.
 - 7. Color name and number.
 - 8. VOC content.
- B. 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.

1.8 FIELD CONDITIONS

- A. Environmental Limitations: Do not apply coatings until spaces are enclosed and weatherproof, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
 - 1. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.
 - 2. 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, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. SW - Sherwin Williams Company
 - 2. PP -The Pittsburgh Paints Company (formerly PPG)
 - 3. BM - Benjamin Moore & Co.
 - 4. Pratt & Lambert.
 - 5. Tnemec.
 - 6. Silver Armour
- B. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to products listed in other Part 2 articles for the paint category indicated.

2.2 PAINT, GENERAL

- A. 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.
- B. 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. Nonflat Paints and Coatings: 150 g/L.
 3. Dry-Fog Coatings: 400 g/L.
 4. Primers, Sealers, and Undercoaters: 200 g/L.
 5. Anticorrosive and Antirust Paints Applied to Ferrous Metals: 250 g/L.
 6. Zinc-Rich Industrial Maintenance Primers: 340 g/L.
 7. Pretreatment Wash Primers: 420 g/L.
 8. Floor Coatings: 100 g/L.
 9. Shellacs, Clear: 730 g/L.
 10. Shellacs, Pigmented: 550 g/L.
- C. Material Quality: Provide manufacturer's best-quality paint material of the various coating types specified that are factory formulated and recommended by manufacturer for application indicated. Paint-material containers not displaying manufacturer's product identification will not be acceptable.
1. Proprietary Names: Use of manufacturer's proprietary product names to designate colors or materials is not intended to imply that products named are required to be used to the exclusion of equivalent products of other manufacturers. Furnish manufacturer's material data and certificates of performance for proposed substitutions.
- D. Colors: As indicated on Drawings.

2.3 BLOCK FILLERS FOR NEW CONCRETE BLOCK

- A. Block Filler, Latex, Interior/Exterior.
1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Benjamin Moore; Moorcraft, Super Craft Latex Block Filler, 285-01.
 - b. Benjamin Moore; Moorspec, Int/Ext Latex Block Filler, 59501.
 - c. PP; Speedhide, Int/Ext Masonry Hi Fill Block Filler, 6-15XI.
 - d. Sherwin-Williams; PrepRite, Int/Ext Block Filler, B25W25.

2.4 PROFILERS FOR GALVANIZED METAL

- A. Cleaner, Etching, for Galvanized Metal:
1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a. ~~PP; Greensolv, G-Clean, 307-[discontinued]~~
 - b. SW; Great Lakes Laboratories Clean 'n Etch, 899.

2.5 PRIMERS/ SEALERS

- A. Primer for previously painted Concrete Block:
1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

- a. PP: Bonding Primer "Seal Grip" Gripper Interior/Exterior 100% Acrylic Universal Primer 17-921XL
- b. SW; Extreme Bond Primer, B51-1150.

B. Primer for exterior above-grade Concrete Block

- 1. Pittsburgh Paints PERMA-CRETE® Interior/Exterior Alkali Resistant Primer 4-603XI.

C. Primer Sealer, Latex, Interior, for Gypsum Wallboard Ceilings and Walls.

- 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a. BM; Regal, First Coat Latex Primer/Undercoater, 216.
 - b. PP; Speedhide, Int. Latex Primer Sealer, 6-2 or Pure Performance Interior Latex Primer 9-900.
 - c. SW; ProBlock int/ext primer, B51-600 Series.
 - d. Sherwin-Williams Company (The); Quali-Kote, Interior Latex Primer, B28WB1; B28WQ8001 or Harmony Interior Latex Primer B11W00900.

D. Primer for Interior Galvanized Metal (after cleaning and etching): Not for use on factory-primed galvanized metal.

- 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a. PP: Pitt-Tech Plus EP Acrylic Primer/Finish 90-1908 Series.
 - b. ~~PPG: Interior/Exterior WB Industrial Primer 90-912.~~
 - c. SW: Pro-Industrial Pro-Cryl Universal Primer B66W310.
 - d. BM: Super Spec HP Acrylic Metal Primer P04/KP04.

E. Rust Inhibitive Primer, for Interior or Exterior Ferrous Metals.

- 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a. PP: Pitt-Tech Plus EP Acrylic Primer 90-1909 (gray) or 90-1912 (white)
 - b. SW: Pro Industrial ProCrylUniversal Metal Primer, B66-1300 Series.
 - c. BM;

2.6 WATER-BASED INTERMEDIATE AND TOP COATS

A. General: The gloss level of paints is determined by the schedule at end of Section. All surfaces are to have a filler and/or primer/sealer, an intermediate coat and a top coat, except for Dry Fall paints.

B. Latex, Interior, Flat, (Gloss Level 1 or 2): For ceilings on Gypsum Wallboard except in janitor's closets and restrooms.

- 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a. PP; Speedhide 6-70 Interior Latex Flat (for ceilings)
 - b. SW; ProMar 200 Zero VOC Latex Flat, B30-12650 series.
 - c. BM;

C. High Performance Architectural Latex, Interior, Eggshell/ Satin (Gloss Level 3): For walls on gypsum wallboard.

- 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a. PP; Prominence Interior 100% Acrylic Latex-Paint & Primer in one, Eggshell 84-3310
 - b. SW; ProMar 200 HP ZERO VOC Eggshell, B20-1900 Series.
 - c. BM;

- D. Latex, Interior, Semi-Gloss, (Gloss Level 5): Ferrous Metal Doors, Frames, Borrowed Lights frames, handrails.
 - 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a. PP; PITT-TECH Plus EP DTM Acrylic Semi-Gloss 90-1610
 - b. SW; Pro Industrial DTM Acrylic Semi-Gloss, B66-1100 series
- E. Water-Based Epoxy Coating System (MPI INT 9.2F Premium Grade):
 - 1. PP:
 - a. Prime Coat; Speedhide, Int. Latex Primer Sealer, 6-2.
 - b. Intermediate Coat: Aquapon WB EP, Waterborne Epoxy, 98E-1.
 - c. Topcoat: Aquapon WB EP, Waterborne Epoxy, 98E-1.
 - 2. SW:
 - a. Prime Coat: ProMar 200 Zero VOC Latex Primer B28W2600
 - b. Intermediate Coat: Pro Industrial Waterbased Catalyzed Epoxy Eg-Shel, B73-360 series or Gloss B73-300 series
 - c. Topcoat: Pro Industrial Waterbased Catalyzed Epoxy Eg-Shel, B73-360 series or Gloss B73-300 series

2.7 URETHANE BASED COATINGS

- A. Urethane based, Semi-Gloss (Gloss Level 5) for exterior galvanized steel:
 - 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the work include, but are not limited to, the following:
 - a. PP; Pitthane ULTRA LS Two-Component, low sheen aliphatic acrylic Polyurethane 95-8930.
 - b. SW; Hi-Solids Polyurethane Semi-Gloss, B65-350 series or Gloss, B65-300 series

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.
 - 1. Comply with procedures specified in PDCA Standard P4.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 - 1. Wood: 15 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. Proceed with coating application only after unsatisfactory conditions have been corrected and surfaces receiving paint are thoroughly dry.
 - 1. Application of coating indicates acceptance of surfaces and conditions within a particular area.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions 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.
 - 2. Where material is factory-primed, contractor is to verify that the finish coats are compatible with the factory-primed surface.
- D. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer but not less than the following:
 - 1. SSPC-SP 2, "Hand Tool Cleaning," except as indicated or otherwise required.
 - 2. Clean ungalvanized ferrous-metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with SSPC's recommendations.
 - 3. Touch up bare areas and shop-applied prime coats that have been damaged. Power Tool Clean per SSPC SP 11 Power Tool Cleaning to Bare Metal, and touch up with same primer as the shop coat.
- 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 fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.
- G. Wood Substrates: Clean surfaces of dirt, oil, and other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sand surfaces exposed to view smooth and dust off.
 - 1. Scrape and clean small, dry, seasoned knots, and apply thin coat of white shellac or other recommended knot sealer before applying primer. After priming, fill holes and imperfections in finish surfaces with putty or wood filler. Sand smooth when dried.
 - 2. Prime, stain, or seal wood to be painted immediately on delivery. Prime edges, ends, faces, undersides, and back sides of wood, including cabinets, counters, cases, and paneling.
 - 3. If transparent finish is required, backprime with spar varnish.
 - 4. Backprime paneling on interior partitions where masonry, plaster, or other wet wall construction occurs on back side.
 - 5. Seal tops, bottoms, and cutouts of unprimed wood doors with a heavy coat of varnish or sealer immediately on delivery.
- H. Material Preparation: Mix and prepare paint materials according to manufacturer's written instructions.
 - 1. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.
 - 2. Stir material before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and strain material before using.
 - 3. Use only thinners approved by paint manufacturer and only within recommended limits.

- I. Tinting: Tint each undercoat a lighter shade to simplify identification of each coat when multiple coats of same material are applied. Tint undercoats to match the color of the finish coat, but provide sufficient differences in shade of undercoats to distinguish each separate coat.

3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions.
- B. Paint colors, surface treatments, and finishes are indicated in the paint schedules.
- C. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.
- D. Provide finish coats that are compatible with primers used.
- E. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, grilles, convactor covers, covers for finned-tube radiation, and similar components are in place. Extend coatings in these areas, as required, to maintain system integrity and provide desired protection.
- F. Sand lightly between each succeeding enamel or varnish coat.
- G. Use applicators and techniques suited for paint and substrate indicated.
 - 1. 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.
 - 2. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
 - 3. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
- H. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- I. 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.
- J. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
 - 1. Paint the following work where exposed in equipment rooms:
 - a. Equipment, including panelboards.
 - b. Pipe hangers and supports.
 - c. Metal conduit.
 - d. Tanks that do not have factory-applied final finishes.
 - 2. Paint the following work where exposed in occupied spaces:
 - a. Equipment, including panelboards.
 - b. Uninsulated metal piping.
 - c. Pipe hangers and supports.
 - d. Metal conduit.
 - e. Other items as directed by Architect.
 - 3. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces. Paint black color.

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. Provide "Wet Paint" signs to protect newly painted finishes. After completing painting operations, remove temporary protective wrappings provided by others to protect their work.
 - 1. After work of other trades is complete, touch up and restore damaged or defaced painted surfaces. Comply with procedures specified in PDCA Standard P1.
- B. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- C. Paint scrapings, used paint filters, rags and other materials wetted or saturated with products that have the potential to spontaneously combust according to NFPA Handbook or manufacturer's product data, should not be left unattended. Clean up and properly dispose of these materials promptly at the end of each work day. To dispose of these materials properly, thoroughly wet the contaminated materials with water and place them in a noncombustible container with a tight-fitting lid, or place them in a water-filled metal container in accordance with NFPA 33 Standard, 2007
- D. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- E. 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.
- F. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 GLOSS SCHEDULE

- A. For intermediate and top coats, the required gloss levels are as follows unless noted otherwise on the Drawings:
 - 1. Gypsum Board Ceilings: Flat.
 - 2. Gypsum Board Walls: Eggshell / Satin.
 - 3. Concrete Block: Eggshell / Satin.
 - 4. Metal Doors, Frames, Borrowed Light Frames (interior): Semi-Gloss.
 - 5. Metal Doors, Frames, Lintels (exterior): Semi-Gloss.
 - 6. Galvanized metal doors, frames, lintels: Semi-Gloss.
 - 7. Structural Steel: Exposed: Eggshell / Satin.
 - 8. Galvanized Metal Ducts: Interiors, where visible: Flat.

END OF SECTION 09 9123

SECTION 10 1100 - VISUAL DISPLAY SURFACES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. White Dry Magnetic Markerboards.
 - a. Aluminum-Framed (VDB1)
 - b. Frameless (VDB2)
 - 2. Accessories

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for visual display surfaces.
 - 1. Include rated capacities, operating characteristics and individual panel weights for sliding visual display units.
- B. Shop Drawings: For visual display surfaces. Include plans, elevations, sections, details, and attachments to other work for each type of item.
 - 1. Show locations of panel joints.
 - 2. Include sections of typical trim members.
 - 3. Show locations of special-purpose graphics for visual display surfaces.
- C. Samples for Verification: For each type of visual display surface indicated.
 - 1. Visual Display Surface: Not less than 6 x 6 inches, mounted on substrate indicated for final Work. Include one panel for each type, color, and texture required.
 - 2. Trim: 6-inch-long sections of each trim profile.
 - 3. Support System: Clips or 6-inch-long sections.
 - 4. Accessories: Full-size Sample of each type of accessory.
- D. Product Schedule: For visual display surfaces, using same room and item designations as used on Drawings. Indicate size of each item and include color and finish selection for each item, including frames.
- E. Sample Warranty for each product.

1.3 INFORMATIONAL SUBMITTALS

- A. Product Test Results: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for surface-burning characteristics of vinyl fabrics.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For visual display surfaces units to include in maintenance manuals.
- B. Manufacturers' Warranties for each type of product.

1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of visual display surfaces from a single fabricator or manufacturer.
- B. 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.
 - 1. Flame-Spread Index: 25 or less.
 - 2. Smoke-Developed Index: 450 or less.
- C. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination"
 - 1. Meet, with Installer present, with Construction Manager, Architect, and other affected Contractors, subcontractors, to verify location, mounting types, substrate conditions of visual display surfaces in each room prior to fabrication.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver factory-built visual display surfaces, including factory-applied trim where indicated, completely assembled in one piece without joints, where possible. If dimensions exceed maximum manufactured panel size, provide two or more pieces of equal length as acceptable to Architect. When overall dimensions require delivery in separate units, pre-fit components at the factory, disassemble for delivery, and make final joints at the site.
- B. Store visual display surfaces vertically with packing materials between each unit.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install visual display surfaces until spaces are enclosed and weather tight, wet work in spaces is complete and dry, work above ceilings is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
- B. Field Measurements: Verify actual dimensions of construction contiguous with visual display surfaces by field measurements before fabrication.
 - 1. Allow for trimming and fitting where taking field measurements before fabrication might delay the Work.
- C. Framed wall stud spacing will be 16" on center unless noted otherwise.

1.8 WARRANTY

- A. Special Warranty for Porcelain-Enamel Face Sheets: Manufacturer's standard form in which manufacturer agrees to repair or replace porcelain-enamel face sheets that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Surfaces lose original writing and erasing qualities.
 - b. Surfaces exhibit crazing, cracking, or flaking.
 - 2. Warranty Period: Minimum 50 (fifty) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Material Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers listed for each specified product.
 - 1. American Specialties, Inc.
 - 2. Claridge Products and Equipment, Inc.
 - 3. PolyVision Corporation; a Steelcase company.
 - 4. AARCO Visual Display Products.
 - 5. Marsh Industries, Inc.
- B. Porcelain-Enamel Face Sheet: Manufacturer's standard steel sheet with porcelain-enamel coating fused to steel.
- C. Gloss Finish: Low gloss; dry-erase markers wipe clean with dry cloth or standard eraser. Suitable for use as projection screen.
- D. Particleboard: ANSI A208.1, Grade M-1 made with binder containing no urea formaldehyde that complies 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."
- E. Fiberboard: ASTM C 208.
- F. Extruded Aluminum: ASTM B 221, Alloy 6063.
- G. Adhesives: Manufacturer's standard product that complies 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."

2.2 MARKERBOARD ASSEMBLIES

- A. Porcelain-Enamel Markerboards: Balanced, high-pressure, factory-laminated markerboard assembly of three-ply construction consisting of backing sheet, core material, and 0.021-inch-thick porcelain-enamel face sheet with low gloss finish.
 - 1. Fabricators may be the material manufacturer or certified fabricators approved by the material manufacturer.
 - 2. Particleboard Core: 3/8 or 7/16 inch thick, urea formaldehyde free; with 0.005-inch-thick, aluminum foil backing.
 - 3. Laminating Adhesive: Manufacturer's standard, moisture-resistant thermoplastic type.

2.3 MARKERBOARD ACCESSORIES

- A. Aluminum Frames and Trim: Fabricated from not less than 0.062-inch-thick, extruded aluminum; 5/8" exposed clear anodized aluminum.
 - 1. Factory-Applied Trim: Manufacturer's standard snap-on trim with no visible screws or exposed joints.
- B. Magnetic Accessory tray.
 - 1. Solid Type: Extruded aluminum with ribbed section and smoothly curved exposed ends.
 - 2. Size 2-3/4" inches deep by 24" long.
 - 3. Finish: Satin anodized aluminum.
- C. Magnetic Marker Tray: Manufacturer's standard, as indicated on Architectural Drawings.

2.4 FABRICATION

- A. Porcelain-Enamel Visual Display Assemblies: Laminate porcelain-enamel face sheet and backing sheet to core material under heat and pressure with manufacturer's standard flexible, waterproof adhesive.
- B. Visual Display Boards: Factory assemble visual display boards unless otherwise indicated.
 - 1. Where factory-applied trim is indicated, trim shall be assembled and attached to visual display boards at manufacturer's factory before shipment.
- C. Factory-Assembled Visual Display Units: Coordinate factory-assembled units with trim and accessories indicated. Join parts with a neat, precision fit.
 - 1. Make joints only where total length exceeds maximum manufactured length or access to the space would not be possible with a single unit. Fabricate with minimum number of joints, as indicated on approved Shop Drawings.
 - 2. Provide manufacturer's standard vertical-joint concealed spline system between abutting sections of markerboards.
 - 3. Where size of visual display boards or other conditions require support in addition to normal trim, provide structural supports or modify trim as indicated or as selected by Architect from manufacturer's standard structural support accessories to suit conditions indicated.
- D. Aluminum Frames and Trim: Fabricate units straight and of single lengths, keeping joints to a minimum. Miter corners to a neat, hairline closure.
 - 1. Where factory-applied trim is indicated, trim shall be assembled and attached to visual display units at manufacturer's factory before shipment.

2.5 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.6 ALUMINUM FINISHES

- A. Clear Anodic Finish: AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances, surface conditions of wall, and other conditions affecting performance of the Work.
- B. Examine walls and partitions for proper preparation and backing for visual display surfaces.
- C. Examine walls and partitions for suitable framing depth where sliding visual display units will be installed.

- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions for surface preparation.
- B. Clean substrates of substances that could impair the performance of and affect the smooth, finished surfaces of visual display boards, including dirt, mold, and mildew.
- C. Prepare surfaces to achieve a smooth, dry, clean surface free of flaking, unsound coatings, cracks, defects, projections, depressions, and substances that will impair bond between visual display surfaces and wall surfaces.
- D. Prepare recesses for visual display units as required by type and size of unit.

3.3 INSTALLATION, GENERAL

- A. General: Install visual display surfaces in locations and at mounting heights indicated on Drawings, or as indicated above. Keep perimeter lines straight, level, and plumb. Provide grounds, clips, backing materials, adhesives, brackets, anchors, trim, and accessories necessary for complete installation.
- B. Caulk perimeter of each board between walls and boards.

3.4 INSTALLATION OF FACTORY-FABRICATED VISUAL DISPLAY BOARDS AND ASSEMBLIES

- A. Visual Display Boards: Attach concealed clips, hangers, and grounds to wall surfaces and to visual display boards with fasteners at not more than 16 inches o.c. Secure both top and bottom of boards to walls.
 - 1. Field-Applied Aluminum Trim: Attach trim over edges of visual display boards and conceal grounds and clips. Attach trim to boards with fasteners at not more than 24 inches o.c. Attach marker-trays to boards with fasteners at not more than 12 inches o.c.

3.5 CLEANING AND PROTECTION

- A. Clean visual display surfaces according to manufacturer's written instructions. Attach one cleaning label to visual display surface in each room.
- B. Touch up factory-applied finishes to restore damaged or soiled areas.
- C. Cover and protect visual display surfaces after installation and cleaning.

END OF SECTION 10 1100

SECTION 10 1400 - SIGNAGE

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Panel signs, interior and exterior mounted.
 - 2. Signage accessories.
- B. Related Sections include the following:
 - 1. Division 01 Section "Temporary Facilities and Controls" for temporary project identification signs.
- C. ADA-ABA Accessibility Guidelines: U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines."

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of sign.
- B. Shop Drawings: Show fabrication and installation details for signs.
 - 1. Include fabrication and installation details and attachments to other work.
 - 2. Show sign mounting heights, locations of supplementary supports, and accessories.
 - 3. Provide message list, typestyles, graphic elements, including tactile characters and domed Grade 2 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 for each specified material.
- D. Samples for Verification: For each of the following products and for the full range of color, texture, and sign material indicated, of sizes indicated:
 - 1. Acrylic Sheet: 8 by 10 inches for each color required.
 - 2. Decorative Acrylic Panel Signs: Full-size Samples of each type of sign required.
 - 3. Exposed Accessories: Full-size Sample of each accessory type.
 - 4. Approved samples will be returned for installation into Project.
- E. Sign Schedule:
 - 1. Submit Signage Schedule organized with the following columns:
 - a. Room No. from Contract Drawings
 - b. Room Name from Contract Drawings
 - c. Sign Type (use architect's designation)
 - d. Final Owner's Room No. to be used on signs
 - e. Final Owner's Room Name to be used on signs
 - f. Lines 1 through 5

- g. Graphic
- h. Comments

2. Use same designations specified or indicated on Drawings.

F. Maintenance Data: For signage cleaning and maintenance requirements to include in maintenance manuals.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For fabricator.

B. Warranty: Manufacturer's Standard Warranty for type of product.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For signs to include in maintenance manuals.

B. Executed Warranty.

1.5 QUALITY ASSURANCE

A. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Coordination and Meetings."

1. Agenda: Sign Schedule, Signage copy, mounting methods, sequencing, and locations

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. Installer Qualifications: An authorized representative of the signage manufacturer for installation and maintenance of units required for this Project.

D. Source Limitations for Signs: Obtain each sign type indicated from one source from a single manufacturer.

E. Regulatory Requirements: Comply with applicable provisions in ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

1.6 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation of exterior signs only when existing and forecasted weather conditions permit installation of signs in exterior locations to be performed according to manufacturers' written instructions and warranty requirements.

B. Field Measurements: Verify recess openings by field measurements before fabrication and indicate measurements on Shop Drawings.

1.7 COORDINATION

- A. For signs supported by or anchored to permanent construction, advise installers of anchorage devices about specific requirements for placement of anchorage devices and similar items to be used for attaching signs.
- B. Coordinate placement of anchorage devices with templates for installing signs.

1.8 WARRANTY

- A. Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Deterioration of metal and finishes beyond normal weathering.
 - b. Deterioration of embedded graphic image colors and sign lamination.
 - 2. Warranty Period: For panel signs, lifetime of building.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide outdoor message display signage capable of withstanding the effects of gravity loads and stresses within limits and under conditions indicated, determined according to ASCE 7, "Minimum Design Loads for Buildings and Other Structures".

2.2 MATERIALS

- A. Acrylic Sheet: ASTM D 4802, Category A-1 (cell-cast sheet), Type UVA (UV absorbing).
- B. Glass Panel: ASTM C1048, Kind FT (fully tempered), Type I, Class 1 (clear) as indicated, Quality-Q3
 - 1. Ultraclear (low-iron) with visible light transmission of not less than 91 percent.
 - 2. Grind smooth and polish exposed glass edges and corners.
- C. Attachments and accessories: As detailed on Drawings.

2.3 PANEL SIGNS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide **Lucent Sign System, Premium, by Best Sign Systems, Inc.** or a comparable product by one of the following:
 - 1. **Lucid, by Takeform.**
 - 2. ACE Sign Systems, Inc.
 - 3. Advance Corporation; Braille-Tac Division.
 - 4. Allen Industries Architectural Signage
 - 5. Allenite Signs; Allen Marking Products, Inc.
 - 6. APCO Graphics, Inc.
 - 7. ASI Signage Systems, Inc.
 - 8. Bunting Graphics, Inc.

9. Innerface Sign Systems, Inc.
 10. InPro Corporation
 11. Matthews International Corporation; Bronze Division.
 12. Mills Manufacturing Company.
 13. Mohawk Sign Systems.
 14. Seton Identification Products.
- B. Graphic Content and Style: Provide sign copy that complies with requirements indicated on Drawings for size, style, spacing, content, mounting height and location, material, finishes, and colors of signage.
- C. Interior and Exterior Panel Signs: Provide smooth sign panel surfaces constructed to remain flat under installed conditions within a tolerance of plus or minus 1/16 inch measured diagonally from corner to corner, complying with the following requirements:
1. Acrylic Sheet: 1/4 inch thick.
 2. Edge Condition: Bullnose.
 3. Corner Condition: Manufacturer's standard radius.
 4. Mounting: Unframed.
 - a. Wall mounted with tamper-proof screws in pre-drilled holes for countersinking, and perimeter of sign sealed with clear sealant.
 5. Surface Texture: Matte.
 6. Colors: As selected by Architect from manufacturer's full range.
 7. Tactile Characters: Characters and Grade 2 Braille raised 1/32 inch above surface with contrasting colors.
- D. Laminated Panels: Permanently laminate face panels to backing sheets of material; use manufacturer's standard process.
- E. Changeable Message Inserts: Where shown on Drawings, fabricate signs to allow insertion of changeable messages in the form of transparent covers with paper inserts printed by Owner.
1. Furnish insert material and software for creating text and symbols for PC-Windows or Apple computers for Owner production of paper inserts.
 2. Furnish insert material cut-to-size for changeable message insert.
- F. Tactile and Braille Sign: Manufacturer's standard process for producing text and symbols complying with ADA-ABA Accessibility Guidelines and with ICC/ANSI A117.1. Text shall be accompanied by Grade 2 Braille. Produce precisely formed characters with square-cut edges free from burrs and cut marks; Braille dots with domed or rounded shape.
1. Panel Material: Clear acrylic sheet with opaque color coating, subsurface applied.
 2. Raised-Copy Thickness: Not less than 1/32 inch.
- G. Subsurface Engraved Acrylic Sheet: Reverse-engrave back face of clear acrylic sheet. Fill resulting copy with enamel. Apply opaque background color coating over enamel-filled copy.
- H. Colored Coatings for Acrylic Sheet: For copy and background colors, provide colored coatings, including inks, dyes, and paints, that are recommended by acrylic manufacturers for optimum adherence to acrylic surface and are UV and water resistant.
1. Colors: As selected by Architect from manufacturer's full range.
- I. Panel Sign Schedule:
1. Sign Types: See Drawings.

2.4 ACCESSORIES

- A. Adhesives: As recommended by sign manufacturer and with a VOC content of 70 g/L or less for adhesives used inside the weatherproofing system and applied on-site when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- B. Two-Face Tape: Manufacturer's standard high-bond, foam-core tape, 0.045 inch (1.14 mm) thick, with adhesive on both sides.

2.5 FABRICATION

- A. General: Provide manufacturer's standard signs of configurations indicated.
 - 1. Preassemble signs in the shop to greatest extent possible. Disassemble signs only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation, in location not exposed to view after final assembly.

2.6 FINISHES, GENERAL

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. 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.

2.7 ACRYLIC SHEET FINISHES

- A. Colored Coatings for Acrylic Sheet: For copy and background colors, provide colored coatings, including inks, dyes, and paints, that are recommended by acrylic manufacturers for optimum adherence to acrylic surface and that are UV and water resistant.

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. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Locate signs and accessories where indicated by Architect in field, using mounting methods of types described and complying with manufacturer's written instructions.
 - 1. Install signs level, plumb, and at heights indicated, with sign surfaces free of distortion and other defects in appearance.
 - 2. Interior Wall Signs: Install signs on walls adjacent to latch side of door where applicable. Where not indicated or possible, such as double doors, install signs on nearest adjacent walls. Locate to allow approach within 3 inches of sign without encountering protruding objects or standing within swing of door.
- B. Wall-Mounted Signs: Comply with sign manufacturer's written instructions except as noted otherwise.
 - 1. Where backup panel is required.
 - 2. Shim Plate Mounting: Provide 1/8-inch-thick, concealed aluminum shim plates with predrilled and countersunk holes, at locations indicated, and where other mounting methods are not practicable. Attach plate with fasteners and anchors suitable for secure attachment to substrate. Attach panel signs to plate using method specified above.
 - 3. Mechanical Fasteners: Use nonremovable mechanical fasteners placed through counter-sunk predrilled holes. Attach signs with fasteners and anchors suitable for secure attachment to substrate as recommended in writing by sign manufacturer.
 - 4. Signs Mounted on Glass: Provide matching opaque plate lined up with signs on opposite side of glass to conceal mounting materials. Adhere to glass and seal edge with sealant.
- C. Project Identification Sign: As detailed on the drawings.

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 10 1400

SECTION 10 2623 – IMPACT-RESISTANT CORNER PROTECTION

PART 1 - GENERAL

1.1 SUMMARY

- A. Work of this section includes:
 - 1. PVC Free Corner Guards (CG-2).
- B. Related Sections:
 - 1. Division 09 Section "Tiling" for CG-1 metal corners installed with thinset ceramic wall tile.

1.2 SUBMITTALS

- A. Product Data: Submit manufacturer's product literature and installation instructions. Include methods of installation for each type of substrate.
 - 1. Submit written data on physical characteristics, durability, resistance to fading and flame resistance characteristics.
- B. Maintenance Data: Include data in Maintenance Manual specified in Division 01.
- C. Shop Drawings: Submit shop drawings showing locations, extent and installation details.
- D. Samples for Verification Purposes: Submit manufacturer's standard size samples showing colors and textures listed on drawings.

1.3 TESTING

- A. Test Reports: Submit certified test reports evidencing compliance with requirements for the following:
 - 1. Fire performance characteristics.
 - 2. Physical properties indicated.
- B. Fire Performance Characteristics: Provide material that is identical to that tested for the following fire performance requirements, according to test method indicated, by UL or other testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. Surface Burning Characteristics: As follows:
 - a. Flame Spread: Not more than 25.
 - b. Smoke Developed: Not more than 450.
 - c. Test Method: ASTM E 84.
- C. Physical Properties: Provide materials that are identical to that tested for following physical properties, according to test method indicated.
 - 1. Impact Strength:
 - a. Test Method: ASTM D 256.
 - b. Rating: 16 ft. lb/ in.

- D. Certification: Submit manufacturer's certificate stating that materials furnished comply with specified requirements. Include supporting certified laboratory testing data indicating that material meets specified test requirements.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to project site in original factory wrapping and containers, clearly labeled with identification of manufacturer, brand name, quality or grade, fire hazard classification, and lot number. Store materials in original undamaged packages and containers, inside well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity; laid flat, blocked off ground to prevent sagging and warping.
- B. Follow instructions and recommendations of manufacturer for special delivery, storage, and handling requirements.

1.5 SEQUENCING AND SCHEDULING

- A. Sequence installation with other work to minimize possibility of damage and soiling during remainder of construction period.

1.6 MAINTENANCE

- A. Maintenance Instructions: Submit manufacturer's printed instructions for maintenance of installed work, including methods and frequency recommended for maintaining optimum condition under anticipated traffic and use conditions. Include precautions against materials and methods which may be detrimental to finishes and performance.

PART 2 - PRODUCTS

2.1 PRODUCTS

- A. Manufacturer: Construction Specialties, Inc. Acrovyn.
 - 1. Colors: As indicated on drawings.
- B. Corner Guards (**CG-2**): Provide corner guards in dimensions, mounting, and profile as indicated. Provide material in 90 deg corners unless otherwise indicated, with thermoformed edges.
 - 1. Provide vinyl corner guards with aluminum retainer secured to wall with appropriate mounting devices, covered with high impact vinyl/acrylic extrusion, locked in place, to absorb heavy impact without damage to guard, retainer or adjacent wall:
 - a. Mounting: Surface mounted.
 - b. Extent: Top of base to ceiling unless otherwise noted.
 - c. Corner Radius: 1/4 inch.
 - d. Size: 3-inch x height shown on Drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions in which protection components will be installed.
 - 1. Complete all finishing operations, including painting, before beginning installation of wall surface protection system materials.

- B. Surface Mounted Plastic Corner Guards and Semi-rigid sheet Wall Covering Materials: Wall surfaces shall be dry and free from dirt, grease, loose paint, and scale.
- C. Do not proceed with installations until unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prior to installation clean substrate to remove dust, debris, and loose particles.

3.3 INSTALLATION

- A. General: Install protection units plumb, level, and true to line without distortions.
 - 1. Do not use materials with chips, cracks, voids, stains, or other defects that might be visible in finished work.
- B. Install aluminum retainers, mounting brackets, and other accessories strictly following manufacturer's instructions.
 - 1. Where splices occur in horizontal runs of over 20 feet, splice aluminum retainer and plastic cover at different locations along run.

3.4 FIELD QUALITY CONTROL

- A. Remove and replace material which is broken, chipped, stained or otherwise damaged and which does not match adjoining work. Provide new matching units, installed as specified and in manner to eliminate evidence of replacement.

3.5 CLEANING

- A. General: Immediately upon completion of installation, clean plastic covers and accessories using a standard ammonia-based household cleaning agent. Clean metal components in accordance with manufacturer's recommendations.
- B. Remove excess adhesive using methods and materials recommended by manufacturer.
- C. Remove surplus materials, rubbish, and debris resulting from installation upon completion of work and leave areas of installation in neat, clean condition.

END OF SECTION 10 2623

SECTION 10 2800 – TOILET, SHOWER AND CUSTODIAL ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes accessories for the following spaces:
 - 1. Custodial accessories and public-use washroom and shower accessories.

1.2 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.
- B. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.
 - 1. Identify locations using room designations indicated on Drawings.
 - 2. Identify products using designations indicated on Drawings.
- C. Sample warranty from mirror manufacturer.
- D. Maintenance Data: For toilet and bath accessories to include in maintenance manuals.

1.3 QUALITY ASSURANCE

- A. Source Limitations: For products listed together in the same articles in Part 2, provide products of same manufacturer unless otherwise approved by Architect.

1.4 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.
- C. Recessed Accessories: Where accessories are indicated to be built into existing or new walls and partitions, investigate existing conditions and verify that accessories can be accommodated before ordering.

1.5 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, 0.0312-inch minimum nominal thickness, unless otherwise indicated.
- B. 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.
- C. Mirrors: ASTM C 1503, Mirror Glazing Quality, fully tempered, clear-glass mirrors, nominal 6.0 mm thick.

2.2 MANUFACTURERS

- A. Basis-of-Design Product: Subject to compliance with requirements provide products indicated on the Drawings manufactured by **Bobrick Washroom Equipment, Inc.** or comparable products manufactured by the following:
 - 1. A&J Washroom Accessories, Inc.
 - 2. American Specialties, Inc.
 - 3. Bradley Corporation.

2.3 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 keys to Owner.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install accessories according to manufacturers' written instructions, 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 method in 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 10 2800

SECTION 10 4416 – FIRE AND EMERGENCY CABINETS AND EXTINGUISHERS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Portable fire extinguishers, mounted in cabinet or directly to wall.
 - 2. Wall cabinets for fire extinguishers – non-rated and rated.
 - 3. Recessed Cabinets for Owner-furnished AED (Automated External Defibrillators).
- B. Related Sections include the following:
 - 1. Division 07 Section "Through-Penetration Firestop Systems" for firestopping sealants at fire-rated cabinets.

1.2 DESIGN REQUIREMENTS

- A. Access for Persons with Disabilities: In addition to local governing regulations, follow Pennsylvania Code, title 34, labor and Industry Chapter 60 Universal Accessibility Standards and ADA, including ADA Accessibility Guidelines.
 - 1. Design fire extinguishers, cabinets, and hardware so they do not protrude more than 4 inches into walks, halls, corridors, passageways, or aisles.

1.3 ACTION SUBMITTALS

- A. Product Data: Manufacturer's product data, including operating instructions.
 - 1. Fire Extinguishers: Include rating and classification.
 - 2. Mounting brackets.
 - 3. Fire Protection Cabinets: Include roughing-in dimensions, details showing mounting methods, relationships of box and trim to surrounding construction, door hardware, cabinet type, trim style, and panel style. Indicate which cabinets are rated for 1 or 2 hour construction.
 - 4. Product Schedule: For fire protection cabinets. Coordinate final fire protection cabinet schedule with fire extinguisher schedule to ensure proper fit and function.

1.4 INFORMATIONAL SUBMITTALS

- A. Manufacturer's Installation Instructions: Indicate special criteria and wall opening coordination requirements.
- B. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For fire extinguishers to include in maintenance manuals.
- B. Warranty.

1.6 QUALITY ASSURANCE

- A. Source Limitations: Obtain fire extinguishers and fire-protection cabinets through one source from a single manufacturer.
- B. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."
- C. Fire-Rated, Fire Protection Cabinets: Listed and labeled to comply with requirements in ASTM E 814 for fire-resistance rating of walls where they are installed.
- D. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.

1.7 COORDINATION

- A. Coordinate size of fire-protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.
- B. Coordinate extinguisher selection to be compatible with extinguishers currently in use at Intermediate School.
- C. Coordinate with electrical requirements of the defibrillating units.

1.8 ENVIRONMENTAL REQUIREMENTS

- A. Do not install extinguishers when ambient temperature may cause freezing of extinguisher ingredients.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Conform to NFPA 10.
- B. Provide extinguishers classified and labeled by Underwriters Laboratories Inc. for the purpose specified and indicated.

2.2 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.
- B. Aluminum: Alloy and temper recommended by aluminum producer and manufacturer for type of use and finish indicated, and as follows:
 - 1. Sheet: ASTM B 209.
 - 2. Extruded Shapes: ASTM B 221.
- C. Stainless-Steel Sheet: ASTM A 666, Type 304.
- D. Acrylic Bubble: One piece.

2.3 PORTABLE FIRE EXTINGUISHERS

- A. General: Provide fire extinguishers of type, size, and capacity specified.
 - 1. 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. Manufacturers: Subject to compliance with requirements, provide extinguishers by one of the following manufacturers:
 - 1. Amerex Corporation
 - 2. Fire End & Croker Corporation.
 - 3. J.L. Industries, Inc., a division of Activar Construction Products Group.
 - 4. Larsen's Manufacturing Company.
 - 5. Kidde.
 - 6. Modern Metal Products; Div. of Technico.
 - 7. Moon American.
- C. Multipurpose Dry-Chemical Type in Steel Container: UL-rated 4-A: 60-B: C, 10-lb nominal capacity, with mono-ammonium phosphate-based dry chemical in enameled-steel container.
 - 1. Application: All locations except where noted otherwise.

2.4 MOUNTING BRACKET

- 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 colored baked-enamel finish.

2.5 AED CABINET

- A. Furnish and install recessed cabinets for AED units to be provided by Owner.
 - 1. Cabinet is to be semi-recessed, standard sized (nom 14" x 14" x 6" deep), with window and audible battery-powered alarm.
 - 2. Cabinet is to be powder-coated steel, non-locking
 - a. Color: White with red lettering.
- B. Manufacturers: Provide units by one of the following:
 - 1. Allied Medical Products.
 - 2. Cardiac Science.
 - 3. Defibtech.
 - 4. HeartStation.
 - 5. Philips Healthcare.
 - 6. Physio-Control.
 - 7. ZOLL Medical.

2.6 FIRE PROTECTION CABINET

- A. Manufacturers: Subject to compliance with requirements, provide cabinets by one of the following:
 - 1. Basis of Design: **J.L. Industries, Inc.**, a division of Activar Construction Products Group.
 - a. **CLEAR VU Steel 1515 Fire Extinguisher Cabinets with Commander Alarm CA**
 - 2. Larsen's Manufacturing Company.

3. Fire End & Croker Corporation.
4. Samson, a division of Activar Construction Products Group.
5. Kidde.
6. Modern Metal Products; Div. of Technico.
7. Potter Roemer LLC.
8. Moon American.

- B. Recessed Cabinet: Cabinet box recessed in walls of sufficient depth to suit style of trim indicated.
 1. Exposed Flat Trim: One-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend).
 2. Fire-Rated Cabinets: Construct fire-rated cabinets with double walls fabricated from 0.0428-inch-thick, cold-rolled steel sheet lined with minimum 5/8-inch-thick, fire-barrier material. Provide factory-drilled mounting holes.
- C. Cabinet Construction: Non-rated, 1-hour rated, or 2 hour rated as shown by location on Drawings.
- D. Door Material: Manufacturer's standard cold-rolled steel sheet.
- E. Door Style: Full bubble with frame.
- F. Door Glazing: Molded acrylic bubble. Color: Clear, transparent.
- G. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.
 1. Provide Projecting door pull and friction latch
 2. Provide continuous hinge, of same material and finish as trim, permitting door to open 180 degrees.
- H. Finishes:
 1. Manufacturer's standard white baked-enamel or powder-coat paint for the interior of cabinet.
 2. Red vertical applied lettering

2.7 FINISHES

- A. Baked-Enamel or Powder-Coat Finish: Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
 1. Color and Gloss: White Gloss.

2.8 FABRICATION

- A. Fire Protection Cabinets: Provide manufacturer's standard box (tub) with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.
 1. Weld joints and grind smooth.
 2. Provide factory-drilled mounting holes.
- B. Cabinet Doors: Fabricate doors according to manufacturer's standards, from materials indicated and coordinated with cabinet types and trim styles selected.
 1. Fabricate door frames with tubular stiles and rails and hollow-metal design, minimum 1/2 inch thick.
 2. Fabricate door frames of one-piece construction with edges flanged for security fire protection cabinets.
 3. Miter and weld perimeter door frames.

- C. Cabinet Trim: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.

2.9 WARRANTY

- A. Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace fire extinguishers that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Failure of hydrostatic test according to NFPA 10.
 - b. Faulty operation of valves or release levers.
 - 2. Warranty Period: Six years from date of Substantial Completion.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine walls and partitions for suitable mounting location and blocking.
- B. Prepare recesses for fire protection cabinets and AED units as required by type and size of cabinet and trim style.
- C. Install rated cabinets in rated partitions.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with manufacturer's written instructions for installing fire-protection specialties.
- B. General:
 - 1. Locate cabinets in locations shown on Drawings in the type of Cabinet and with the type of Extinguisher identified.
 - 2. Locate 2 wall-mounted Class A, B, C extinguishers in Mechanical Rooms, at location to be selected by Architect.
- C. Install cabinets, mounting brackets and extinguishers in locations and at mounting heights indicated or, if not indicated, at heights acceptable to authorities having jurisdiction.
 - 1. Prepare recesses for cabinets as required by type and size of cabinet and trim style.
 - 2. Fasten cabinets to structure, square and plumb.
 - 3. Fasten mounting brackets to surfaces, square and plumb, at locations indicated.
 - a. Mounting Brackets:
 - 1) 48 inches above finished floor to handle of extinguisher
 - 2) 54 inches above finished floor to top of fire extinguisher.
- D. Identification: Apply decals and markings at locations indicated.

3.3 ADJUSTING AND CLEANING

- A. Remove temporary protective coverings and strippable films, if any, as fire-protection specialties are installed, unless otherwise indicated in manufacturer's written installation instructions.
- B. Adjust cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.
- C. Replace fire protection cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.
- D. Provide final protection and maintain conditions that ensure that cabinets and doors are without damage or deterioration at the time of Substantial Completion.
- E. Extinguishers must be inspected and tagged with date of inspection prior to Substantial Completion.

END OF SECTION 10 4416

SECTION 10 5113 - METAL LOCKERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Fully framed, welded, single tier staff lockers – Type A.
 - 2. Knock-down, two-tier, ventilated metal lockers – Type B.
 - 3. Locker benches
- B. Related Sections include the following:
 - 1. Division 06 Section "Miscellaneous Rough Carpentry" for wood base, furring, blocking, and shims required for installing lockers and concealed within other construction before metal locker installation.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of metal locker and bench.
- B. Shop Drawings: For metal lockers. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Show locker trim and accessories.
 - 2. Include locker identification system and numbering sequence.
 - 3. Identify each space in which there are lockers or benches and indicate which type of locker or bench is being installed in that location.
- C. Samples for Initial Selection: For units with factory-applied color finishes.
- D. Samples for Verification: For metal lockers, in manufacturer's standard sizes.

1.3 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.
- B. Warranty: Sample of manufacturer's warranty.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For adjusting, repairing, and replacing locker doors and latching mechanisms to include in maintenance manuals.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Full-size units of the following metal locker hardware items equal to five percent of amount installed for each type and finish installed, but no fewer than five units of each of the following:
 - a. Blank identification plates.
 - b. Hooks.

1.6 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 metal lockers and accessories from single source from single manufacturer.
- C. Regulatory Requirements: Where metal lockers and benches are indicated to comply with accessibility requirements, comply with ICC/ANSI A117.1.
 - 1. Provide minimum 5 -percent of lockers of each type specified, evenly distributed in each locker run, bank or area served, where indicated on the drawings or at locations otherwise subject to Architect approval, with the following handicap features.
 - a. Provide not less than 1 shelf located no higher than 48 inches above the floor for forward reach.
 - b. Provide hardware that does not require tight grasping, pinching, or twisting of the wrist, and that operates with a force of not more than 5 lbf.
- D. Pre-installation Conference: Conduct conference at Project site to confirm locker positions.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver metal lockers until spaces to receive them are clean, dry, and ready for their installation.

1.8 PROJECT CONDITIONS

- A. Field Measurements: Verify actual dimensions of recessed or framed openings by field measurements before fabrication.
 - 1. Concealed framing, blocking, and reinforcements that support metal lockers before they are enclosed.
 - 2. Recessed openings.

1.9 COORDINATION

- A. Coordinate material, sizes and locations of bases for metal lockers where indicated on the Drawings.
- B. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of work specified in other Sections to ensure that metal lockers can be supported and installed as indicated.

1.10 EXTRA MATERIALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Full-size units of the following metal locker hardware items equal to 5 percent of amount installed for each type and finish installed, but no fewer than the number indicated below:
 - a. Hooks (minimum 12)
 - b. Rubber door silencers (minimum 24)

1.11 WARRANTY

- A. Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal lockers that fail in materials or workmanship, excluding finish, within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures.
 - b. Faulty operation of latches and other door hardware.
 - 2. Damage from deliberate destruction and vandalism is excluded.
 - 3. Warranty Period for Knocked-Down Metal Lockers: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B, suitable for exposed applications.
- B. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with A60 zinc-iron, alloy (galvannealed) coating designation. Use this material for the floor and shelves of lockers.
- C. Expanded Metal: ASTM F 1267, Type II (flattened), Class I, 3/4-inch steel mesh, with at least 70 percent open area.
- D. Extruded Aluminum: ASTM B 221, alloy and temper recommended by aluminum producer and manufacturer for type of use and finish indicated.
- E. Steel Tube: ASTM A 500, cold rolled.
- F. Fasteners: Zinc- or nickel-plated steel, slotless-type, exposed bolt heads; with self-locking nuts or lock washers for nuts on moving parts.
- G. Anchors: Material, type, and size required for secure anchorage to each substrate.
 - 1. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls, and in locker rooms, for corrosion resistance.
 - 2. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.

2.2 MANUFACTURERS

- A. Provide scheduled basis-of-design products or, subject to compliance with requirements, comparable products by one of the following manufacturers:
 - 1. Basis of Design: Republic Storage Systems
 - 2. Art Metal Products.
 - 3. List Industries, Inc.
 - 4. Lyon Workspace Products, LLC
 - 5. Penco Products, Inc

2.1 STAFF WORK LOCKERS (Type A)

- A. Basis-of-Design Product: Republic Storage Systems; **"All-Welded Ventilated Lockers"**
- B. Locker Size and Arrangement: As indicated on Drawings
 - 1. Single-tier, 24 in wide x 15 in deep x 72 in high on 4-inch wood or cast-in-place concrete base.
 - 2. Tops: Manufacturer's standard continuous sloping top
- C. Body: Assembled by welding body components together. Fabricate from unperforated steel sheet as follows:
 - 1. Tops: 0.060-inch nominal thickness, with single bend at edges.
 - 2. Bottoms: Metallic-coated 0.063-inch nominal thickness, with single bend at edges.
 - 3. Backs: 0.048-inch nominal thickness.
 - 4. Shelves: 0.060-inch nominal thickness, with double bend at front and single bend at sides and back.
- D. Frames: Channel formed; fabricated from 0.060-inch nominal-thickness steel sheet or 0.097-inch nominal-thickness steel angles; lapped and factory welded at corners; with top and bottom main frames factory welded into vertical main frames. Form continuous, integral door strike full height on vertical main frames.
- E. Body: Fully-framed all-welded Hollow-T construction, 13 gauge 1/2" fully-framed flattened expanded metal sides, 16 gauge continuous top, 18 gauge solid back, 16 gauge galvaneal bottom:
- F. Doors: One-piece; fabricated from 0.075-inch nominal-thickness (14 gage), cold-rolled steel sheet; formed into channel shape with double bend at vertical edges, and with right-angle single bend at horizontal edges.
 - 1. Stiffeners: Manufacturer's standard full-height stiffener fabricated from min. 0.04-inch-thick, cold-rolled steel sheet; welded to inner face of doors.
 - a. Stiffener required where locker door exceeds 15 inches in width.
 - b. Acceptable option: Provide 0.074-in (14 ga) doors in lieu of welded stiffeners where door exceeds 15 inches wide.
 - 2. Perforated Doors: 14 gauge diamond perforated sheet steel with recessed handles, and multi-point gravity lift-type latching.
- G. Hinges: Welded and riveted, factory-installed rivets that are completely concealed and tamper resistant when door is closed; fabricated to swing 180 degrees.
 - 1. Continuous Hinges: Manufacturer's standard, steel continuous hinge.
- H. Hinges: Welded to door and attached to door frame with no fewer than two factory-installed rivets per hinge that are completely concealed and tamper resistant when door is closed; fabricated to swing 180 degrees.
 - 1. 2" high, 5-knuckle, full loop, tight pin style, Locker doors over 42" high shall have three hinges. Locker doors 42" high and less shall have two hinges.
- I. Recessed Door Handle and Latch: Seamless stainless-steel cup with integral door pull, smooth, rounded edges inside, recessed so locking device does not protrude beyond face of door; pry- and vandal- resistant.
 - 1. Single-Point Latching: Nonmoving latch hook with steel padlock loop that projects through recessed cup and is finished to match metal locker body.
 - a. Latch Hook: Equip each door with one latch hook, fabricated from 0.120-inch nominal-thickness steel sheet; welded midway up full-height door strike; with resilient silencer.

2.2 VENTILATED METAL STAFF LOCKERS (Type B)

- A. Basis-of-Design Product: Republic Storage Systems; **"Single Point II Ventilated Lockers"**
- B. Locker Size and Arrangement: As indicated on Drawings
 - 1. Two-tier, 12 in wide x 15 in deep x 72 in high on 4-inch wood or cast-in-place concrete base
 - 2. Tops: Manufacturer's standard continuous sloping top
- C. Body: Assembled by riveting or bolting body components together. Fabricate from unperforated steel sheet as follows:
 - 1. Tops and Intermediate Dividers: 0.024-inch nominal thickness, with single bend at sides.
 - 2. Bottoms: Metallic-coated 0.060-inch nominal thickness, with single bend at sides.
 - 3. Backs: 0.048-inch nominal thickness, with full-height, double-flanged connections.
 - 4. Shelves: 0.060-inch nominal thickness, with double bend at front and single bend at sides and back.
- D. Frames: Channel formed; fabricated from 0.060-inch nominal-thickness steel sheet; lapped and factory welded at corners; with top and bottom main frames factory welded into vertical main frames. Form continuous, integral door strike full height on vertical main frames.
- E. Doors: One piece; fabricated from 0.075-inch nominal-thickness (14 gage), steel sheet; formed into channel shape with double bend at vertical edges and with right-angle single bend at horizontal edges.
 - 1. Reinforcement: Manufacturer's standard reinforcing angles, channels, or stiffeners for doors more than 15 inches wide; welded to inner face of doors.
 - 2. Sound-Dampening Panels: Manufacturer's standard, designed to stiffen doors and reduce sound levels when doors are closed, of die-formed metal with full perimeter flange and sound-dampening material; welded to inner face of doors.
 - 3. Door Style: Perforated.
- F. Hinges: Welded to door and attached to door frame with no fewer than two factory-installed rivets per hinge that are completely concealed and tamper resistant when door is closed; fabricated to swing 180 degrees.
 - 1. 2" high, 5-knuckle, full loop, tight pin style, Locker doors over 42" high shall have three hinges. Locker doors 42" high and less shall have two hinges.
- G. Recessed Door Handle and Latch: Stainless-steel cup with integral door pull, recessed so locking device does not protrude beyond face of door; pry and vandal resistant.
 - 1. Single-Point Latching: Nonmoving latch hook with steel padlock loop that projects through recessed cup and is finished to match metal locker body.
 - a. Latch Hook: Equip each door with one latch hook, fabricated from 0.120-inch nominal-thickness steel sheet; welded midway up full-height door strike; with resilient silencer.

2.3 LOCKER BENCHES

- A. Provide bench units with overall assembly height of 17-1/2 inches.
- B. Bench Tops: Manufacturer's standard one-piece units, with rounded corners and edges.
 - 1. Size: Minimum 9-1/2 inches wide by 1-1/4 inches thick.
 - 2. Laminated clear hard maple with one coat of clear sealer on all surfaces and one coat of clear lacquer on top and sides.

- C. Fixed Pedestals: Manufacturer's standard supports, with predrilled fastener holes for attaching bench top and anchoring to floor, complete with fasteners and anchors, and as follows:
 - 1. Tubular Steel: 1-1/2-inch-diameter steel tubing threaded on both ends, with standard pipe flange at top and bell-shaped cast-iron base; with baked-enamel or powder-coat finish; anchored with exposed fasteners.
 - a. Color: Match metal lockers.

2.4 FABRICATION

- A. General: Lockers are installed on prepared bases except where indicated otherwise on Drawings.
 - 1. New 4-inch-high pressure-treated wood-framed base or cast-in-place concrete base.
- B. Fabricate metal lockers square, rigid, and without warp and with metal faces flat and free of dents or distortion. Make exposed metal edges safe to touch and free of sharp edges and burrs.
 - 1. Form body panels, doors, shelves, and accessories from one-piece steel sheet unless otherwise indicated.
 - 2. Provide fasteners, filler plates, supports, clips, and closures as required for complete installation.
 - 3. Flat-topped lockers are to have a continuous flush top.
- C. Fabricate each metal locker with an individual door and frame; individual top, bottom, and back; and common intermediate uprights separating compartments. Factory weld frame members of each metal locker together to form a rigid, one-piece assembly.
- D. All-Welded Construction: Factory preassemble metal lockers by welding all joints, seams, and connections; with no bolts, nuts, screws, or rivets used in assembly of main locker groups. Factory weld main locker groups into one-piece structures. Grind exposed welds flush.
- E. Knocked-Down Construction: Fabricate metal lockers using nuts, bolts, screws, or rivets for nominal assembly at Project site.
- F. Accessible Lockers:
 - 1. Number of ADA compliant lockers of this type: minimum 5% of total. Coordinate locations with architect in the field.
 - 2. Fabricate as follows:
 - a. Locate bottom shelf no lower than 15 inches above the floor.
 - b. Where hooks, coat rods, or shelves are provided, locate no higher than 48 inches above the floor.
- G. Center Dividers: Full-depth, vertical partitions between bottom and shelf; finished to match lockers.
- H. Hooks: Manufacturer's standard ball-pointed type, aluminum or steel; zinc plated.
 - 1. Equip each locker with one double-prong ceiling hook, and two single-prong wall hooks.
- I. Identification Plates: Manufacturer's standard, etched, embossed, or stamped aluminum plates, with numbers and letters at least 3/8 inch high. Add Braille II numbers and/or letters at ADA compliant locker identification plates.
 - 1. Equip each locker with a unique identification plate.
- J. Continuous Sloping Tops: Fabricated from cold-rolled steel sheet, manufacturer's standard thickness, but not less than 0.035 inch thick (20 ga).
 - 1. Closures: Vertical-end type.
 - 2. Sloped top corner fillers, mitered.
- K. Recess Trim: Fabricated with minimum 2-1/2-inch face width and in lengths as long as practical; finished to match lockers.

- L. Filler Panels: Fabricated in an unequal leg angle shape; finished to match lockers. Provide slip-joint filler angle formed to receive filler panel.
- M. Finished End Panels: Designed for concealing unused penetrations and fasteners, except for perimeter fasteners, at exposed ends of non-recessed metal lockers; finished to match lockers.
 - 1. Form to 1-inch dimension as detailed.

2.5 STEEL SHEET FINISHES

- A. Powder-Coat Finish: Immediately after cleaning and pretreating, electrostatically apply manufacturer's standard, baked-polymer, thermosetting powder finish. Comply with resin manufacturer's written instructions for application, baking, and minimum dry film thickness.
 - 1. Colors as scheduled, or where not scheduled, as selected by Architect from Manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine walls, floors, and support bases, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install level, plumb, and true; shim as required, using concealed shims.
 - 1. Anchor locker runs at ends and at intervals recommended by manufacturer, but not more than 36 inches o.c. Using concealed fasteners, install anchors through backup reinforcing plates, channels, or blocking as required to prevent metal distortion.
 - 2. Anchor single rows of metal lockers to walls near top and bottom of lockers and to floor.
- B. Knocked-Down Metal Lockers: Assemble with standard fasteners, with no exposed fasteners on door faces or face frames.
- C. All-Welded Metal Lockers: Connect groups together with standard fasteners, with no exposed fasteners on face frames.
- D. Equipment and Accessories: Fit exposed connections of trim, fillers, and closures accurately together to form tight, hairline joints, with concealed fasteners and splice plates.
 - 1. Attach hooks with at least two fasteners.
 - 2. Attach door locks on doors using security-type fasteners.
 - 3. Identification Plates: Identify metal lockers with identification indicated on Drawings.
 - a. Attach plates to each locker door, near top, centered, with at least two aluminum rivets. For ADA compliant lockers, locate signage no higher than 60 inches above floor.
 - b. Coordinate numbering system with Owner.
 - 4. Attach recess trim to recessed metal lockers with concealed clips.
 - 5. Attach filler panels with concealed fasteners. Locate filler panels where indicated on Drawings or where required to close gaps so that lockers fill the space between walls.
 - 6. Attach sloping-top units to metal lockers, with closures at exposed ends.

- 7. Attach finished end panels with fasteners only at perimeter to conceal exposed ends of non-recessed metal lockers.
- E. Fixed Locker Benches: Provide no fewer than two pedestals for each bench, uniformly spaced not more than 72 inches apart. Securely fasten tops of pedestals to undersides of bench tops, and anchor bases to floor.

3.3 ADJUSTING, CLEANING AND PROTECTION

- A. Clean, lubricate, and adjust hardware. Adjust doors and latches to operate easily without binding.
- B. Protect metal lockers from damage, abuse, dust, dirt, stain, or paint. Do not permit use during construction.
- C. Touch up marred finishes, or replace metal lockers that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by locker manufacturer.

END OF SECTION 10 5113

SECTION 10 5613 - METAL STORAGE SHELVING

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Wall mounted adjustable cantilever metal storage shelving

1.02 SUBMITTALS

- A. Product Data: Include rated capacities, construction details, material descriptions, dimensions of individual components and profiles, and finishes for metal storage shelving.
- B. Shop Drawings: Show fabrication and installation details for metal storage shelving, including upright-to-shelf/arm connections, lateral bracing, and attachments to other work. Include plans, elevations, sections, details, and relationship to other work.
- C. Samples for Verification: For the following components, of size indicated below.
 - 1. Shelves: Full size, but not more than 24 inches wide.
 - 2. Shelf-to-Post Connectors: Full size.
 - 3. Shelf Labels: Full size.
- D. Product Schedule: For metal storage shelving. Use same designations indicated on Drawings.
- E. Manufacturer's installation instructions.
- F. Form of special warranty.

1.03 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 metal storage shelving through one source from a single manufacturer.
- C. Welding: Qualify procedures and personnel according to AWS D1.3, "Structural Welding Code--Sheet Steel."

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Deliver metal storage shelving palletted, wrapped, or crated to provide protection during transit and Project-site storage.

1.05 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install metal storage shelving until spaces are enclosed and weatherproof, wet work in spaces is completed and dry, and ambient temperature is being maintained at the levels indicated for Project when occupied for its intended use.

- B. Field Measurements: Verify shelving unit location by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
 - 1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating shelving units without field measurements. Coordinate construction to ensure actual dimensions correspond to established dimensions.

1.06 COORDINATION

- A. Coordinate locations and installation of metal storage shelving that may interfere with ceiling systems including lighting, HVAC, and sprinklers.

1.07 EXTRA MATERIALS

- A. Furnish extra materials described below, before installation begins, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Shelves: Full-size units equal to 5 percent of amount installed for each type indicated, but no fewer than 10 shelves.
 - 2. Shelf-to-Post Connectors: Full-size units equal to 5 percent of amount installed for each type indicated, but no fewer than 20 connectors, 2 for each shelf.
 - 3. Shelf Labels: Full-size units equal to 5 percent of amount installed for each type indicated, but no fewer than 10 labels.

1.08 WARRANTY

- A. Post-and-Cantilever Storage System: 10 years warranty for properly installed storage system to cover repair or replacement of defective or failed components.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. Structural Performance for Post-and-Shelf Metal Storage Shelving: Provide metal storage shelving capable of withstanding the loads indicated when tested according to MH 28.1, "Specification for the Design, Testing, Utilization and Application of Industrial Grade Steel Shelving."
- B. Compliance: System shall comply with Fed Spec AA-S-1048, Kind I, Class 2, Type 7D.
- C. Post-and-Cantilever system description:
 - 1. Cantilevered continuous solid shelves without front supports providing completely open, full width shelves.
 - 2. Custom shelf lengths to completely fit layout indicated without voids or gaps
 - 3. Shelves may be positioned at any height above base bracket. Systems with slots or holes that dictate shelf heights are not acceptable.
 - 4. Expandable system using additional modular components.
 - 5. System can be disassembled and re-erected in different location or configuration.
- D. Product Certification: Manufacturer's certification that products and systems comply with specified requirements. Itemize deviations from basis of design, and include appropriate justification of deviations.

2.02 MANUFACTURERS

- A. Basis-of-Design Product: The design for each type of metal storage shelving is based on the product named. Subject to compliance with requirements, provide either the named product or a comparable product.

2.03 MATERIALS

- A. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.
- B. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.
- C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with G60 zinc (galvanized) or A60 zinc-iron-alloy (galvannealed) coating.
- D. Steel Tubing: ASTM A 513, Type 2.
- E. Steel Wire: ASTM A 899.

2.04 POST-AND-SHELF METAL STORAGE SHELVING

- A. Open Metal Storage Shelving: Factory-formed, field-assembled, metal storage shelving system; designed for shelves to span between and be supported by posts, with shelves adjustable over the entire height of shelving unit post. Fabricate initial shelving unit with a post at each back corner. Fabricate additional shelving units as add-on units, designed to mount to wall as indicated. Provide fixed bottom shelves, and adjustable top and intermediate shelves, and accessories indicated.
 - 1. Basis-of-Design Product: E-Z Shelving Systems, Inc. (800)353-1331 or comparable product, subject to approval.
 - 2. Wall-Mounted: Upright with slotted tubular face to receive shelf brackets and double flange on backside for attachment to substrate.
 - 3. Shelf Brackets: 12 gage (0.093-inch) thick, galvanized steel sheet, with holes for secure attachment to posts, include hot dipped galvanized bolts, clamps and lock nuts.
 - 4. Solid Shelves: Fabricated from 16 gage (0.053-inch) thick, galvanized steel sheet, with slots or holes for secure attachment of shelf.
 - a. Fabricate fronts and backs of shelves with box-formed edges, with corners lapped and welded.
 - b. Load-Carrying Capacity: 500 lbs.
 - 5. Shelf Quantity: As shown on the drawings.
 - 6. Shelf-to-Post Connectors: Mechanical fasteners (6 gauge steel clamps with profile matching posts secured with fastening bolts). Provide clamps and hardware plated with electro-zinc and chromate dipped to enhance rust prevention.
 - 7. Overall Unit Sizes: As indicated on the Drawings for each different location required.
 - 8. Finish: Manufacturer's standard baked enamel or plastic powder resin coating.
- B. Closet Rods: 1-1/16 inches outside diameter chrome plated round tubing of 14 gauge steel thickness.
- C. Rod Hanger: 14 gauge electro-zinc plated and chromate dipped steel notched and formed to hold closet rod under front vertical flange of shelf.

2.05 FABRICATION

- A. Shop Assembly: Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

- B. Fabricate freestanding metal storage shelving square and rigid with posts plumb and true, and shelves flat and free of dents or distortion. Fabricate connections to form a rigid structure, free of buckling and warping.
- C. Shear and punch metals cleanly and accurately. Remove burrs.
- D. Form edges and corners free of sharp edges or rough areas. Fold back and crimp exposed edges of unsupported sheet metal to form a 1/2-inch-wide hem on the concealed side; ease edges of metal plate to radius of approximately 1/32 inch.
- E. Form metal in maximum lengths to minimize joints. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- F. Weld corners and seams continuously to comply with referenced AWS standard 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. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
 - 5. Weld before finishing components to greatest extent possible. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
- G. Build in straps, plates, brackets, and other reinforcements as needed to support shelf loading.
- H. Cut, reinforce, drill, and tap metal fabrications to receive hardware, fasteners, and similar items.
- I. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges.
- J. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Locate joints where least conspicuous.

2.06 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish all steel surfaces, components, and accessories except prefinished stainless-steel and chrome-plated surfaces.
- C. Baked-Enamel or Powder-Coat Finish: Manufacturer's standard baked-on finish consisting of prime coat and thermosetting topcoat. Comply with coating manufacturer's written instructions for cleaning, pretreatment, application, and minimum dry thickness.

2.07 GALVANIZED STEEL FINISHES

- A. Surface Preparation: Clean surfaces with nonpetroleum solvent so surfaces are free of oil and other contaminants. After cleaning, apply a conversion coating suited to the organic coating to be applied over it. Clean welds, mechanical connections, and abraded areas, and apply galvanizing repair paint specified below to comply with ASTM A 780.
 - 1. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.
- B. Baked-Enamel Finish: Immediately after cleaning and pretreating, apply manufacturer's standard 2-coat, baked-enamel finish consisting of prime coat and thermosetting topcoat, with a minimum dry film thickness of 1 mil for topcoat. Comply with paint manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 2 mils.
 - 1. Color and Gloss: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
- B. Examine floors for suitable conditions where metal storage shelving will be installed.
- C. Examine walls and ceilings to which metal storage shelving will be placed for properly located blocking, grounds, or other solid backing for attachment of support fasteners.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Vacuum finished floor over which metal storage shelving is to be installed.

3.03 INSTALLATION

- A. Install metal storage shelving level, plumb, square, rigid, and true, and within erection tolerances specified.
 - 1. Install shelves in each shelving unit at spacing indicated on Drawings or, if not indicated, at equal spacing.
 - 2. Connect side-to-side shelving units together at corner posts with support ties.
- B. Erection Tolerances: Erect metal storage shelving with a maximum tolerance from vertical of 1/2 inch from 0 to 10 feet of height.

3.04 ADJUSTING AND CLEANING

- A. Verify that shelves and shelf-to-post connectors adjust easily and properly.
- B. On completion of installation, clean exposed surfaces as recommended by manufacturer.
- C. Touch up marred finishes or replace metal storage shelving that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by metal storage shelving manufacturer.
 - 1. Galvanized Surfaces: Clean bolted connections and abraded areas and repair galvanizing to comply with ASTM A 780.
- D. Replace metal storage shelving that has been damaged or has deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 10 5613

SECTION 10 7516 – GROUND-SET FLAGPOLES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes:
 - 1. Ground-mounted aluminum flagpoles
 - 2. Flags.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of flagpole required. Include installation instructions, construction details, material descriptions, dimensions of individual components and profiles, operating characteristics, fittings, accessories, and finishes for flagpoles.
- B. Shop Drawings: Show general layout, jointing, grounding method, and anchoring and supporting systems.
 - 1. Include details of foundation system for ground-set poles.
- C. Finish Samples for Verification: If requested by Architect, for each finished metal used for flagpoles and accessories.

1.3 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For flagpoles to include in operation and maintenance manuals.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain each flagpole as complete unit, including fittings, accessories, bases, and anchorage devices, from single source from single manufacturer.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. General: Spiral wrap flagpoles with heavy paper and enclose in a hard fiber tube or other protective container.
- B. Do not store flagpoles outdoors in their wrapping. Follow Manufacturer's instructions. Staining of flagpoles during storage is solely the responsibility of the Contractor.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide flagpole assemblies, including anchorages and supports, capable of withstanding the effects of gravity loads and wind loads as determined according to the building code in effect for this Project or ANSI/NAAMM FP 1001, "Guide Specifications for Design Loads of Metal Flagpoles," whichever is more stringent.
 - 1. Wind Loads: Minimum 100 mph 3-second gust according to SEI/ASCE 7

- a. With flag: 100 mph
 - b. Without flag: 145 mph
- 2. Base flagpole design on polyester flag of maximum standard size suitable for use with flagpole.

2.2 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Basis-of-Design: Kearney-National Inc. (DKM Corp); Hapco/American Flagpole Div.
 - 2. Baartol Co., Inc.
 - 3. Concord Industries/ Flagpole Components, Inc.
 - 4. Eder Flag Manufacturing Company, Inc.
 - 5. Acme Lingo Flagpoles, LLC
 - 6. Pole-Tech Co., Inc.
 - 7. American Flag Store

2.3 FLAGPOLES

- A. Flagpole Construction, General: Construct flagpoles in one piece.
- B. Exposed Height: 30 feet.
- C. Aluminum Flagpoles: Provide cone-tapered flagpoles fabricated from seamless extruded tubing complying with ASTM B 24, Alloy 6063, Temper T6, with a minimum wall thickness of 3/16 inch.
- D. Metal Foundation Tube: Manufacturer's standard corrugated-steel foundation tube, not less than 0.064-inch-nominal wall thickness. Provide with 3/16-inch steel bottom plate and support plate; 3/4-inch-diameter, steel ground spike; and steel centering wedges welded together. Galvanize steel after assembly, minimum of G-60. Provide loose hardwood wedges at top of foundation tube for plumbing pole.
 - 1. Provide flashing collar of same material and finish as flagpole.
- E. Sleeve for Aluminum Flagpole: Foundation sleeve, made to fit flagpole, for casting into concrete foundation.
 - 1. Provide flashing collar of same material and finish as flagpole.

2.4 FITTINGS

- A. Finial Ball: Manufacturer's standard, sized as standard with manufacturer for flagpole size indicated.
 - 1. 0.063-inch spun aluminum with gold anodic finish.
- B. External Halyard: Ball-bearing, nonfouling, revolving truck assembly of cast metal with continuous 5/16-inch-diameter, braided polypropylene halyard and 9-inch cast-metal cleats with fasteners. Finish exposed metal surfaces to match flagpole.
 - 1. Provide two halyards and two cleats at each flagpole.
 - 2. Provide cast-metal cleat covers, finished to match flagpole, secured with cylinder locks.
 - 3. Halyard Flag Snaps: Provide two stainless-steel swivel snap hooks per halyard.
 - a. Provide with neoprene or vinyl covers.

OR AT CONTRACTOR'S OPTION:

4. Plastic Halyard Flag Clips: Made from injection-molded, UV-stabilized, acetal resin (Delrin). Clips attach to flag and have two eyes for inserting both runs of halyards. Provide two flag clips per halyard.
 - a. Product: Subject to compliance with requirements, provide "Quiet Halyard" flag clasp by Lingo.

2.5 FLAGS

- A. Provide one U.S. Flag.
 1. Flags Material: 2-ply Polyester for outdoor use.
 2. Flag Construction: Embroidered stars; sewn stripes with lockstitch seams and four rows of lock-stitching on fly ends; brass grommets and heavy polyester heading.
 3. Flag Sizes:
 - a. US Flag is to be 6' x 10'.

2.6 MISCELLANEOUS MATERIALS

- A. Concrete: Provide concrete composed of portland cement, coarse and fine aggregate, and water mixed in proportions to attain a 28-day compressive strength of not less than 3000 psi, complying with Division 3 Section "Cast-in-Place Concrete."
- B. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107.
- C. Drainage Material: Crushed stone, or crushed or uncrushed gravel; coarse aggregate.
- D. Sand: ASTM C 33, fine aggregate.
- E. Elastomeric Joint Sealant: Single-component neutral-curing silicone joint sealant complying with requirements in Division 7 Section "Elastomeric Joint Sealants" for Use NT (nontraffic) and for Use M, G, A, and, as applicable to joint substrates indicated, for Use O.
- F. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

2.7 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.8 ALUMINUM FINISHES

- A. Natural Satin Finish: Fine, directional, medium satin polish; buff complying with AA-M20; seal aluminum surfaces with clear, hard-coat wax.
 1. Class I, Clear Anodic Finish: AA-M12C22A41 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, including foundation, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare uncoated metal flagpoles that are set in foundation tubes by painting below-grade portions with a heavy coat of bituminous paint.
 - 1. Field verify exact installation locations with Architect.
- B. Foundation Excavation: Excavate to neat clean lines in undisturbed soil. Remove loose soil and foreign matter from excavation and moisten earth before placing concrete. Place and compact drainage material at excavation bottom.
- C. Provide forms where required due to unstable soil conditions and for perimeter of flagpole base at grade. Secure and brace forms, foundation tube, fiberglass sleeve, or anchor bolts in position, braced to prevent displacement during concreting.
- D. Place 3000 psi concrete complying with ASTM C94 in place by using vibrators immediately after mixing. Moist-cure exposed concrete for not less than seven days or use non-staining curing compound.
- E. Trowel exposed concrete surfaces to a smooth, dense finish, free of trowel marks, and uniform in texture and appearance. Provide positive slope for water runoff to perimeter of concrete base.

3.3 FLAGPOLE INSTALLATION

- A. General: Install flagpoles where shown and according to manufacturer's written instructions and in coordination with adjacent sitework and landscaping.
- B. Ground Set: Place foundation tube or sleeve, center, and brace to prevent displacement during concreting. Place concrete. Plumb and level foundation tube or sleeve and allow concrete to cure. Install flagpole, plumb, in foundation tube or sleeve.
 - 1. Foundation Tube: Place tube seated on bottom plate between steel centering wedges and install hardwood wedges to secure flagpole in place. Place and compact sand in foundation tube and remove hardwood wedges. Seal top of foundation tube with a 2-inch layer of elastomeric joint sealant and cover with aluminum flashing collar.

END OF SECTION 10 7516

SECTION 11 3316 – MISCELLANEOUS SPECIALTY EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes miscellaneous fabricated, loose or mounted accessory equipment.
 - 1. Vehicle-bay equipment furnished, delivered, and installed by Contractor (CFE-2, -2, -3)

1.2 COORDINATION

- A. Coordinate accessory locations with other work to prevent interference with clearances required, and for proper installation, adjustment, operation, cleaning, and servicing of equipment.
- B. Deliver inserts and anchoring devices as required to prevent delaying the Work.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include operating characteristics, rated capacities, dimensions of individual appliances, finishes and utility requirements, as appropriate.
 - 2. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
 - 3. Include anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
 - 4. Include electrical, mechanical, plumbing characteristics.
 - a. Wiring Diagrams: Power, signal, and control wiring.
- B. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.
 - 1. Identify locations using room designations indicated.
 - 2. Identify equipment using designations indicated.

1.4 INFORMATIONAL SUBMITTALS

- A. Installer Certificates: Signed by manufacturer certifying that Equipment Installer complies with specified requirements.
- B. Product Certification: Manufacturer's certification that products and systems comply with specified requirements. Itemize deviations from basis of design, and include appropriate justification of deviations.
- C. Sample Warranty: For manufacturer's special warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For accessories to include in maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified original equipment manufacturer that fabricates equipment and their components.
- B. Product Options: Information on Drawings and in Specifications establishes requirements for product's aesthetic effects and performance characteristics.
 - 1. 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.
 - 2. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, and in-service performance.
- C. Regulatory Requirements: Comply with provisions of the following product certifications:
 - 1. NFPA: Provide electrical appliances listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
 - 2. UL and NEMA: Provide electrical components required as part of residential appliances that are listed and labeled by UL and that comply with applicable NEMA standards.
- D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- E. Pre-installation Conference: Conduct conference at project site. Review methods and procedures related to shipment, handling and installation of equipment including, but not limited to, the following :
 - 1. Inspect and discuss condition and levelness of flooring, rough-in, blocking and other preparatory work performed under other contracts.
 - 2. Review structural loading limitations.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver factory-assembled units, individually factory packaged and protected. Label with manufacturer's name, product name, and model number.
- B. Do not deliver equipment until spaces to receive them are clean, dry, and ready for their installation.

1.8 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install equipment until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- B. Field Measurements: Verify the following by field measurements and indicate measurements on Shop Drawings:
 - 1. Concealed framing, blocking, and reinforcements that support items before they are enclosed.
 - 2. Actual locations of walls, columns, and other construction contiguous with equipment.

1.9 COORDINATION

- A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of work specified in other Sections to ensure that equipment can be supported and installed as indicated.
- B. Coordinate plumbing and wiring requirements with building plumbing and electrical system.
- C. Coordinate layout and installation of plumbing, mechanical, and electrical services as they affect equipment.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.2 MANUFACTURERS AND PRODUCTS

- A. Product and Manufacturer limitations:
 - 1. Basis-of-Design Product: The design is based on the product scheduled or otherwise shown on the Drawings.
 - 2. It is the intent of this specification to establish performance and quality criteria consistent with established standards of design and function herein described. Work not meeting these minimum standards will not be accepted.
 - 3. Where a product is scheduled or specified, provide the products indicated.
 - 4. Where a manufacturer is specified, provide products by one of the manufacturers specified.

2.3 EQUIPMENT

- A. Provide scheduled products, as listed below and scheduled in "Contractor-Furnished Equip - Contractor Installed" on Drawings:
 - CFE-1 Mobile Vehicle Lift & Jack
 - CFE-2 4-Post Vehicle Lift
 - CFE-3 2-Post Vehicle Lift

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine floors and other conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
 - 1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.

- B. Examine roughing-in for electrical and mechanical systems to verify actual locations of connections before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install accessories according to manufacturers' written instructions, 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. Built-in Equipment: Securely anchor units to supporting structure with included or otherwise appropriate fasteners. Verify that clearances are adequate for proper functioning and that rough openings are completely concealed.
- C. Freestanding Equipment: Place units in final locations after finishes have been completed in each area. Verify that clearances are adequate to properly operate equipment.

3.3 PROTECTION, ADJUSTING AND CLEANING

- A. Remove packing material and leave units in clean condition, ready for operation.
- B. Test, adjust, and verify operation. Repair or replace items found to be defective or operating below rated capacity.
 - 1. Verify that accessories required have been furnished and installed.
- C. Verify that operating parts work freely and fit neatly, and that clearances are adequate to properly and freely operate appliances.
- D. Clean, lubricate, and adjust hardware. Adjust doors and latches to operate easily without binding. Verify that locking devices operate properly.
- E. After completing unit installation, remove protective coverings if any.
- F. Repair or replace damaged parts, dents, buckles, abrasions, and other defects affecting appearance or serviceability. Touch up factory-applied finishes to restore damaged or soiled areas.
- G. Clean surfaces, repair minor damage as directed manufacturer. Replace other damaged parts or components.
- H. Remove temporary labels and protective coatings.
- I. Clean and polish exposed surfaces according to manufacturer's written instructions.

3.4 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections with the assistance of a factory-authorized service representative:
 - 1. Perform visual, mechanical, and electrical inspection and testing for each item according to manufacturers' written recommendations. Certify compliance with each manufacturer's appliance-performance parameters.
 - 2. Leak Test: After installation, test for leaks. Repair leaks and retest until no leaks exist.
 - 3. Operational Test: After installation, start units to confirm proper operation.
 - 4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and components.

- B. An appliance will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.

3.5 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain equipment.

END OF SECTION 11 6316

SECTION 12 2413 - ROLLER WINDOW SHADES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Manually-operated shade systems with single and double rollers.
 - 2. Light filtering and room darkening shades.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include styles, material descriptions, construction details, dimensions of individual components and profiles, features, finishes, and operating instructions for roller shades.
- B. Shop Drawings: Show fabrication and installation details for roller shades, including shade band materials, their orientation to rollers, and their seam and batten locations.
- C. Samples: For each exposed product and for each color and texture specified, 10 inches long.
- D. Samples for Verification: For each type of roller shade.
 - 1. Shadeband Material: Not less than 3 inches square. Mark inside face and direction of material if applicable.
 - 2. Fascia Material
- E. Roller-Shade Schedule: Use same designations indicated on Drawings, and same room names and numbers.
- F. Qualification Data: For Installer.

1.3 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For roller shades to include in maintenance manuals.
- B. Executed Warranties.

1.4 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Roller Shades: Full-size units equal to 5 percent of quantity installed for each size, color, and shade band material indicated, but no fewer than two units.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Obtain roller shades system through one source from a single manufacturer with a minimum of ten years' experience and minimum of five projects of similar scope and size in manufacturing products comparable to those specified in this section.
- B. Fire-Test-Response Characteristics: Passes NFPA 701 small and large-scale vertical burn. Materials tested shall be identical to products proposed for use.
- C. ShadeCloth Anti-Microbial Characteristics: 'No Growth' per ASTM G 21 results for fungi ATCC9642, ATCC 9644, ATCC9645.
- D. Requirements for Electronic Hardware, Controls, and Switches: Roller shade hardware, shade fabric, EDU, and all related controls shall be furnished and installed as a complete two-way communicating system and assembly.
- E. Requirements for Roller Shade Installer/Contractor:
 - 1. Roller Shade Hardware, shade fabric, motor, and all related controls shall be furnished and installed as a complete two-way communicating system and assembly.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver roller shades in factory packages, marked with manufacturer, product name, and location of installation using same designations indicated on Drawings.

1.7 FIELD CONDITIONS

- A. Environmental Limitations: Do not install roller shades until construction and finish work in spaces, including painting, is complete and dry and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- B. Field Measurements: Where roller shades are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Allow clearances for operating hardware of operable glazed units through entire operating range. Notify Architect of installation conditions that vary from Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1.8 WARRANTY

- A. Roller Shade Hardware Warranty: Manufacturer's standard non-depreciating twenty-five-year limited warranty.
- B. Standard Shadecloth: Manufacturer's standard twenty-five-year warranty.
- C. Roller Shade Installation: One year from date of Substantial Completion, not including scaffolding, lifts or other means to reach inaccessible areas, which are deemed Owner's responsibility.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. **Basis-of-Design:** Subject to compliance with requirements, provide as follows or provide comparable products by other acceptable Manufacturers listed below:
1. Manufacturer: Premier Sunshades
- B. Other Acceptable Manufacturers:
1. Rollease Acmeda
 2. Draper Inc.
 3. MechoShade Systems, Inc
 4. Creston Electronics
 5. Hunter Douglas
- C. Source Limitations: Obtain roller shades from single source from single manufacturer.

2.2 ROLLER SHADE SYSTEMS

- A. Chain-and-Clutch Operating Mechanisms: With continuous-loop bead chain and clutch that stops shade movement when bead chain is released; permanently adjusted and lubricated.
1. Bead Chains:
 - a. #10 qualified Stainless steel chain rated to 90 lb. (41 kg) minimum breaking strength.
 - b. Loop Length: Full length of roller shade.
 - c. Limit Stops: Provide upper and lower ball stops.
 - d. Chain-Retainer Type: Chain tensioner, jamb mounted.
 2. Spring Lift-Assist Mechanisms: Manufacturer's standard for balancing roller-shade weight and lifting heavy roller shades.
 - a. Provide for shadebands that weigh more than 10 lb or for shades as recommended by manufacturer, whichever criteria are more stringent.
- B. Rollers: Corrosion-resistant steel or extruded-aluminum tubes of diameters and wall thicknesses required to accommodate operating mechanisms and weights and widths of shadebands indicated without deflection. Provide with permanently lubricated drive-end assemblies and idle-end assemblies designed to facilitate removal of shadebands for service.
1. Roller Drive-End Location: As indicated on Drawings.
 2. Direction of Shadeband Roll: Regular, from back of roller.
 3. Shadeband-to-Roller Attachment:
 - a. Any method of attaching shade band to roller tube that requires use of adhesive, adhesive tapes, staples, and/or rivets is not acceptable.
 - b. Shade band shall be made removable / replaceable with a "snap-on / snap-off" spline mounting, without having to remove shade roller from shade brackets.
- C. Mounting Hardware: Brackets or endcaps, corrosion resistant and compatible with roller assembly, operating mechanism, installation accessories, and mounting location and conditions indicated.
- D. Roller-Coupling Assemblies: Coordinated with operating mechanism and designed to join up to three inline rollers into a multiband shade that is operated by one roller drive-end assembly.

- E. Shadebands:
 - 1. Shadeband Material: Light-filtering fabric.
 - 2. Shadeband Bottom (Hem) Bar: Steel or extruded aluminum.
 - a. Type: Enclosed in sealed pocket of shadeband material.
- F. Installation Accessories:
 - 1. Front Fascia: Aluminum extrusion that conceals front and underside of roller and operating mechanism and attaches to roller endcaps without exposed fasteners.
 - a. Shape: L-shaped.
 - b. Height: Manufacturer's standard height required to conceal roller and shadeband when shade is fully open.
 - 2. Installation Accessories Color and Finish: To be selected by Architect from manufacturer's full range.

2.3 SHADECLOTH

- A. Shadeband Material Flame-Resistance Rating: Comply with NFPA 701-99 and IBC when tested by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
- B. Visually Transparent Single-Fabric Shade cloth: Single thickness non-raveling 0.030-inch thick vinyl fabric, woven from 0.018-inch diameter extruded vinyl yarn comprising of 21 percent polyester and 79 percent reinforced vinyl, in colors as scheduled or as selected from manufacturer's available range.
 - 1. Dense Basket Weave: 3 percent open, 2 by 2 dense basket-weave pattern.
- C. Visually Opaque Single-Fabric Shadecloth: Single thickness, opaque non-raveling 0.018-inch thick polyester fabric, with solid colored backing, in colors scheduled or as selected from manufacturer's available range.
 - 1. Room Darkening: 0 percent open, polyester with acrylic coating.

2.4 ROLLER-SHADE FABRICATION

- A. Product Safety Standard: Fabricate roller shades to comply with WCMA A 100.1, including requirements for flexible, chain-loop devices; lead content of components; and warning labels.
- B. Unit Sizes: Fabricate units in sizes to fill window and other openings as follows, measured at 74 degree F:
 - 1. Between (Inside) Jamb Installation: Width equal to jamb-to-jamb dimension of opening in which shade is installed less 1/4 inch per side or 1/2-inch total, plus or minus 1/8 inch. Length equal to head-to-sill or -floor dimension of opening in which shade is installed less 1/4 inch, plus or minus 1/8 inch.
- C. Shade band Fabrication: Fabricate shade bands without battens or seams to extent possible except as follows:
 - 1. Vertical Shades: Where width-to-length ratio of shade band is equal to or greater than ratio determined by fabricator, provide battens and seams at uniform spacing's along shade band length to ensure shade band tracking and alignment through its full range of movement without distortion of the material.
 - 2. Railroaded Materials: Railroad material where material roll width is less than the required width of shade band and where indicated. Provide battens and seams as required by railroaded material to produce shade bands with full roll-width panel(s) plus, if required, one partial roll-width panel located at top of shade band.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, operational clearances, accurate locations of connections to building electrical system, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using methods recommended by manufacturer for achieving best result for substrate under the project conditions.
- C. Coordinate with window installation and placement of concealed blocking to support shades.

3.3 ROLLER-SHADE INSTALLATION

- A. Install roller shades level, plumb, and aligned with adjacent units according to manufacturer's written instructions and approved shop drawings.
 - 1. Locate so shade band is at least 2 inches from interior face of glass. Allow proper clearances for window operation hardware. Use mounting devices as indicated.
 - 2. Replace shades not in compliance with specified tolerances at no extra cost to Owner.

3.4 ADJUSTING

- A. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.
 - 1. Adjust level, projection, and shade centering from mounting bracket. Verify there is no telescoping of shade fabric.

3.5 CLEANING AND PROTECTION

- A. Clean roller-shade surfaces after installation, according to manufacturer's written instructions.
 - 1. Clean soiled shades and exposed components as recommended by manufacturer.
 - 2. Replace shades that cannot be cleaned to "like new" condition.
- B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer that ensures that roller shades are without damage or deterioration at time of Substantial Completion.
- C. Touch-up, repair or replace damaged products before Substantial Completion.
 - 1. Replace damaged roller shades that cannot be repaired, in a manner approved by Architect, before time of Substantial Completion.

3.6 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain manual-operated roller shades.

END OF SECTION 12 2413

SECTION 12 3553 PLASTIC-LAMINATE CLAD CASEWORK

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Fixed, modular and custom plastic-laminate clad wood casework and components.
 - 2. Plastic-laminate countertops.
- B. Related Sections include the following:
 - 1. Division 06 Section "Rough Carpentry" and Division 09 Section "Gypsum Board Assemblies" for wood blocking and reinforcing for anchoring manufactured casework.
 - 2. Division 09 Section "Resilient Wall Base and Accessories" for rubber base applied to manufactured casework.
 - 3. Divisions 20 through 26 Sections for HVAC, plumbing, and electrical components and devices attached to or integrated with casework.

1.2 DEFINITIONS

- A. Exposed Portions of Casework: Surfaces visible when doors and drawers are closed, including bottoms of cabinets more than 48 inches above floor, and visible surfaces in open cabinets or behind glass doors.
 - 1. Ends of cabinets indicated to be installed directly against and completely concealed by walls or other cabinets after installation are not considered exposed.
- B. Semi-exposed Portions of Casework: Surfaces behind opaque doors, such as interiors of cabinets, shelves, dividers, interiors and sides of drawers, and interior faces of doors. Bottoms of wall cabinets and tops of cases 78 inches or more above floor are defined as semi-exposed.
- C. Concealed portions of casework include ends installed directly against walls or other cabinets, sleepers, web frames, dust panels, and other surfaces not usually visible after installation.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated, including countertops and each hardware component.
- B. Shop Drawings: For plastic-laminate clad casework. Include plans, elevations, sections, details, cutouts and attachments to other work.
 - 1. Indicate types and sizes of cabinets.
 - 2. Indicate locations of hardware and keying of locks.
 - 3. Indicate locations of blocking and reinforcements required for installing casework.
 - 4. Indicate locations and types of service fittings together with conduit, piping, and associated service supply connection required.
 - 5. Include details of exposed conduits, if required, for service fittings.
 - 6. Indicate locations of and clearances from adjacent walls, doors, windows, other building components, and other cabinetry, equipment, or furnishings.
 - 7. Indicate critical dimensions required for compliance with referenced accessibility standards.
 - 8. Indicate duct connections, electrical connections, and locations of access panels.

9. Include roughing-in information for mechanical, plumbing, and electrical connections.
 10. Include layout of units in relation to lighting fixtures and air-conditioning registers and grilles.
- C. Samples for Initial Selection: Not required. Provide scheduled finish products, subject to verification by Architect.
- D. Samples for Verification: Unless otherwise directed, approved full-size Samples may become part of the completed Work, if in an undisturbed condition at time of Substantial Completion. Notify Architect of their exact locations. If acceptable full-size Samples at Project site are not incorporated into the Work, retain and remove them when directed by Architect.
1. One of each finish type of full-size finished base cabinet, wall cabinet, and tall cabinet, complete with hardware, doors, adjustable shelves, and drawers, but without countertop.
 2. 6-inch-square Samples for each type of finish, including top material and edge banding.
 3. Section of countertop showing top, front edge, and backsplash/ side splash construction.
 4. One of each service fitting specified, complete with accessories and specified finish.
 5. One of each type of sink and accessory item specified.
 6. One of each type of hardware item specified.
- E. Keying Schedule: Include schematic keying diagram, and index each key set to unique designations that are coordinated with the Contract Documents and Owner.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Manufacturer and qualified Installer.
- B. Product Test Reports for Casework: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating compliance of laboratory casework with requirements of specified product standard and system structural performance specified in "Performance Requirements" Article.
- C. Product Test Reports for Countertop Surface Material: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating compliance of laboratory countertop surface materials with requirements specified for chemical and physical resistance.
- D. Warranty: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Certificate of 5 (five) year warranty on casework and warranties for each countertop product.

1.6 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with current ICC/ANSI A117.1 as referenced by PA Uniform Construction Code and as adopted by authorities having jurisdiction.
- B. Installer Qualifications: An authorized representative of institutional casework manufacturer for installation and maintenance of units required for this Project.
- C. Source Limitations: To the greatest extent possible obtain manufactured casework through one source from a single manufacturer or manufacturer-approved distributor.
1. Obtain countertops, hardware, accessories, and service fittings not provided under a separate Prime Contract, from casework manufacturer.

- D. Quality Standard: Unless otherwise indicated, comply with AWI's "Architectural Woodwork Quality Standards," Section 1600.
 - 1. Provide AWI Quality Certification Program certificate indicating that manufactured casework complies with requirements.
- E. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.
- F. Product Designations: Drawings indicate sizes and configurations of casework by referencing designated manufacturer's catalog numbers. Other manufacturers' casework of similar sizes, similar door and drawer configurations, and complying with the Specifications may be considered.
- G. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." Review methods and procedures related to manufactured casework and adjacent construction.
- H. Keying Conference: Conduct conference at Project site with Owner. Incorporate keying conference decisions into final keying requirements.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver casework only after painting, utility roughing-in, and similar operations that could damage, soil, or deteriorate casework have been completed in installation areas. If casework must be stored in other than installation areas, store only in areas where environmental conditions meet requirements specified in "Project Conditions" Article.
- B. Protect finished surfaces during handling and installation with protective covering of polyethylene film or other suitable material.

1.8 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install plastic-laminate clad casework until building is enclosed, wet work and utility roughing-in are complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.
- B. Field Measurements: Where casework is indicated to fit to other construction, verify dimensions by field measurements before fabrication and indicate measurements on Shop Drawings.
 - 1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating institutional casework without field measurements. Coordinate construction to ensure that actual dimensions correspond to established dimensions.
- C. Coordinate layout and installation of framing and reinforcements in gypsum board assemblies for support of casework.
- D. Coordinate installation of casework with installation of appliances, service utilities and other adjacent or integral equipment and accessories.
- E. Coordinate installation of casework with installation of mechanical, electrical and plumbing fittings. Provide cutouts for sinks and plumbing fittings where indicated.

1.9 EXTRA MATERIALS

- A. Furnish complete touchup kit for each type and color of casework provided. Include scratch fillers, stains, finishes, and other materials necessary to perform permanent repairs to damaged laboratory casework finish.
- B. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Cabinet Mounting Clips and Related Hardware: Quantity equal to 0.5 percent of amount installed, but no fewer than 12 of each type.
 - 2. Shelf Mounting Clips: Quantity equal to .05 percent of amount installed, but no fewer than 40 of each type.
 - 3. Cabinet pulls, hinges, catches: Quantity equal to 0.5 percent of amount installed, but no fewer than 20 of each type.
 - 4. Cabinet cam lock sets: One per room.

1.10 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of casework that fail in materials or workmanship within specified warranty period. Failures include, but are not limited to, the following:
 - 1. Delamination of components or other failures of glue bond.
 - 2. Warping of components.
 - 3. Failure of operating hardware.
 - 4. Deterioration of finishes.
- B. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. System Structural Performance: Laboratory casework and support framing system shall withstand the effects of the following gravity loads and stresses without permanent deformation, excessive deflection, or binding of drawers and doors:
 - 1. Support Framing System: 600 lb/ft.
 - 2. Suspended Base Cabinets (Internal Load): 160 lb/ft.
 - 3. Work Surfaces (Including Tops of Suspended Base Cabinets): 160 lb/ft.
 - 4. Wall Cabinets (Upper Cabinets): 160 lb/ft.
 - 5. Shelves: 40 lb/sq. ft.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. Accessibility: Comply with Federal Register Volume 56, No. 144, Rules and Regulations and regulatory requirements referenced in Part 1; and with the following special requirements where indicated on architectural plans as "ADA", or as otherwise indicated or required by authorities having jurisdiction.
 - 1. Countertop Height: With or without cabinet below, not to exceed a height of 34 inches Above Finished Floor (AFF), at a surface depth of 24 inches.

2. Countertop Maximum Side Reach Depth: Maximum 24 inches from wall surface to finished front edge of counter.
 - a. Casework Cabinet Mark as scheduled references manufacturer's standard nominal unit dimensions. Provide base cabinets in custom depth as necessary to meet accessible reach ranges, except as otherwise indicated.
3. Kneespace Clearance: Minimum 29 inches AFF, and 30 inches clear span width.
4. 12 inch deep shelving, adjustable or fixed: Not to exceed a range from 9 inches AFF to 54 inches AFF.
5. Wardrobe Cabinets: Furnish with rod/shelf adjustable to 48 inches AFF at a maximum 21 inch shelf depth.
6. Sink Cabinet Clearances: In addition to other requirements, upper kneespace frontal depth shall be no less than 8 inches, and lower toe frontal depth shall be no less than 11 inches, at a point 9 inches AFF, and as further described in Volume 56, Section 4.19.
 - a. Where scribing or shimming cabinet base for uneven floor, lay out and sequence work to maintain required sink cabinet clearances.

2.2 MANUFACTURERS - CASEWORK

- A. Basis of Design Manufacturer: **Stevens Industries**. Subject to compliance with requirements, other manufacturers offering products that may be incorporated into the Work are the following:
 1. ACS Casework – Advanced Cabinetry Systems.
 2. Case Systems.
 3. Southern Cabinetry, Inc.

2.3 CABINET MATERIALS

- A. General:
 1. Plastic Laminate: High-pressure decorative laminate complying with NEMA LD 3. Subject to compliance with requirements, provide products by the following manufacturers:
 - a. Basis of Design:
 - 1) Cabinets: Wilsonart, as scheduled
 - 2) Countertops: Wilsonart, as scheduled
 - b. Subject to approval of colors and patterns:
 - 1) Formica by Diller
 - 2) Laminart by Wilsonart
 - 3) Nevamar by Panolam
 - 4) Pionite Decorative Surfaces by Panolam
 2. Edgebanding for Plastic Laminate: Rigid PVC extrusions, through color with satin finish.
 - a. Basis of Design Manufacturer and Product: Dollken Woodtape. Subject to compliance with characteristics of Dollken Woodtape, other manufacturers' products may be accepted.
 - b. Colors and Patterns: As scheduled on the Drawings, or as otherwise selected by Architect from manufacturer's full range.
 - c. Locations, including but not limited to the following:
 - 1) Exposed and semi-exposed edges: 1 mm PVC machine applied.
 - 2) Adjustable shelves in cabinets: 1 mm PVC on front edge.
 - 3) Drawer sides, back and sub-front: 1 mm PVC.
 - 4) Miscellaneous shelves not in cabinets: 3 mm PVC, external edges and outside corners machine profiled to 1/8 inch radius.
 - 5) Door and Drawer fronts: 3mm PVC, machine applied on external edges and outside corners machine profiled to 1/8 inch radius.
 - 6) Plastic Laminate countertop edges: 3mm PVC

- B. Solid-Surfacing Material: Homogeneous solid sheets of filled plastic resin complying with ISSFA-2.
- C. Exposed Materials:
 - 1. Plastic Laminate: Type VGS.
 - a. All exposed vertical casework is to be faced with plastic laminate, including ends within knee spaces. Tops and bottoms and edges of shelves are to be faced with plastic laminate, with edge banding where indicated.
 - b. Interior finish of units with open interiors: Top, bottom, back, sides, horizontal and vertical members and adjustable shelving faces to be surfaced with VGS laminate.
 - c. Colors: As indicated on Drawings.
 - 2. Unless otherwise indicated, provide specified edgebanding on all exposed edges.
- D. Semi-exposed Materials:
 - 1. Plastic Laminate: Type VGS GP-28. Provide plastic laminate for interior faces of doors and drawer fronts.
 - 2. Melamine-Faced Particleboard: Particleboard with decorative surface of thermally fused, melamine-impregnated web and complying with LMA SAT-1.
 - a. Provide melamine-faced particleboard for semiexposed surfaces, unless otherwise indicated. Bottom of wall cabinets is to be faced with melamine laminate.
 - b. Interior finish for units with closed interiors: Top, bottom, back, sides, horizontal and vertical members to be faced with melamine laminate.
 - c. Colors: As selected by Architect from manufacturer's full range.
 - 3. Unless otherwise indicated, provide specified edgebanding on all semiexposed edges.
- E. Concealed Core Materials:
 - 1. Plywood: Hardwood plywood complying with HPVA HP-1.
 - 2. Particleboard up to 7/8-inch thick: ANSI A208.1, Grade M-2.
 - 3. Particleboard 1 inch thick and thicker: Industrial Grade, average 45-pound density, meeting ANSI A 208.1-2009, M-2 requirements.
 - 4. Plastic Laminate: Type BKL.

2.4 CABINET DESIGN

- A. Plastic Laminate Casework: Flush overlay with square edges; Plastic laminate and solid-surface tops as scheduled.
 - 1. Application: Typical, except as otherwise indicated.

2.5 CABINET FABRICATION

- A. Construction: Provide plastic-laminate-faced casework fabricated to dimensions, profiles and details shown on Drawings of the following minimum construction: AWI Custom Grade.
- B. Balanced construction of all laminated panels is required. Unfinished core stock surfaces, even on concealed surfaces (excluding edges) are not permitted.
 - 1. Cabinet Body:
 - a. Tops and bottoms are glued and doweled to cabinet sides and internal cabinet components such as fixed horizontals, rails and verticals. Minimum 6 dowels each joint for 24-inch-deep cabinets and a minimum of 4 dowels each joint for 12-inch-deep cabinets.
 - b. Tops, bottoms and sides of all cabinets are particleboard core.

2. Cabinet Back:
 - a. 1/4-inch-thick medium density fiberboard panel fully captured by the cabinet top, bottom and side panels. Finish to match cabinet interior. 3/4-inch x 4-inch particleboard rails must be placed behind the back panel at the top and bottom, and doweled to the sides utilizing 10 mm hardwood fluted dowels. A third intermediate rail will be included on all cabinets taller than 56 inches. In addition, utilize hot melt glue to secure back.
 - b. Exposed back on fixed or movable cabinets is to be 3/4-inch-thick particleboard with the exterior surface finished in VGS laminate in color selected.
 3. Base:
 - a. Fixed base and tall units must have an individual factory-applied base, constructed of 3/4-inch-thick plywood. Base is a nominal 4 inch high unless otherwise indicated on the drawings. Face with specified base finish.
 4. Base Tops:
 - a. Base units, except sink base units are to have a full sub-top.
 - b. Sink base units must have an open top and a stretcher at the front, attached to the sides. The back is to be split with removable access panel.
 5. Drawers:
 - a. Sides, back and sub-front: Minimum 1/2-inch-thick particleboard, laminated with thermally fused melamine doweled and glued into sides. Top edge banded with 1 mm PVC.
 - b. Drawer Bottom: Minimum 1/2-inch-thick particleboard laminated with thermally fused melamine, screwed directly to the bottom edges of drawer box.
 - c. Paper storage drawers: Minimum 3/4-inch-thick particleboard sides, back and sub-front laminated with thermally fused melamine. Minimum 1/2-inch-thick particleboard drawer bottoms screwed directly to the bottom edges of the drawer box. Provide PVC angle retaining bar at the rear of the drawer.
 - d. Drawer Fronts: High-pressure VGS laminate over 3/4-inch-thick particleboard, balanced with high-pressure cabinet liner CLS. Edge with 3mm PVC, machine applied, at external edges; outside corners machine profiled to 1/8-inch radius.
 6. Doors:
 - a. Doors less than 48 Inches in Height: 3/4 inch thick, with particleboard cores, plastic-laminate faced on both sides.
 - b. Doors More Than 48 Inches in Height: 1-inch thick, with particleboard cores, plastic-laminate faced on both sides.
- C. Base Cabinets, Tall Cabinets: For installation on concrete floor deck, fabricate floor-mounted casework for installation over separate continuous wood ladder-type structural cabinet support, with no cabinet body sides extending to floor.
1. Structural Cabinet Support: Cabinet sub-base, separate from cabinet body, and continuous; water resistant exterior grade plywood with concealed fastening to cabinet bottom. Ladder-type construction, of front, back, and intermediates, to form a secure and level platform to which cabinets attach.
 2. Sub-base cabinet support at exposed cabinet end panels shall be recessed 1/4 inch from face of finished end, for flush installation of finished base material.
 3. Provide 3-mm PVC edge along bottom edge of exposed cabinet end panels.
- D. Side Panels and vertical dividers will have adjustable shelf hardware at 32 mm line boring centers. Door hinges, drawer slides and pull-out shelves must be mounted in the line boring for consistent alignment
- E. Filler Strips and Closure Panels: Provide as needed to close spaces between cabinets and walls, ceilings, and indicated equipment. Fabricate from same material and with same finish as cabinet fronts.
1. Filler strips are not to be wider than 3 inches. Adjacent cabinet is required to be adjusted in width to reduce size or filler strip to 3 inches or under. Coordinate with Architect when filler is greater than 3 inches wide.

2.6 CABINET HARDWARE AND SPECIALTY ITEMS

- A. General: Provide commercial-quality, heavy-duty hardware complying with requirements indicated for each type. Refer to Drawings for hardware components not indicated below.
 - 1. Unless otherwise indicated, provide manufacturer's standard satin-finish, and powder-coated, commercial-quality, heavy-duty hardware complying with requirements indicated.
 - 2. Use threaded metal or plastic inserts with machine screws for fastening to panel core material, except where hardware is through-bolted from back side.
- B. Hinges: Matte Nickel, semiconcealed, 5-knuckle hinges complying with BHMA A156.9, Grade 1, with antifriction bearings and rounded tips.
 - 1. Basis of Design: Rockford Process Control #37655, matching existing cabinet doors.
 - 2. Doors 48 inches and over in height: 3 hinges per door.
 - 3. Provide magnetic door catch with maximum 5 pound pull, attached with screws and slotted for adjustment.
- C. Countertop support brackets: Epoxy powder coated, 11 gauge steel with integral cleat mount opening and wire management opening.
 - 1. Basis-of-Design: Hafele, work surface brackets; size as required.
- D. Under-counter support frames: Epoxy powder coated.
- E. Pulls, typical: Solid stainless steel. Basis of Design Product: EPCO Stainless steel pull, MC 401 brushed chrome, or approved equal. Provide 2 pulls for drawers more than 24 inches in width. Pull design must allow minimum of 1-1/2 inches of clearance between face of drawer and face of pull for compliance with accessibility requirements. Provide other specified hinges where indicated on drawings.
- F. Grommets for Cable Passage through Countertops: 2 1/2-inch OD, molded-plastic grommets and matching plastic caps with slot for wire passage, color as selected from manufacturer's standard.
 - 1. Basis of Design Manufacturer and Product: Mockett: EDP3, matching existing cabinets.
 - 2. Locate in the field per Architect.
- G. Wire Management Tray: Basis of Design: Humanscale, Neatlinks 2.6 inch diameter, 17 inch long, plastic cable tray.
- H. Drawer Slides: Full-extension ball-bearing, metal-channel, self-closing drawer slides, designed to be mounted on bottom edge of drawer side and to prevent rebound when drawers are closed, complying with BHMA A156.9, Type B05091, and rated for the following loads:
 - 1. Box Drawer Slides: 120 lbf.
 - 2. File Drawer Slides: 200 lbf.
 - a. Provide steel ball bearing glides with steel file hangers.
 - 3. Pencil Drawer Slides: 45 lbf.
 - 4. Keyboard Slide: 75 lbf.
- I. File Suspension System: Extruded molding integral with top of drawer box sides to accept standard hanging file folders in letter or legal size as indicated on Drawings.
- J. Coat Rods: 1 inch diameter, 14 gauge chrome plated steel installed in captive mounting hardware by cabinet manufacturer.
- K. Coat Hooks: Basis-of-Design: Mockett item #CH23 satin stainless coat and hat hook.

- L. Locks: Cam type with 5-pin tumbler, brass with satin nickel-plated finish; complying with BHMA A156.11, Type C165CB Basis of Design: CompX National Stock Locks C8055 series.
 - 1. Provide products compatible with existing cabinet keying.
 - 2. Key each room separately. Coordinate keying of each room with Owner and Architect prior to fabrication.
 - 3. Provide a minimum of two keys per lock and six master keys.
 - 4. Provide locks at all cabinets, both doors and drawers, unless otherwise indicated.
 - 5. Provide elbow catch or chain bolt to secure inactive door on all locked pairs of cabinet doors.
- M. Adjustable Shelf Supports: Basis of Design: EPCO vinyl covered shelf support with 1/4 inch pin. Model 521-N.
 - 1. Provide 4 (four) per shelf.
 - 2. Supports fit into cabinet end panels and vertical dividers, adjustable on 32 mm centers to interface pre-drilled holes.
 - 3. Supports must carry structural load to 300 pounds per support without failure.
- N. CPU Holder: Basis-of-Design: Mockett, CPU 2A, adjustable 14-inch Accuride slide; Universal design; color selected by Architect from manufacturer's full range.
 - 1. Provide as indicated on drawings.
- O. Tag Holder: Basis-of-Design: Mockett, Model CF2-94; 4-3/4 by 1-7/8 inches; Finish: Satin Aluminum
 - 1. Provide as indicated on drawings.
- P. Paper Towel Dispenser: Basis of Design: Satin finish stainless steel; capacity 300 c-fold or multifold towels; Bobrick Model B-526 TrimLine Countertop Dispenser

2.7 COUNTERTOPS, SHELVES AND SINKS

- A. Countertops, General: Provide units with smooth surfaces in uniform plane free of defects. Make exposed edges and corners straight and uniformly beveled. Provide front and end overhang of 1 inch, with continuous drip groove on underside 1/2 inch from edge. Provide all outside corners with a 1-inch radius. Radius is not shown on Drawings.
 - 1. Countertop Materials: Plastic Laminate, Solid Surface. Location for each type of material is shown on Drawings.
- B. Sinks, General: Stainless steel sinks in countertops are to be provided by Plumbing Contractor.
 - 1. GC's casework fabricator to provide sink and plumbing fixture cutouts. PC to furnish full-size template to GC for coordination.
- C. Plastic Laminate Countertops and Shelves:
 - 1. Countertops: Plastic-laminate sheet, complying with NEMA LD 3-2005, shop bonded with waterproof adhesive to both sides of 1-1/2-inch-thick core. Sand surfaces to which plastic laminate is to be bonded.
 - 2. Plastic-Laminate Shelves: Plastic-laminate sheet complying with NEMA LD 3, shop bonded with waterproof adhesive to both sides and both edges of 3/4-inch-thick particleboard for shelves up to 36" wide; 1-inch particleboard for shelves over 36 inches wide. Sand surfaces to which plastic laminate is to be bonded. Attach 1 mm PVC edge banding to front edge.
 - 3. Plastic-Laminate Type for Flat Countertops and for splash edges: HGS 1.2 mm (0.048-Inch).
 - 4. Plastic-Laminate Type for Shelves: HGL.
 - 5. Countertop Core: 1-1/2 inch hardwood-faced plywood, medium-density-overlaid plywood, or particleboard complying with ANSI A208.1, Grade M-2, Exterior Glue.
 - a. At sink locations, countertop core is to be 1-1/2 inch thick ANSI A208.1-2009 M2 moisture resistant (MR) particleboard, 47 pound average density.
 - 6. Adhesive for Bonding Plastic Laminate: Manufacturer's standard.
 - 7. Colors, Textures, and Patterns: As shown on Drawings.

8. Finish front and side edges of countertops with 3 mm edge banding.
9. Splashes: Faces and top edges of backsplashes and end splashes surfaced with same plastic laminate as top.
 - a. Except as otherwise noted, fabricate top and backsplash as separate plastic laminate pieces with 3mm PVC edgebanding at exposed edge. Where indicated, provide separate end splashes fitted to top.
 - b. Provide 3-mm PVC edging on front edge of top, on top edges of backsplashes and end splashes, and on ends of tops and splashes.

2.8 ELECTRICAL FITTINGS FOR CASEWORK

- A. Coordinate with installation of metal housings, receptacles, terminals, switches, pilot lights, device plates, accessories, and other electrical items required for mounting on or in any of the casework as indicated on Electrical Drawings.
- B. Electrical Service Fittings: Provide units complete with metal housings, receptacles, terminals, device plates, accessories, and gaskets required for mounting on casework.
 1. Receptacles: Comply with NEMA WD 1, NEMA WD 6, FS W-C-596, and UL 498. Duplex type, Configuration 5 20R.
 - a. Receptacle Grade: General grade, unless otherwise indicated.
 - b. GFCI Receptacles: Comply with UL 943, General grade.
 2. Recessed-Type Fittings: Provide with galvanized steel boxes.
 3. Cover Plates: Provide satin finish, chrome-plated cover plates with formed, beveled edges.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas, with Installer present, for compliance with requirements for installation tolerances, location of blocking and reinforcements, and other conditions affecting performance of plastic-laminate laboratory casework.
 1. Verify location and sizes of utility rough-in associated with work of this section.
 2. Notify the Architect and Construction Manager in writing of unsatisfactory conditions.
 3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF CABINETS

- A. Quality Standard: Install woodwork to comply with AWI Section 1700 for Premium Grade for Modular Cabinets.
- B. Coordinate Work of this Section with related work of other Sections and by other Prime Contractors as necessary to obtain proper installation of all items.
- C. General:
 1. Use factory-trained Installer. Erect casework, rigid, plumb, level, in proper relation to adjacent construction. Install scribes, fillers and trim as required. Cut out for all sink and electrical outlets as required.
 2. Use concealed joint fasteners to align and secure adjoining cabinet units.
 3. Use fixture attachments in concealed locations for wall mounted components.
 4. Install level, plumb, and true; shim as required, using concealed shims.
 5. Provide filler pieces and scribe for accurate fit where casework abuts other finished work and to close spaces between cabinets and walls, ceilings, and equipment. Fabricate from same material and with same finish as cabinets and install as an integral part of assembly.

6. Conceal fasteners where practicable. Countersink anchorage devices at exposed locations. Conceal with solid plugs to match surrounding finish, flush with surrounding surfaces.
 7. Provide all necessary components, attachments, accessories, and appurtenances for a complete, continuous and finished installation.
 8. Provide such custom fabrications and assemblies, and provide custom field scribing, coping, jointing, fitting, or other field modification as specified in Division 06 "Architectural Woodwork and Finish Carpentry," as shown on Drawings, or as otherwise required for a complete, continuous and finished installation
 9. Adjust and align hardware so moving parts operate freely and contact points meet accurately. Allow for final adjustment after installation.
 10. Adjust casework and hardware so doors and drawers operate smoothly without warp or bind. Lubricate operating hardware as recommended by manufacturer
- D. Base Cabinets: Set cabinets straight, level, and plumb. Adjust top rails and subtops within 1/16 inch of a single plane. Fasten cabinets to utility-space framing, partition framing, wood blocking, or reinforcements in partitions with fasteners spaced not more than 24 inches o.c. Fasten adjacent cabinets together with joints flush, tight, and uniform. Align similar adjoining doors and drawers to a tolerance of 1/16 inch.
1. Where base cabinets are not installed adjacent to walls, fasten to floor or structural sub-base platform at toe space with fasteners spaced 24 inches o.c. Secure sides of cabinets to floor or Sub Base, where they do not adjoin other cabinets, with not less than two fasteners.
 2. Structural Sub-Base Platform: Secure to floor and to partition framing or blocking, using appropriate fasteners at spacing and locations in accordance with approved submittals.
- E. Wall Cabinets: Hang cabinets straight, level, and plumb. Adjust fronts and bottoms within 1/16 inch of a single plane. Fasten to hanging strips, masonry, partition framing, blocking, or reinforcements in partitions. Fasten each cabinet through back, near top, at not less than 24 inches o.c. Align similar adjoining doors to a tolerance of 1/16 inch.
1. Fasten through back, near top and bottom, at ends, and not more than 16 inches o.c. with No. 10 wafer-head screws sized for 1-inch penetration into wood framing, blocking, or hanging strips, or No. 10 wafer-head sheet metal screws through metal backing or metal framing behind wall finish. Use toggle bolts and expansion anchors, as appropriate, at masonry or plaster on metal lath.
- F. Install hardware uniformly and precisely. Set hinges snug and flat in mortises.
- G. Adjust casework and hardware so doors and drawers align and operate smoothly without warp or bind and contact points meet accurately. Lubricate operating hardware as recommended by manufacturer.

3.3 INSTALLATION OF COUNTERTOPS

- A. Abut top and edge surfaces in one true plane with flush hairline joints and with internal supports placed to prevent deflection. Locate joints only where shown on Shop Drawings.
1. Secure field joints in plastic-laminate countertops with concealed clamping devices located within 6 inches of front and back edges and at intervals not exceeding 24 inches. Tighten according to manufacturer's written instructions to exert a constant, heavy-clamping pressure at joints.
- B. Fastening:
- C. Field Jointing: Where possible, make in the same manner as shop jointing using dowels, splines, adhesives, and fasteners recommended by manufacturer. Prepare edges to be joined in shop so Project-site processing of top and edge surfaces is not required. Locate field joints where shown on Shop Drawings.
1. Secure countertops to cabinets with Z-type fasteners or equivalent, using two or more fasteners at each cabinet front, end, and back.
 2. Where necessary to penetrate countertops with fasteners, countersink heads approximately 1/8 inch and plug hole flush with material equal to countertop in chemical resistance, hardness, and appearance.

- D. Secure backsplashes and side splashes to tops with concealed metal brackets at 16 inches o.c. and walls with adhesive.
- E. Seal junctures of top, splash, and walls with mildew-resistant silicone sealant or another permanently elastic sealing compound recommended by countertop material manufacturer.
- F. Provide required holes and cutouts for gas, water and electrical service fittings.
- G. Seal unfinished edges and cutouts in plastic-laminate and solid surface countertops supported on particle board or plywood with a heavy coat of polyurethane varnish.
- H. Carefully dress joints smooth, remove surface scratches, and clean entire surface.

3.4 INSTALLATION OF SINKS

- A. Drop-in Installation of Stainless Steel Sinks: Use casework manufacturer's recommended adjustable support system for cabinet-type installations. Set top edge of sink unit in countertop manufacturers' recommended chemical-resistant sealing compound or adhesive and firmly secure to produce a tight and fully leakproof joint. Adjust sink and securely support to prevent movement. Remove excess sealant while still wet and finish joint for neat appearance.

3.5 INSTALLATION OF ACCESSORIES

- A. Install accessories according to Shop Drawings and manufacturer's written instructions.
- B. Install shelf standards plumb and at heights to align shelf brackets for level shelves. Install shelving level and straight, closely fitted to other work where indicated.

3.6 INSTALLATION OF SERVICE FITTINGS

- A. Coordinate with requirements in Divisions 20, 22, 26 and 27 Sections for installing water and gas service fittings, piping, electrical devices, and wiring.

3.7 ADJUSTING

- A. Test installed work for rigidity and ability to support loads.
- B. Adjust moving or operating parts to function smoothly and correctly.
- C. Provide a one-time training session outlining casework features, adjustments and maintenance.

3.8 CLEANING AND PROTECTING

- A. Repair or remove and replace defective work as directed on completion of installation.
- B. Clean finished surfaces, touch up as required, and remove or refinish damaged or soiled areas to match original factory finish, as approved by Architect.
- C. Clean plastic surfaces, repair minor damage as directed by plastic laminate manufacturer. Replace other damaged parts or components.

- D. Instruct Owner's designated personnel in proper handling, assembly, adjusting, transporting, storage, and maintenance of units.
- E. Protection: Provide 6-mil plastic or other suitable water-resistant covering over countertop surfaces. Tape to underside of countertop at a minimum of 48 inches o.c. Remove protection at Substantial Completion.
 - 1. Observe procedures and precautions for protection of casework and countertops from damage during construction, until acceptance of work by Owner.

END OF SECTION 12 3553