MOORE COUNTY NEW COURTHOUSE
AND RENOVATION
CARTHAGE, NORTH CAROLINA

IFB 2021-09
VOLUME 1 OF 2

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Prebid Question Form: (Use on-line form. To access form go to www.moseleyarchitects.com, “Bidding”, “Submit a Question”).

Geotechnical Report: (Available by request. Follow the “Submit a Question” procedure above to request a copy).

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CARTHAGE, NORTH CAROLINA
Architect’s Project No: 582405

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Sealed bids for construction of the MOORE COUNTY NEW COURTHOUSE AND RENOVATION in Carthage, North Carolina will be received by Moore County Purchasing, attn: Terra Vuncannon, at 206 South Ray Street Carthage NC, 28327; until 4:00 p.m., local prevailing time, April 22nd, 2021, and then publicly opened and read immediately thereafter. A drop box is available in the lobby at 206 South Ray Street for bids or they may be hand-delivered.

Bids received after the announced time and date for submittal, whether by mail or otherwise, will be rejected. Bidders are responsible for ensuring their Bid is received before the deadline indicated. Bids submitted by telephone, email, text message, or facsimile shall not be accepted.

Due to COVID 19 all attendees MUST adhere to County and CDC guidelines for protective measures. Attendees must wear a face covering and maintain social distance protocol. A temperature kiosk is in the lobby and staff will provide a screening checklist prior to entry to the bid opening.

The Project generally consists of the construction of a new multi-story courthouse in downtown Carthage and a renovation of the existing courthouse. Construction is anticipated to begin in Summer 2021.

Responses to any questions/clarifications will be in the form of addenda if required. The last day for questions/clarifications shall be placed by the end of the day at 5:00 PM on April 12, 2021.

Beginning on March 19, 2021, all Bidders may obtain, and/or examine electronic Bidding Documents by visiting moseleyarchitects.com, “Bidding.” In order for Moseley Architects to maintain an accurate list of planholders, each Offeror shall forward and complete the following required steps:

1. Visit moseleyarchitects.com, click the “Bidding” tab at the top of the page, scroll to Moore County New Courthouse and Renovation click on “Bid Documents”, and follow the instructions to “Request a key.” Once complete, access to the electronic Bidding Document files can be obtained, saved, and or examined as needed. Addenda for the Project will be posted to the above listed website.

A MANDATORY Pre-Bid Conference will be held at 10:00 am on March 26th, 2021 in the BOC Courtroom in the historic courthouse at 1 Courthouse Square, Carthage, NC 28327. The Pre-Bid is mandatory for General Contractors only, although sub-contractors are also encouraged to attend.

Bidding documents and addenda may also be obtained through the Moore County NC website at www.moorecountync.gov/financial-services/purchasing.

Any questions relating to the Bidding Documents shall be directed in writing to Terra Vuncannon (Purchasing Manager) at tvuncannon@moorecountync.gov, no later than 5:00 pm on April 12, 2021.

The County reserves the right to reject any and/or all bids.

END OF INVITATION TO BID
Instructions to Bidders

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

Moore County New Courthouse and Renovation – IFB 2021-09

THE OWNER:
(Name, legal status, address, and other information)

Moore County
Post Office Box 905
One Courthouse Square
Carthage, North Carolina 28327

THE ARCHITECT:
(Name, legal status, address, and other information)

Moseley Architects P.C.
6210 Ardrey Kell Road
The Hub at Waverly
Suite 425
Charlotte, North Carolina 28277

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8 ENUMERATION OF THE PROPOSED CONTRACT DOCUMENTS

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, Instructions to Bidders, supplementary instructions to bidders, the bid form, and any other bidding forms. 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 (General, Supplementary and other Conditions), Drawings, Specifications, all Addenda, 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. Definitions, but are subject to and governed by definitions under applicable laws and regulations.

§ 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 in conformance with 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.

§ 1.10 A Responsible Bidder means a person or entity that has the capability, in all respects, to perform fully the Contract requirements and the moral and business integrity and reliability that will assure good faith performance.

§ 1.11 A Responsive Bidder means a person or entity that has submitted a Bid which conforms in all material respects to the Invitation to Bid and requirements of the Bidding Documents.

§ 1.12 An informality means a minor defect or variation of a Bid from the exact requirements of the Invitation to Bid and of the Bidding Documents which does not affect the price, quality, quantity or delivery schedule for the goods, services or construction being procured.

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;
   .5 the Bid is based upon the materials, equipment, and systems required by the Bidding Documents without exception; and
   .6 the Bidder has read and understands the provisions for liquidated damages, if any, set forth in the form of Agreement between the Owner and Contractor.
.7 The Bidder has carefully reviewed the Bidding Documents and has verified that all of the Bidding Documents received are complete. The Bidder shall notify the Architect immediately if received Bidding Documents are not complete.

.8 The Bidder has familiarized itself with all applicable federal, state and local laws, ordinances, rules and regulations that in any manner may affect cost, progress or performance of the Work; the Bidder has obtained the necessary licenses for bidding, if applicable, and is licensed or certified to perform the Work.

.9 The Bidder shall pay all county, city, state and federal taxes required by laws in effect at the time the Bids are received and resulting from the Work or traceable thereto. Said taxes shall not be in addition to the Contract price between the Owner and the Bidder, as the taxes shall be an obligation of the Bidder and not of the Owner, and the Owner shall be held harmless and indemnified for the same by the Bidder.

.10 The failure or omission of any Bidder to receive or examine any form, instrument, addendum or other documents, or to acquaint itself with conditions existing at the site(s), shall in no way relieve any Bidder from any obligations with respect to its Bid or to the Contract.

.11 The Bidder agrees that its Bid shall be based on products and work indicated in the Bidding Documents.

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.)

§ 3.1.2 Any required deposit shall be refunded to Bidders who submit a bona fide Bid and return the paper Bidding Documents in good condition within ten days after receipt of Bids. The cost to replace missing or damaged paper documents will be deducted from the deposit. A Bidder receiving a Contract award may retain the paper Bidding Documents, and the Bidder’s deposit will be refunded.

§ 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.

§ 3.1.2.1 When the Bidding Documents are returned by the Bidders to the Architect or Owner, the shipping or postage shall be prepaid by the Bidder. The Bidder’s deposit will not be refunded if the deposit sum is non-refundable as indicated in the Advertisement or Invitation to Bid.

§ 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.

§ 3.1.4.1 Every Bidder is responsible to review all Bidding Documents received to verify that each set contains a complete set of Contract Documents. Any incomplete Bidding Documents shall be immediately returned to the Architect.

§ 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 the 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 by the Bidder in writing and shall be received by the Architect at least seven days prior to the date for receipt of Bids.

(Indicate how, such as by email, website, host site/platform, paper copy, or other method Bidders shall submit requests for clarification and interpretation.)
§ 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 The Bidder assumes all risks using a price or bid proposal representing a product or Work that is not indicated in the Bidding Documents and, if the Bidder elects to use that product or Work he shall submit it in accordance with the Division 1 requirements, and as stated herein. If that product or Work is rejected, the Bidder shall provide a product or Work indicated in the Bidding Documents at its cost. The Architect and the Owner shall not consider any requests for additional payments to provide the Work as required by the Contract Documents.

§ 3.3.2 Substitution Process
§ 3.3.2.1 Written requests for substitutions shall be received by the Architect at least ten days prior to the date for receipt of Bids. Requests shall be submitted in the same manner as that established for submitting clarifications and interpretations in Section 3.2.2.

§ 3.3.2.2 Bidders shall submit substitution requests on a Substitution Request Form if one is provided in the Bidding Documents.

§ 3.3.2.3 If a Substitution Request Form is not provided, requests 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.

§ 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.

§ 3.3.5 No substitutions will be considered after the Contract award unless specifically provided for in the Contract Documents.

§ 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.)

Copies of the Addendum will be posted electronically and a notice of posting will be sent via email to each plan holder of record.

§ 3.4.2 Addenda will be available where Bidding Documents are on file.

§ 3.4.3 Addenda will be issued no later than four days 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.

§ 3.4.3.1 Depending on the nature of an Addendum (clarifications, limited scope of revisions, added manufacturers) issued less than four days prior to receipt date, the Architect, in its professional judgment, reserves the right to issue said Addendum without postponement of the bid date. However, if in the professional judgment of the Architect, the information contained in the Addendum would be such that it would be unfair or unreasonable to prepare a bid proposal...
§ 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. After the bid issue date, all communications between the County and prospective Bidders shall be in writing. No oral questions shall be accepted. Any inquiries, requests for interpretation, technical questions, clarifications, or additional information shall be directed to Terra Vuncannon at tvuncannon@moorecountync.gov. All questions concerning this BID shall reference the BID number, section, and page number. Questions and responses affecting the scope of the goods will be provided to all prospective Bidders by issuance of an Addendum. It is the responsibility of the bidder to review addenda on the County website at www.moorecountync.gov.

ARTICLE 4   BIDDING PROCEDURES
§ 4.1 Preparation of Bids
§ 4.1.1 Bids shall be submitted on the forms included with or identified in 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. Where so indicated by the bid form, all amounts shall be expressed in figures only.

§ 4.1.4 Edits to entries made on paper bid forms must be initialed by the signer of the Bid. All changes made by the Bidder to the bid form or outside of the envelope shall be signed or initialed by the Bidder. Bids containing any conditions, omissions, erasures, alterations, or items not called for in the Bid, may be rejected by the Owner as being incomplete or nonresponsive.

§ 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. If the Bidder does not desire to bid on an Alternate, enter the words "No Bid". If the Owner elects to accept an Alternate, all Bidders submitting a "No Bid" for the Alternate selected by the Owner will be ruled nonresponsive and their Bid will not be considered in the award of the Contract. If the Bidder does not enter an Alternate Bid amount, "No Change", or "No Bid" for all requested Alternates, and leaves the Alternate information blank, their Bid will be considered nonresponsive and will not be considered in the award of the Contract.

§ 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 legal status 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 where the Project is located. Each copy of the Bid shall be signed 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, certify the agent’s authority to bind the Bidder.

§ 4.1.8 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: bid security in the form of either a cashier’s or certified check or an acceptable Bid Bond in the amount of five percent (5%) of the Bid amount, and made payable to Moore County, North Carolina. The bid security is a guarantee that if the Contract is awarded by the Owner to the Bidder, the Bidder shall enter into the Contract with the Owner for the Work mentioned in this Bid or forfeit the bid security to the Owner, not as a penalty, but as liquidated damages. No forfeiture under a bid security shall exceed the lesser of (i) the difference between the Bid for which the bid security was written and the next low Bid of another Bidder, or (ii) the face amount of the bid security. (Insert the form and amount of bid security.)
§ 4.2.2 All bonds shall be executed by a surety company selected by the Bidder which is legally authorized to do business in the State of North Carolina, and the bond shall be the same in both form as well as substance as AIA Document A310, Bid Bond. The Bidder shall require the attorney-in-fact, who executed the required bond on behalf of the surety company, to affix thereto a certified and current copy of the power of attorney. The bond premium shall be paid by the Bidder and the cost shall be included in the Bid.

§ 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. In the event the Owner fails to comply with Section 6.2, the amount of the bid security shall not be forfeited to the Owner.

§ 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 The Owner will have the right to retain the bid security of Bidders to whom an award is being considered until (a) the Contract has been executed and bonds, if required, have been furnished; (b) the specified time has elapsed so that Bids may be withdrawn; or (c) all Bids have been rejected. However, if no Contract has been awarded or a Bidder has not been notified of the acceptance of its Bid, a Bidder may, beginning 61 days after the opening of Bids, withdraw its Bid and request the return of its bid security.

§ 4.3 Submission of Bids
§ 4.3.1 A Bidder shall submit its Bid as indicated below:
(Indicate how, such as by website, host site/platform, paper copy, or other method Bidders shall submit their Bid.)

1. Sealed Bids will be received until 4:00 pm (April 22, 2021) from qualified vendors for Moore County Court Facility Construction. For your convenience, a Bid Drop-Off Box is located in the lobby at 206 South Ray Street. A Mandatory Pre-bid will be held at (March 26, 2021/time TBD) at the 2nd floor Community Room of the Rick Rhyme Public Safety Center located at 302 South McNeil Street, Carthage, NC 28327. Due to the COVID 19 event all attendees MUST adhere to County and CDC guidelines for protective measures. Attendees must wear a face covering and maintain social distance protocol. A temperature kiosk is in the lobby and staff will provide a screening checklist prior to entry to the pre-bid meeting.

2. Sealed bids shall be sent to the below address. All inquiries for information concerning Instructions for Proposals, Bid Submission Requirements or Procurement Procedures shall be directed to (in writing):

Terra Vuncannon, Purchasing Manager
206 South Ray Street
Carthage, NC 28327
(910) 947-7118 (Telephone)
tvuncannon@moorecountync.gov

§ 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."IFB 2021-09 SEALED BID AND BID BOND ENCLOSED" on the face thereof.

§ 4.3.2.2 In compliance with N.C.G.S. 143-128 (d) Bidders shall identify on their bid the subcontractors they have selected for the subdivisions or branches of work identified and defined in N.C.G.S, 143-128(a) but briefly referred to as (1) Plumbing, and (2) Mechanical, and (3) Electrical. A Bidder whose bid is accepted shall not substitute any person as subcontractor in the place of the subcontractor listed in the original bid, except (i) if the listed subcontractor’s bid is later determined by the Contractor to be nonresponsible or nonresponsive or the listed subcontractor refuses to enter into a
contract for the complete performance of the bid work, or (ii) with the approval of the awarding authority for good cause shown by the Contractor. The terms, conditions, and requirements of each contract between the contractor and a subcontractor performing the work under a subdivision or branch of work listed above shall incorporate by reference the terms, conditions, and requirements of the Contract between the Contractor and the Owner.

§ 4.3.2.3 Submit a single copy of the bid form and bid bond.

§ 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 not be accepted.

§ 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 In the solicitation or awarding of Contracts, the Owner shall not discriminate because of the race, religion, color, sex, age, disability or national origin of the Bidder. The Owner welcomes and encourages the participation of small businesses and businesses owned by women and minorities in procurement transactions made by the Owner.

§ 4.3.7 Trade secrets or proprietary information submitted by a Bidder in connection with a procurement transaction, shall not be subject to public disclosure under the Freedom of Information Act; however, the Bidder must invoke the applicable protection, prior to or upon submission of the data or other materials, and must identify the data or other materials to be protected and state the reasons why protection is necessary. The Owner will not accept responses to the Invitation to Bid in cases where the Bidder declares the entire response to the Invitation to Bid to be proprietary information. The Bidder must designate, in the smallest increments possible, that part of the Bid which is deemed to be proprietary.

§ 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. A Bid may not be modified, withdrawn or canceled by the Bidder after the time and date designated for the receipt of Bids and for sixty-one (61) calendar days thereafter except as provided in subparagraph 4.4.3 of these Instructions to Bidders and each Bidder so agrees in submitting a Bid.

§ 4.4.1.1 A Bid may be modified or withdrawn by the Bidder any time prior to the time and date set for the receipt of Bids. The Bidder shall notify the Owner in writing of its intentions. Such notice shall be in writing over the signature of the person who submitted the original Bid and the notice shall be received and date and time stamped by the Owner on or before the date and time set for the receipt of Bids.

§ 4.4.1.2 Bidders may indicate modifications to Bid amounts by writing the modification on the outside of the sealed envelope containing the Bid and initialing the modification. Only the Bid amount may be modified by this means; no other qualifications may be made.

§ 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 within two days, or pursuant to a timeframe specified by the law of the jurisdiction where the Project is located, requesting withdrawal of its Bid. Upon providing evidence of such error to the reasonable satisfaction of the Architect, 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: A Bidder may withdraw its Bid from consideration if the Bid price was substantially lower than other Bids due solely to a mistake therein, provided the Bid was submitted in good faith, and the mistake was a clerical mistake as opposed to a judgment mistake, and was actually due to an unintentional arithmetic error or an unintentional omission of a quantity of Work, labor made directly in the compilation of a Bid which unintentional arithmetic error or unintentional omission can be clearly shown by objective evidence drawn from
inspection of original work papers, documents and materials used in the preparation of the Bid sought to be withdrawn. If a Bid contains both clerical and judgment mistakes, a Bidder may withdraw its Bid from consideration if the Bid would have been substantially lower than the other Bids due solely to the clerical mistake, that was an unintentional arithmetic error or an unintentional omission of a quantity of Work, labor or material made directly in the compilation of a Bid which shall be clearly shown by objective evidence drawn from inspection of original work papers, documents and materials used in the preparation of the Bid sought to be withdrawn.

§ 4.4.3.1 The Bidder shall submit to the Owner its original work papers, documents and materials used in the preparation of the Bid within one (1) day after the date fixed for submission of Bids. Such work papers shall be delivered to the Owner by the Bidder in person or by registered mail at or prior to the time fixed by the Owner for the opening of Bids. The Contract shall not be awarded by the Owner until such period has elapsed. Such mistake shall be proved only from the original work papers, documents, and materials delivered to the Owner as required herein.

§ 4.4.3.2 No Bidder who is permitted to withdraw a Bid shall for compensation, supply any material or labor to or perform any subcontract or other work agreement for the person or firm to whom the Contract is awarded or otherwise benefit directly or indirectly from the performance of the Work for which the withdrawn Bid was submitted.

§ 4.4.3.3 If a Bid is withdrawn under authority of this section, the next lowest responsive and responsible Bidder shall be deemed to be the low Bidder.

§ 4.4.3.4 When the procedure set forth in the paragraphs above is utilized, original work papers, documents, and materials used in the preparation of the Bid must be submitted in an envelope or package separate and apart from the envelope containing the Bid marked clearly as to the contents.

§ 4.4.3.5 If the Owner denies the withdrawal of a Bid under the provisions of this section, it shall notify the Bidder in writing stating the reasons for its decision and award the Contract to such Bidder at the Bid price, provided such Bidder is a responsible and responsive Bidder.

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. All Bids received on time in accordance with the Bidding Document requirements shall be opened and publicly read aloud. Any Bidder, upon request, shall be afforded the opportunity to inspect Bid records within a reasonable time after the opening of all Bids but prior to award, except in the event that the public body decides not to accept any of the Bids and to reopen the Contract. Otherwise, Bid records shall be open to public inspection only after award of the Contract. Any inspection of procurement transaction records shall be subject to reasonable restriction to ensure the security and integrity of the records.

§ 5.2 Rejection of Bids

Unless otherwise prohibited 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 by the Bidding Documents, or a Bid which is in any way incomplete or not in conformance with requirements of the Bidding Documents is subject to rejection.

§ 5.3 Acceptance of Bid (Award)

§ 5.3.1 It is the intent of the Owner to award a Contract to the lowest responsive and responsible Bidder. Bidder provided the Bid has been submitted in accordance with the requirements of the Bidding Documents. Unless otherwise prohibited by law, the Documents and does not exceed the funds available. The 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, is in the Owner’s own best interests.

§ 5.3.1.1 In determining the lowest responsible Bidder, the Owner may consider, among other things, the Bidder’s past performance, conduct on other contracts, and other information provided by the Bidder, including in the Contractor’s Pre-Qualification Package, if requested.

§ 5.3.2 Unless otherwise prohibited by law, the 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 In case of a tie Bid, preference may be given to goods, services, and construction produced in Moore County or the State of North Carolina or provided by persons, firms or corporations having principal places of business in Moore County or the State of North Carolina, if such a choice is available; otherwise the tie shall be decided by lot. A Moore County business may be given preference over a State of North Carolina business, if such a choice is available.

§ 5.3.4 If a Contract is to be awarded, the Owner will give the Bidder a Notice of Award within sixty (60) calendar days after the day of the Bid opening.

§ 5.4 NEGOTIATION WITH LOWEST RESPONSIVE AND RESPONSIBLE BIDDER

§ 5.4.1 If award of a Contract to the lowest responsive and responsible Bidder is precluded because of limitations on available funds, the Owner reserves the right to negotiate the Bid amount with the lowest responsive, responsible Bidder to obtain a Contract amount within the available funds. The negotiations may involve changes in either the features or scope of the Work. Such negotiations may include reducing the quantity, quality, or other cost saving mechanisms involving items in the Bid amount, including unit prices (if any) and/or allowances (if any) that affect the Bid amount, and/or Alternates (if any).

§ 5.4.2 The Owner shall notify the lowest responsive and responsible Bidder that such a situation exists and the Owner and Bidder shall then conduct their negotiations in person, by mail, by telephone or by any means they find convenient.

§ 5.4.3 If an acceptable Contract can be negotiated, the changes to the Bid amount and Bidding Documents agreed upon in the negotiations shall be summarized in a "Post Bid Addendum," and included in the Contract.

§ 5.4.4 If the Owner and the lowest responsive and responsible Bidder cannot negotiate a Contract within available funds, the Owner shall terminate negotiations and reject all bids.

ARTICLE 6 POST-BID INFORMATION

§ 6.1 Contractor's Qualification Statement

Bidders to whom award of a Contract is under consideration shall submit to the Architect, upon request and within the timeframe specified by the Architect, a properly executed AIA Document A305™, Contractor’s Qualification Statement, unless such a Statement has been previously required and submitted for this Bid.

§ 6.2 Owner's Financial Capability

A Bidder to whom award of a Contract is under consideration may request in writing, fourteen days prior to the expiration of the time for withdrawal of Bids, that the Owner furnish to the Bidder reasonable evidence that financial arrangements have been made to fulfill the Owner’s obligations under the Contract. The Owner shall then furnish such reasonable evidence to the Bidder no later than seven days prior to the expiration of the time for withdrawal of Bids. Unless such reasonable evidence is furnished within the allotted time, the Bidder will not be required to execute the Agreement between the Owner and Contractor.

§ 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 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, at the Bidder’s option, (1) withdraw the Bid or (2) submit an acceptable substitute person or entity. The Bidder may also submit any required entity with an adjustment in the Base Bid or Alternate Bid to account for cover the difference in cost occasioned by such
substitution, such substitution, provided such adjustment in cost is justifiable and reasonable. The Owner may accept the adjusted bid price or disqualify the Bidder. In the event of either withdrawal or 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 has 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. Owner.

ARTICLE 7 PERFORMANCE BOND AND PAYMENT BOND

§ 7.1 Bond Requirements

§ 7.1.1 If stipulated in the Bidding Documents, the Bidder shall furnish bonds. The successful Bidder shall furnish a Performance Bond covering the faithful performance of the Contract and a Payment Bond covering the payment of all obligations arising thereunder. Each bond shall be written for the full value of the Contract, including all adjustments as authorized by Change Order.

§ 7.1.2 If the furnishing of such bonds is stipulated in the Bidding Documents, the cost 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. All bonds shall be written by sureties or insurance companies licensed to do business in the State of North Carolina.

§ 7.1.3 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. Bond premiums shall be paid by the successful Bidder and the cost shall be included in the Bid price. Any subsequent bond premium costs shall be as authorized by Change Order.

§ 7.1.4 Unless otherwise indicated below, the Penal Sum of the Payment and Performance Bonds shall be the amount of the Contract Sum.

(If Payment or Performance Bonds are to be in an amount other than 100% of the Contract Sum, indicate the dollar amount or percentage of the Contract Sum.)

§ 7.2 Time of Delivery and Form of Bonds

§ 7.2.1 The successful 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 along with the signed Contract (Agreement) forms and the required Certificate of Insurance to the Owner within fifteen (15) calendar days after the Notice of Award of the Contract.

§ 7.2.2 Unless otherwise provided, the bonds shall be written on AIA Document A312, Performance Bond and Payment Bond. Each bond shall be written for the full amount of the Contract.

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

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

ARTICLE 8 ENUMERATION OF THE PROPOSED CONTRACT DOCUMENTS

ARTICLE 8 FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR

§ 8.1 Copies of the proposed Contract Documents have been made available to the Bidder and consist of the following documents:

1. AIA Document A101™–2017, Unless otherwise required in the Bidding Documents, the Contract for the Work will be written on AIA Document A101, Standard Form of Agreement Between Owner and Contractor, unless otherwise stated below.

(Insert the complete AIA Document number, including year, and Document title.)


(Insert the complete AIA Document number, including year, and Document title.)
3 AIA Document A201™–2017, General Conditions of the Contract for Construction, unless otherwise stated below. Contractor Where the Basis of Payment Is a Stipulated Sum.
(Insert the complete AIA Document number, including year, and Document title.)

4 AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, dated as indicated below.
(Insert the date of the E203-2013.)

5 Drawings § 8.2 The Contractor recognize that time is of the essence and that the Owner will suffer financial loss if the Work is not completed by the Substantial Completion date required or as may be amended by the Contract Documents. Contractor recognizes the delays, expenses and damages that are involved in proving in a legal proceeding the actual loss that may be suffered by the Owner if the Work is not completed on time. Accordingly, the Owner and the Contractor agree, stipulate and fix as liquidated damages if delayed, but not as a penalty, the sum indicated on the Bid Form that the Contractor together with the Contractor’s surety shall pay the Owner for each calendar day or part thereof that expires after the date required or as may be amended by the Contract Documents for the Substantial Completion of the Work.

  Number Title Date

6 Specifications
Section Title Date Pages

7 Addenda:
Number Date Pages

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

[ ] AIA Document E204™–2017, Sustainable Projects Exhibit, dated as indicated below.
(Insert the date of the E204-2017.)

[ ] The Sustainability Plan:
Title Date Pages

[ ] Supplementary and other Conditions of the Contract:
Document Title Date Pages

9 Other documents listed below:
(List here any additional documents that are intended to form part of the Proposed Contract Documents.)
§ 8.3 The Contractor recognizes that time is of the essence and that the Owner will suffer financial loss if the Work is not completed by the Final Completion date required or as may be amended by the Contract Documents. The Contractor recognizes the delays, expenses and damages that are involved in proving in a legal proceeding the actual loss that may be suffered by the Owner if the Work is not completed on time. Accordingly, the Owner and the Contractor agree, stipulate and fix as liquidated damages if delayed, but not as a penalty, the sum indicated on the Bid Form that the Contractor together with the Contractor’s surety shall pay the Owner for each calendar day or part thereof that expires after the date required or as may be amended by the Contract Documents for the Final Completion of the Work.
SECTION 004100 - BID FORM **IFB-2021-09**

DATE: __________

TO: Terra Vuncannon, Purchasing Manager
206 South Ray Street
Carthage, NC 28327

FROM: ____________________________
(Bidder’s Name)

_______________________________
(Bidder’s Address)

_______________________________
(Bidder’s Address)

FOR: MOORE COUNTY NEW COURTHOUSE AND RENOVATION

Having carefully examined the site, and all of the Bidding and Contract Documents, and in compliance with the “Invitation to Bid” and “Instructions to Bidders” the undersigned proposes to provide all labor, materials, supplies, equipment, services, and perform all Work necessary for the construction of this Project in accordance with the Bid Documents, dated March 19, 2021, prepared by Moseley Architects.

Complete this Bid Form in blue or black ink or by typewriter. Discrepancies in the multiplications of units of work and the unit prices will be resolved in favor of the correct multiplication of the unit prices. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum.

**BASE BID PRICE:**

The Base Bid Price includes all Work required by and in strict accordance with the Bid Documents for this Project, for the Lump Sum of:

$ ________________________________ (Figures only).

**LUMP SUM ALLOWANCES** (Reference Division 1 Section 012100 “Allowances”)

1. Allowance for SIGNAGE for new Courthouse: **$40,000.00**

**TOTAL BASE BID PRICE**
(inclusive of Base Bid Price + Unit Price Allowance) =

$ ________________________________ Figures only.

**ADDITIVE ALTERNATES** (Reference Division 1 Section 012300 “Alternates”)

1. Add Alternate No.1: Renovation of existing Courthouse, inclusive of a $10,000 allowance for interior panel signage.
$ ________________________ (Figures only)


$ ________________________ (Figures only)

3. Add Alternate No. 3: Secure Parking Lot.

$ ________________________ (Figures only)

4. Add Alternate No. 4: Courtroom furnishings on Fourth Floor.

$ ________________________ (Figures only)

5. Add Alternate No. 5: Preferred Manufacturer - Stanley Security.

$ ________________________ (Figures only)

SUB-CONTRACTORS LIST

Bidders Submitting a Single prime Contract are required to list the names of sub-contractors used in determining their bid. List the names of sub-contractors below. (If using separate sub-contractors for the combined bid list both subs and identify the project they are to construct.)

- HVAC: ______________________________________________________
- Plumbing: ____________________________________________________
- Electrical: ____________________________________________________
- Security Control System Contractor: _____________________________
- Detention Equipment Contractor: ________________________________

RECEIPT OF ADDENDA

We acknowledge the receipt of the following Addenda:

  Addendum No. ____________, dated ________________________________
  Addendum No. ____________, dated ________________________________
  Addendum No. ____________, dated ________________________________
  Addendum No. ____________, dated ________________________________
TIME OF COMPLETION

Based upon a Notice to Proceed within sixty (60) calendar days from the opening of the bid, Work included in this Contract for Phase 1 (New Courthouse Construction) shall be Substantially Complete no later than eight hundred and fifty (850) calendar days and finally complete no later than thirty (30) calendar days thereafter. Work included in this Contract for Phase 2 (Renovation of Existing Courthouse – Alternates 1 and 2) shall be Substantially Complete no later than two hundred and forty (240) calendar days and finally complete no later than thirty (30) calendar days thereafter from the completion of Phase 1. Refer to sheet A1.1.1 for Phasing Information.

LIQUIDATED DAMAGES

The undersigned agrees, stipulates and fixes as liquidated damages if delayed, but not as a penalty, the sum of Five Hundred Dollars ($500.00) per calendar day that the undersigned together with the undersigned’s surety shall pay the Owner for each calendar day or part thereof that expires after the date specified for the Substantial Completion of the Work and until the Work is Substantially Complete. By bidding, the undersigned hereby agrees to be responsible for such liquidated damages.

ATTACHMENTS TO BID

Moore County Non-Collusion Affidavit
Moore County E-Verify Affidavit
W-9
Bid Bond
MBE Participation Forms

ACKNOWLEDGMENT AND REPRESENTATIONS

• If notice of acceptance of this bid is given to the undersigned within SIXTY (60) days after the date of opening of bids, or any time thereafter before this bid is withdrawn, the undersigned will execute and deliver the Owner’s prescribed modified AIA A101 Architect Agreement promptly after it has been presented to him for signature. Evidence of Insurance pursuant to A201 General Conditions Article 11 and Performance and Payment Bonds shall be furnished to the Owner at the execution of this Agreement.

• Upon request of the Owner, the undersigned Bidder agrees to submit evidence in affidavit form of applicable experience, adequate financial resources, work in hand capacity, adequate organization, and acceptable past performance. Submittal will be in the form of AIA Document A305 Contractor’s Qualification Statement. Bidders qualification information shall be considered privileged and confidential.

• The undersigned Bidder certifies that neither he/she, nor any official, agent or employee has entered into any agreement, participated in any collusion, or otherwise taken any action which is in restraint of free competitive bidding in connection with this bid. The person signing this Bid Form represents that he/she has full authority and representative capacity to execute this Bid Form in the capacity indicated below.
The undersigned Bidder is a licensed General Contractor in accordance with applicable North Carolina state statutes and regulations, as amended.

By submitting this bid, Bidder warrants and represents that Contractor and its Subcontractors comply with the E-Verify System requirements for confirmation of employment status of employees per Article 2 of Chapter 64 of North Carolina General Statutes.

CERTIFICATION

I certify that the firm name given below is the true and complete name of the Bidder and that the Bidder is legally qualified and licensed, to perform all Work included in the scope of the Contract.

Legal Name of Bidder (Company) ______________________________________

Bidder’s (Company) Address ______________________________________

Affix Corporate Seal (if applicable):

Signature ____________________
(Signature of person(s) legally authorized to bind Bidder (Company) to this Contract)

By: _________________________
(Typed or printed Name(s) of Person(s) Signing)

Title: _________________________
(Typed or printed Title(s) of Person(s) Signing)

Telephone Number: ____________ E-mail: _________________________
(include Area Code) (of person indicated above)

North Carolina General Contractor License No.: _________________________

(This form may be reproduced in exact detail)

END OF BID FORM
Bid Bond

CONTRACTOR:  
(Name, legal status and address)

SURETY:  
(Name, legal status and principal place of business)

OWNER:  
(Name, legal status and address)
Moore County  
Post Office Box 905  
One Courthouse Square  
Carthage, North Carolina 28327

BOND AMOUNT:  
$

PROJECT:  
(Name, location or address, and Project number, if any)  
Moore County New Courthouse and Renovation

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.
Signed and sealed this   day of  ,

(Contractor as Principal)  (Seal)

(Witness)

(Title)

(Surety)  (Seal)

(Witness)

(Title)
# Substitution Request Form – Prior to Receipt of Bids

<table>
<thead>
<tr>
<th>General Information</th>
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<tbody>
<tr>
<td>Project Name</td>
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<tr>
<td>A/E Project Number</td>
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<table>
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<tr>
<th>Specified Product/Item Information</th>
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<tbody>
<tr>
<td>Specification Title</td>
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<tr>
<td>Section</td>
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<td>Page</td>
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<tr>
<td>Article / Paragraph</td>
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<tr>
<td>Description</td>
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<table>
<thead>
<tr>
<th>Proposed Substitution Information</th>
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<tr>
<td>Proposed Substitution</td>
</tr>
<tr>
<td>Reason for not providing specified product/item</td>
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<tr>
<td>Comparative Data</td>
</tr>
<tr>
<td>Attach a point-by-point comparative data list. Include all differences between the proposed substitution and the specified product/item. If not provided, this Request will be rejected.</td>
</tr>
<tr>
<td>Manufacturer</td>
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<tr>
<td>Manufacturer Address</td>
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<tr>
<td>Manufacturer Phone</td>
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<tr>
<td>Manufacturer Representative Email address</td>
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<tr>
<td>Trade / Model Name</td>
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<td>Model Number</td>
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<td>Installer (if known)</td>
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<td>Installer Address</td>
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<td>Installer Phone</td>
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<td>History</td>
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<td>☐ New product</td>
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<tr>
<td>☐ 2-5 years</td>
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<tr>
<td>☐ 5-10 yrs</td>
</tr>
<tr>
<td>☐ 10 yrs or longer</td>
</tr>
<tr>
<td>Proposed substitution affects other parts of the Work</td>
</tr>
<tr>
<td>☐ Yes</td>
</tr>
<tr>
<td>☐ No</td>
</tr>
<tr>
<td>If yes, explain</td>
</tr>
</tbody>
</table>

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<tr>
<th>Proposed Substitution Similar Installation</th>
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<tbody>
<tr>
<td>Have you used this product/item on any other projects</td>
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<tr>
<td>☐ Yes</td>
</tr>
<tr>
<td>☐ No</td>
</tr>
<tr>
<td>Project</td>
</tr>
<tr>
<td>Project Address</td>
</tr>
<tr>
<td>Architect/Engineer</td>
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<tr>
<td>A/E Phone</td>
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</table>
Entity submitting this Substitution Request certifies all of the following:

- Proposed substitution has been fully investigated and determined to be equivalent or superior in all respects to the specified product, except as may otherwise be specifically and clearly indicated herein.
- If applicable, proposed substitution shall not adversely affect LEED requirements nor shall it prevent achieving the relative number of applicable LEED point[s] the specified product would have received.
- Proposed substitution’s function, appearance, and quality are equal or superior in all respects to the specified product, except as may otherwise be specifically and clearly indicated herein.
- Same or superior warranty and/or guarantees shall be furnished for proposed substitution as is required for the specified product/item.
- Same maintenance service and source replacement parts, as applicable, are available; including local availability.
- Proposed substitution shall have no adverse effect on other trades.
- Proposed substitution shall not affect dimensions and functional clearances.
- Coordination, installation, and changes to the Work as necessary for the accepted proposed substitution shall be complete in all respects.

Entity’s Information

Submitted by  
Signed By  
Date  
Email address of Signee above  
Company Name  
Address  
Phone  

Architect / Engineer Review and Action

If this Substitution request is acceptable, it shall be included in an Addendum. If the proposed substitution is not included in an Addendum, then the proposed substitution was rejected; was not submitted in accordance with the Bidding/Procurement Documents; and/or this Form was not complete. This Form shall be completely filled in to be considered for acceptance.

Acceptance of this Substitution request is an acceptance of the manufacturer and product/item only for general conformance with the design concept reflected in the Bidding/Procurement Documents. The A/E has made no attempt to verify specific performance data, or to check details of the proposed substitution as to special features, capacities, physical dimensions, or code and/or regulatory compliance – all of which remain the responsibility of the submitting entity and the Contractor (if not the submitting entity).

END OF SUBSTITUTION REQUEST FORM
# Identification of HUB Certified/ Minority Business Participation

I, ________________________________ (Name of Bidder), do hereby certify that on this project, we will use the following HUB Certified/ minority business as construction subcontractors, vendors, suppliers or providers of professional services.

<table>
<thead>
<tr>
<th>Firm Name, Address and Phone #</th>
<th>Work Type</th>
<th>*Minority Category</th>
<th>**HUB Certified (Y/N)</th>
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*Minority categories: Black, African American (B), Hispanic (H), Asian American (A) American Indian (I), Female (F) Socially and Economically Disadvantaged (D)

** HUB Certification with the state HUB Office required to be counted toward state participation goals.

The total value of minority business contracting will be ($) ________________.
State of North Carolina AFFIDAVIT A – Listing of Good Faith Efforts

County of ________________________________

(Name of Bidder)

Affidavit of ________________________________

I have made a good faith effort to comply under the following areas checked:

Requirements for Good Faith Efforts:

Bidders must earn at least 50 points from the good faith efforts listed for their bid to be considered responsive. (1 NC Administrative Code 30 I.0101)

1 – (10 pts) Contacted minority businesses that reasonably could have been expected to submit a quote and that were known to the contractor, or available on State or local government-maintained lists, at least 10 days before the bid date and notified them of the nature and scope of the work to be performed.

2 – (10 pts) Made the construction plans, specifications and requirements available for review by prospective minority businesses or providing these documents to them at least 10 days before the bids are due.

3 – (15 pts) Broken down or combined elements of work into economically feasible units to facilitate minority participation.

4 – (10 pts) Worked with minority trade, community, or contractor organizations identified by the Office of Historically Underutilized Businesses and included in the bid documents that provide assistance in recruitment of minority businesses.

5 – (10 pts) Attended prebid meetings scheduled by the public owner.

6 – (20 pts) Provided assistance in getting required bonding or insurance or provided alternatives to bonding or insurance for subcontractors.

7 – (15 pts) Negotiated in good faith with interested minority businesses and did not reject them as unqualified without sound reasons based on their capabilities. Any rejection of a minority business based on lack of qualification should have the reasons documented in writing.

8 – (25 pts) Provided assistance to an otherwise qualified minority business in need of equipment, loan capital, lines of credit, or joint pay agreements to secure loans, supplies, or letters of credit, including waiving credit that is ordinarily required. Assisted minority businesses in obtaining the same unit pricing with the bidder's suppliers in order to help minority businesses in establishing credit.

9 – (20 pts) Negotiated joint venture and partnership arrangements with minority businesses in order to increase opportunities for minority business participation on a public construction or repair project when possible.

10 - (20 pts) Provided quick pay agreements and policies to enable minority contractors and suppliers to meet cash-flow demands.

The undersigned, if apparent low bidder, will enter into a formal agreement with the firms listed in the Identification of Minority Business Participation schedule conditional upon scope of contract to be executed with the Owner. Substitution of contractors must be in accordance with GS143-128.2(d) Failure to abide by this statutory provision will constitute a breach of the contract.

The undersigned hereby certifies that he or she has read the terms of the minority business commitment and is authorized to bind the bidder to the commitment herein set forth.

Date: __________________________ Name of Authorized Officer: __________________________

Signature: __________________________ Title: __________________________

State of ________________, County of __________________________

Subscribed and sworn to before me this _____ day of ___________ 20____

Notary Public __________________________

My commission expires __________________________
State of North Carolina --AFFIDAVIT B-- Intent to Perform Contract with Own Workforce.

County of ______________________________

Affidavit of ____________________________________________ (Name of Bidder)

I hereby certify that it is our intent to perform 100% of the work required for the ________________________________ contract.

_________________________________________________________ (Name of Project)

In making this certification, the Bidder states that the Bidder does not customarily subcontract elements of this type project, and normally performs and has the capability to perform and will perform all elements of the work on this project with his/her own current work forces; and

The Bidder agrees to provide any additional information or documentation requested by the owner in support of the above statement. The Bidder agrees to make a Good Faith Effort to utilize minority suppliers where possible.

The undersigned hereby certifies that he or she has read this certification and is authorized to bind the Bidder to the commitments herein contained.

Date:__________ Name of Authorized Officer:________________________________________________________

Signature:________________________________________________________

Title:________________________________________________________

State of ______________________________, County of________________________________________

Subscribed and sworn to before me this ___________day of _________20__

Notary Public ______________________________

My commission expires __________________________
State of North Carolina - AFFIDAVIT C - Portion of the Work to be Performed by HUB Certified/Minority Businesses

County of ____________________

(Note this form is to be submitted only by the apparent lowest responsible, responsive bidder.)

If the portion of the work to be executed by HUB certified/minority businesses as defined in GS143-128.2(g) and 128.4(a),(b),(e) is equal to or greater than 10% of the bidders total contract price, then the bidder must complete this affidavit. This affidavit shall be provided by the apparent lowest responsible, responsive bidder within 72 hours after notification of being low bidder.

Affidavit of ____________________________ I do hereby certify that on the ____________________________

(Name of Bidder)

(Project Name) Amount of Bid $ __________________

I will expend a minimum of ______ % of the total dollar amount of the contract with minority business enterprises. Minority businesses will be employed as construction subcontractors, vendors, suppliers or providers of professional services. Such work will be subcontracted to the following firms listed below.

<table>
<thead>
<tr>
<th>Name and Phone Number</th>
<th>*Minority Category</th>
<th>**HUB Certified Y/N</th>
<th>Work Description</th>
<th>Dollar Value</th>
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*Minority categories: Black, African American (B), Hispanic (H), Asian American (A) American Indian (I), Female (F) Socially and Economically Disadvantaged (D)

** HUB Certification with the state HUB Office required to be counted toward state participation goals.

Pursuant to GS143-128.2(d), the undersigned will enter into a formal agreement with Minority Firms for work listed in this schedule conditional upon execution of a contract with the Owner. Failure to fulfill this commitment may constitute a breach of the contract.

The undersigned hereby certifies that he or she has read the terms of this commitment and is authorized to bind the bidder to the commitment herein set forth.

Date: __________ Name of Authorized Officer: _______________________

Signature: ____________________________

Title: ____________________________

State of ______________, County of ____________________

Subscribed and sworn to before me this ______day of _______ 20____

Notary Public ____________________________

My commission expires ________________

MBForms 2002-Revised July 2010
State of North Carolina  AFFIDAVIT D – Good Faith Efforts

County of __________________________
(Note this form is to be submitted only by the apparent lowest responsible, responsive bidder.)

If the goal of 10% participation by HUB Certified/ minority business is not achieved, the Bidder shall provide the following documentation to the Owner of his good faith efforts:

Affidavit of __________________________________________ I do hereby certify that on the
(Name of Bidder)

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Amount of Bid</th>
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I will expend a minimum of _____% of the total dollar amount of the contract with HUB certified/ minority business enterprises. Minority businesses will be employed as construction subcontractors, vendors, suppliers or providers of professional services. Such work will be subcontracted to the following firms listed below. (Attach additional sheets if required)

<table>
<thead>
<tr>
<th>Name and Phone Number</th>
<th>*Minority Category</th>
<th>**HUB Certified Y/N</th>
<th>Work Description</th>
<th>Dollar Value</th>
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</table>

*Minority categories: Black, African American (B), Hispanic (H), Asian American (A) American Indian (I), Female (F) Socially and Economically Disadvantaged (D)

** HUB Certification with the state HUB Office required to be counted toward state participation goals.

Examples of documentation that may be required to demonstrate the Bidder's good faith efforts to meet the goals set forth in these provisions include, but are not necessarily limited to, the following:

A. Copies of solicitations for quotes to at least three (3) minority business firms from the source list provided by the State for each subcontract to be let under this contract (if 3 or more firms are shown on the source list). Each solicitation shall contain a specific description of the work to be subcontracted, location where bid documents can be reviewed, representative of the Prime Bidder to contact, and location, date and time when quotes must be received.

B. Copies of quotes or responses received from each firm responding to the solicitation.

C. A telephone log of follow-up calls to each firm sent a solicitation.

D. For subcontracts where a minority business firm is not considered the lowest responsible sub-bidder, copies of quotes received from all firms submitting quotes for that particular subcontract.

E. Documentation of any contacts or correspondence to minority business, community, or contractor organizations in an attempt to meet the goal.

F. Copy of pre-bid roster

G. Letter documenting efforts to provide assistance in obtaining required bonding or insurance for minority business.

H. Letter detailing reasons for rejection of minority business due to lack of qualification.

I. Letter documenting proposed assistance offered to minority business in need of equipment, loan capital, lines of credit, or joint pay agreements to secure loans, supplies, or letter of credit, including waiving credit that is ordinarily required.

Failure to provide the documentation as listed in these provisions may result in rejection of the bid and award to the next lowest responsible and responsive bidder.

Pursuant to GS143-128.2(d), the undersigned will enter into a formal agreement with Minority Firms for work listed in this schedule conditional upon execution of a contract with the Owner. Failure to fulfill this commitment may constitute a breach of the contract.
The undersigned hereby certifies that he or she has read the terms of this commitment and is authorized to bind the bidder to the commitment herein set forth.

Date: ________________ Name of Authorized Officer: ________________________________

  Signature: ________________________________________________________________

  Title: ____________________________________________________________________

State of ______________________, County of _________________________________

Subscribed and sworn to before me this _____ day of ____________ 20____

  Notary Public ____________________________

  My commission expires ________________
MOORE COUNTY
NON-COLLUSION AFFIDAVIT

State of North Carolina
County of Moore

I _________________________________, being first duly sworn, deposes and says that:

He/She is the________________________ of ____________________________, the proposer that has submitted the attached proposal;

He/She is fully informed respecting the preparation and contents of the attached proposal and of all pertinent circumstances respecting such proposal;

Such proposal is genuine and is not a collusive or sham proposal;

Neither the said Proposer nor any of its officers, partners, owners, agents, representatives, Employees or parties of interest, including this affiant, has in any way colluded, conspired, connived or agreed, directly or indirectly, with any other Proposer, firm or person to submit a collusive or sham proposal in connections with the contract for which the attached proposal has been submitted or to refrain from bidding in connection with such contract, or has in any manner, directly or indirectly, sought by agreement or collusion or communication or conference with any other Proposer, firm or person to fix the price or prices in the attached proposal or of any other Proposer or to fix overhead, profit or cost element of the proposal price of any other Proposer or to secure through collusion, conspiracy, connivance or unlawful agreement any advantage against the County of Moore or any person interested in the proposed contract; and

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

____________________________________
Signature and Title

State of North Carolina
County of _______________________
Subscribed and sworn before me,
This _____ day of ________________, 2021

___________________________________
Notary Public
My commission expires _______________
Moore County E-Verify Affidavit

STATE OF NORTH CAROLINA
COUNTY OF MOORE

I, ____________________________ (the individual attesting below), being duly authorized by and on behalf of ____________________________ (the entity bidding on project hereinafter "Employer") after first being duly sworn hereby swears or affirms as follows:

1. Employer understands that E-Verify is the federal E-Verify program operated by the United States Department of Homeland Security and other federal agencies, or any successor or equivalent program used to verify the work authorization of newly hired employees pursuant to federal law in accordance with NCGS §64-25(5).

2. Employer understands that Employers Must Use E-Verify. Each employer, after hiring an employee to work in the United States, shall verify the work authorization of the employee through E-Verify in accordance with NCGS§64-26(a).

3. Employer is a person, business entity, or other organization that transacts business in this State and that employs 25 or more employees in this State. (mark Yes or No)
   a. YES _____, or
   b. NO _____

4. Employer's subcontractors comply with E-Verify, and if Employer is the winning bidder on this project Employer will ensure compliance with E-Verify by any subcontractors subsequently hired by Employer.

Executed, this ____ day of _______________, 2021.

Signature of Affiant
Print or Type Name: _________________________

State of North Carolina
County of ________________

Signed and sworn to (or affirmed) before me, this the _____
day of __________________, 2021.

My Commission Expires:

________________________  _________________________
Notary Public (Affix Official/Notarial Seal)
Contractor's Qualification Statement

The Undersigned certifies under oath that the information provided herein is true and sufficiently complete so as not to be misleading.

SUBMITTED TO:
ADDRESS:

SUBMITTED BY:
NAME:
ADDRESS:

PRINCIPAL OFFICE:
[ ] Corporation
[ ] Partnership
[ ] Individual
[ ] Joint Venture
[ ] Other

NAME OF PROJECT: (if applicable) Moore County New Courthouse and Renovation

TYPE OF WORK: (file separate form for each Classification of Work)
[ ] General Construction
[ ] HVAC
[ ] Electrical
[ ] Plumbing
[ ] Other: (Specify)

§ 1 ORGANIZATION
§ 1.1 How many years has your organization been in business as a Contractor?
§ 1.2 How many years has your organization been in business under its present business name?
§ 1.2.1 Under what other or former names has your organization operated?

§ 1.3 If your organization is a corporation, answer the following:
§ 1.3.1 Date of incorporation:
§ 1.3.2 State of incorporation:
§ 1.3.3 President’s name:
§ 1.3.4 Vice-president’s name(s)

§ 1.3.5 Secretary’s name:
§ 1.3.6 Treasurer’s name:

§ 1.4 If your organization is a partnership, answer the following:
§ 1.4.1 Date of organization:
§ 1.4.2 Type of partnership (if applicable):
§ 1.4.3 Name(s) of general partner(s)

§ 1.5 If your organization is individually owned, answer the following:
§ 1.5.1 Date of organization:
§ 1.5.2 Name of owner:

§ 1.6 If the form of your organization is other than those listed above, describe it and name the principals:

§ 2 LICENSING
§ 2.1 List jurisdictions and trade categories in which your organization is legally qualified to do business, and indicate registration or license numbers, if applicable.

§ 2.2 List jurisdictions in which your organization’s partnership or trade name is filed.

§ 3 EXPERIENCE
§ 3.1 List the categories of work that your organization normally performs with its own forces.

§ 3.2 Claims and Suits. (If the answer to any of the questions below is yes, please attach details.)
§ 3.2.1 Has your organization ever failed to complete any work awarded to it?

§ 3.2.2 Are there any judgments, claims, arbitration proceedings or suits pending or outstanding against your organization or its officers?

§ 3.2.3 Has your organization filed any law suits or requested arbitration with regard to construction contracts within the last five years?

§ 3.3 Within the last five years, has any officer or principal of your organization ever been an officer or principal of another organization when it failed to complete a construction contract? (If the answer is yes, please attach details.)
§ 3.4 On a separate sheet, list major construction projects your organization has in progress, giving the name of project, owner, architect, contract amount, percent complete and scheduled completion date.

§ 3.4.1 State total worth of work in progress and under contract:

§ 3.5 On a separate sheet, list the major projects your organization has completed in the past five years, giving the name of project, owner, architect, contract amount, date of completion and percentage of the cost of the work performed with your own forces.

§ 3.5.1 State average annual amount of construction work performed during the past five years:

§ 3.6 On a separate sheet, list the construction experience and present commitments of the key individuals of your organization.

§ 4 REFERENCES

§ 4.1 Trade References:

§ 4.2 Bank References:

§ 4.3 Surety:
   § 4.3.1 Name of bonding company:
   § 4.3.2 Name and address of agent:

§ 5 FINANCING

§ 5.1 Financial Statement.
   § 5.1.1 Attach a financial statement, preferably audited, including your organization’s latest balance sheet and income statement showing the following items:
   
   Current Assets (e.g., cash, joint venture accounts, accounts receivable, notes receivable, accrued income, deposits, materials inventory and prepaid expenses);

   Net Fixed Assets;

   Other Assets;
Current Liabilities (e.g., accounts payable, notes payable, accrued expenses, provision for income taxes, advances, accrued salaries and accrued payroll taxes);

Other Liabilities (e.g., capital, capital stock, authorized and outstanding shares par values, earned surplus and retained earnings).

§ 5.1.2 Name and address of firm preparing attached financial statement, and date thereof:

§ 5.1.3 Is the attached financial statement for the identical organization named on page one?

§ 5.1.4 If not, explain the relationship and financial responsibility of the organization whose financial statement is provided (e.g., parent-subsidiary).

§ 5.2 Will the organization whose financial statement is attached act as guarantor of the contract for construction?

§ 6 SIGNATURE
§ 6.1 Dated at this day of

Name of Organization:

By:

Title:

§ 6.2

M being duly sworn deposes and says that the information provided herein is true and sufficiently complete so as not to be misleading.

Subscribed and sworn before me this day of

Notary Public:

My Commission Expires:
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)

Moore County
Post Office Box 905
One Courthouse Square
Carthage, North Carolina 28327

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

To be determined

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

Moore County New Courthouse and Renovation

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

Moseley Architects P.C.
6210 Ardrey Kell Road
The Hub at Waverly
Suite 425
Charlotte, North Carolina 28277

The Owner and Contractor agree as follows.
TABLE OF ARTICLES

1 THE CONTRACT DOCUMENTS
2 THE WORK OF THIS CONTRACT
3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION
4 CONTRACT SUM
5 PAYMENTS
6 DISPUTE RESOLUTION
7 TERMINATION OR SUSPENSION
8 MISCELLANEOUS PROVISIONS
9 ENUMERATION OF CONTRACT DOCUMENTS

EXHIBIT A INSURANCE AND BONDS

ARTICLE 1 THE CONTRACT DOCUMENTS
The Contract Documents consist of this Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), 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 a Modification, 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 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
§ 3.3.1 Subject to adjustments of the Contract Time as provided in the Contract Documents, the Contractor shall achieve Substantial Completion of the entire Work:
(Choose one of the following boxes and complete the necessary information.)
§ 3.3.2 Subject to adjustments of the Contract Time as provided in the Contract Documents, if portions of the Work are to be completed prior to Substantial Completion of the entire Work, the Contractor shall achieve Substantial Completion of such portions by the following dates:

<table>
<thead>
<tr>
<th>Portion of Work</th>
<th>Substantial Completion Date</th>
</tr>
</thead>
</table>

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

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 ($ ), subject to additions and deductions as provided in the Contract Documents.

§ 4.2 Alternates

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

<table>
<thead>
<tr>
<th>Item</th>
<th>Price</th>
</tr>
</thead>
</table>

§ 4.2.2 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.)

<table>
<thead>
<tr>
<th>Item</th>
<th>Price</th>
<th>Conditions for Acceptance</th>
</tr>
</thead>
</table>

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

<table>
<thead>
<tr>
<th>Item</th>
<th>Price</th>
</tr>
</thead>
</table>

§ 4.4 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.)

<table>
<thead>
<tr>
<th>Item</th>
<th>Units and Limitations</th>
<th>Price per Unit ($0.00)</th>
</tr>
</thead>
</table>

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

§ 4.6 Other:
(Insert provisions for bonus or other incentives, if any, that might result in a change to the Contract Sum.)
ARTICLE 5  PAYMENTS

§ 5.1 Progress Payments

§ 5.1.1 Based upon Applications for Payment submitted to the Architect by the Contractor and Certificates for Payment issued by the 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 Architect not later than the 20 day of a month, the Owner shall make payment of the amount certified to the Contractor not later than the 25 day of the month. If an Application for Payment is received by the Architect after the application date fixed above, payment of the amount certified shall be made by the Owner not later than 10 days after the Architect receives the Application for Payment. (Federal, state or local laws may require payment within a certain period of time.)

§ 5.1.4 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 Architect may require. This schedule of values shall be used as a basis for reviewing the Contractor’s Applications for Payment.

§ 5.1.5 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.

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

§ 5.1.6.1 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.

§ 5.1.6.2 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 A201–2017;
.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 A201–2017; and
.5 Retainage withheld pursuant to Section 5.1.7.

§ 5.1.7 Retainage

§ 5.1.7.1 For each progress payment made prior to Substantial Completion of the Work, 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.)
§ 5.1.7.1 The following items are not subject to retainage:
(Insert any items not subject to the withholding of retainage, such as general conditions, insurance, etc.)

§ 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 Substantial Completion of the entire Work, including modifications for Substantial Completion of portions of the Work as provided in Section 3.3.2, insert provisions for such modifications.)

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

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

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

§ 5.2 Final Payment
§ 5.2.1 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 A201–2017, and to satisfy other requirements, if any, which extend beyond final payment; and
.2 a final Certificate for Payment has been issued by the Architect.

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

§ 5.3 Interest
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.
(Insert rate of interest agreed upon, if any.)
%

ARTICLE 6 DISPUTE RESOLUTION
§ 6.1 Initial Decision Maker
The Architect will serve as the Initial Decision Maker pursuant to Article 15 of AIA Document A201–2017, unless the parties appoint below another individual, not a party to this Agreement, to serve as the Initial Decision Maker.
(If the parties mutually agree, insert the name, address and other contact information of the Initial Decision Maker, if other than the Architect.)
§ 6.2 Binding Dispute Resolution
For any Claim subject to, but not resolved by, mediation pursuant to Article 15 of AIA Document A201–2017, the method of binding dispute resolution shall be as follows:
(Check the appropriate box.)

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

[ ] Litigation in a court of competent jurisdiction

[ ] Other (Specify)

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

ARTICLE 7 TERMINATION OR SUSPENSION
§ 7.1 The Contract may be terminated by the Owner or the Contractor as provided in Article 14 of AIA Document A201–2017.

§ 7.1.1 If the Contract is terminated for the Owner’s convenience in accordance with Article 14 of AIA Document A201–2017, 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.)

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

ARTICLE 8 MISCELLANEOUS PROVISIONS
§ 8.1 Where reference is made in this Agreement to a provision of AIA Document A201–2017 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)

§ 8.3 The Contractor’s representative:
(Name, address, email address, and other information)
§ 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 A101™–2017, Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum, Exhibit A, Insurance and Bonds, and elsewhere in the Contract Documents.

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

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

§ 8.7 Other provisions:

ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS
§ 9.1 This Agreement is comprised of the following documents:
.1 AIA Document A101™–2017, Standard Form of Agreement Between Owner and Contractor
.2 AIA Document A101™–2017, Exhibit A, Insurance and Bonds
.3 AIA Document A201™–2017, General Conditions of the Contract for Construction
.4 AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, dated as indicated below:
(Insert the date of the E203-2013 incorporated into this Agreement.)

.5 Drawings
Number Title Date

.6 Specifications
Section Title Date Pages

.7 Addenda, if any:
Number Date Pages

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.

.8 Other Exhibits:
(Check all boxes that apply and include appropriate information identifying the exhibit where required.)
[ ] AIA Document E204™–2017, Sustainable Projects Exhibit, dated as indicated below:
(Insert the date of the E204-2017 incorporated into this Agreement.)

[ ] The Sustainability Plan:

<table>
<thead>
<tr>
<th>Title</th>
<th>Date</th>
<th>Pages</th>
</tr>
</thead>
</table>

[ ] Supplementary and other Conditions of the Contract:

<table>
<thead>
<tr>
<th>Document</th>
<th>Title</th>
<th>Date</th>
<th>Pages</th>
</tr>
</thead>
</table>

.9 Other documents, if any, listed below:
(List here any additional documents that are intended to form part of the Contract Documents. AIA Document A201™–2017 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.)

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

OWNER (Signature)            CONTRACTOR (Signature)
(Printed name and title)      (Printed name and title)
Performance Bond

CONTRACTOR:  
(Name, legal status and address)

SURETY:  
(Name, legal status and principal place of business)

OWNER:  
(Name, legal status and address)  
Moore County  
Post Office Box 905  
One Courthouse Square  
Carthage, North Carolina 28327

CONSTRUCTION CONTRACT
Date:  
Amount: $ 0.00  
Description: (Name and location)  
Moore County New Courthouse and Renovation

BOND
Date:  
(Not earlier than Construction Contract Date)

Amount: $  
Modifications to this Bond: None  
See Section 16

CONTRACTOR AS PRINCIPAL  
Company: (Corporate Seal)  
Signature:  
Name and Title: (Any additional signatures appear on the last page of this Performance Bond.)

SURETY  
Company: (Corporate Seal)  
Signature:  
Name and Title:

AGENT or BROKER:  
OWNER'S REPRESENTATIVE: (Architect, Engineer or other party:)

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.
§ 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 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;

.1 the Owner declares a Contractor Default, terminates the Construction Contract and notifies the Surety;

.2 and 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: ________________________________
Payment Bond

CONTRACTOR:
(Name, legal status and address)

SURETY:
(Name, legal status and principal place of business)

OWNER:
(Name, legal status and address)
Moore County
Post Office Box 905
One Courthouse Square
Carthage, North Carolina 28327

CONSTRUCTION CONTRACT
Date:
Amount: $ 0.00
Description:
(Name and location)
Moore County New Courthouse and Renovation

BOND
Date:
(Not earlier than Construction Contract Date)
Amount: $
Modifications to this Bond: None See Section 18

CONTRACTOR AS PRINCIPAL
Company: (Corporate Seal)
Signature: __________________________ Signature: __________________________
Name and Title: __________________________ Name and Title: __________________________

SURETY
Company: (Corporate Seal)

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.

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

(FOR INFORMATION ONLY — Name, address and telephone)
AGENT or BROKER: 
OWNER’S REPRESENTATIVE: 
(Architect, Engineer or other party:)

Moore County
Post Office Box 905
One Courthouse Square
Carthage, North Carolina 28327
§ 1 The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Owner to pay for labor, materials and equipment furnished for use in the performance of the Construction Contract, which is incorporated herein by reference, subject to the following terms.

§ 2 If the Contractor promptly makes payment of all sums due to Claimants, and defends, indemnifies and holds harmless the Owner from claims, demands, liens or suits by any person or entity seeking payment for labor, materials or equipment furnished for use in the performance of the Construction Contract, then the Surety and the Contractor shall have no obligation under this Bond.

§ 3 If there is no Owner Default under the Construction Contract, the Surety’s obligation to the Owner under this Bond shall arise after the Owner has promptly notified the Contractor and the Surety (at the address described in Section 13) of claims, demands, liens or suits against the Owner or the Owner’s property by any person or entity seeking payment for labor, materials or equipment furnished for use in the performance of the Construction Contract and tendered defense of such claims, demands, liens or suits to the Contractor and the Surety.

§ 4 When the Owner has satisfied the conditions in Section 3, the Surety shall promptly and at the Surety’s expense defend, indemnify and hold harmless the Owner against a duly tendered claim, demand, lien or suit.

§ 5 The Surety’s obligations to a Claimant under this Bond shall arise after the following:

§ 5.1 Claimants, who do not have a direct contract with the Contractor,

1 have furnished a written notice of non-payment to the Contractor, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were, or equipment was, furnished or supplied or for whom the labor was done or performed, within ninety (90) days after having last performed labor or last furnished materials or equipment included in the Claim; and

2 have sent a Claim to the Surety (at the address described in Section 13).

§ 5.2 Claimants, who are employed by or have a direct contract with the Contractor, have sent a Claim to the Surety (at the address described in Section 13).

§ 6 If a notice of non-payment required by Section 5.1.1 is given by the Owner to the Contractor, that is sufficient to satisfy a Claimant’s obligation to furnish a written notice of non-payment under Section 5.1.1.

§ 7 When a Claimant has satisfied the conditions of Sections 5.1 or 5.2, whichever is applicable, the Surety shall promptly and at the Surety’s expense take the following actions:

§ 7.1 Send an answer to the Claimant, with a copy to the Owner, within sixty (60) days after receipt of the Claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed; and

§ 7.2 Pay or arrange for payment of any undisputed amounts.

§ 7.3 The Surety’s failure to discharge its obligations under Section 7.1 or Section 7.2 shall not be deemed to constitute a waiver of defenses the Surety or Contractor may have or acquire as to a Claim, except as to undisputed amounts for which the Surety and Claimant have reached agreement. If, however, the Surety fails to discharge its obligations under Section 7.1 or Section 7.2, the Surety shall indemnify the Claimant for the reasonable attorney’s fees the Claimant incurs thereafter to recover any sums found to be due and owing to the Claimant.

§ 8 The Surety’s total obligation shall not exceed the amount of this Bond, plus the amount of reasonable attorney’s fees provided under Section 7.3, and the amount of this Bond shall be credited for any payments made in good faith by the Surety.

§ 9 Amounts owed by the Owner to the Contractor under the Construction Contract shall be used for the performance of the Construction Contract and to satisfy claims, if any, under any construction performance bond. By the Contractor furnishing and the Owner accepting this Bond, they agree that all funds earned by the Contractor in the performance of the Construction Contract are dedicated to satisfy obligations of the Contractor and Surety under this Bond, subject to the Owner’s priority to use the funds for the completion of the work.

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User Notes: (812077683)
§ 10 The Surety shall not be liable to the Owner, Claimants or others for obligations of the Contractor that are unrelated to the Construction Contract. The Owner shall not be liable for the payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligation to make payments to, or give notice on behalf of, Claimants or otherwise have any obligations to Claimants under this Bond.

§ 11 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.

§ 12 No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the state in which the project that is the subject of the Construction Contract is located or after the expiration of one year from the date (1) on which the Claimant sent a Claim to the Surety pursuant to Section 5.1.2 or 5.2, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. 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.

§ 13 Notice and Claims 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. Actual receipt of notice or Claims, however accomplished, shall be sufficient compliance as of the date received.

§ 14 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.

§ 15 Upon request by any person or entity appearing to be a potential beneficiary of this Bond, the Contractor and Owner shall promptly furnish a copy of this Bond or shall permit a copy to be made.

§ 16 Definitions

§ 16.1 Claim. A written statement by the Claimant including at a minimum:
.1 the name of the Claimant;
.2 the name of the person for whom the labor was done, or materials or equipment furnished;
.3 a copy of the agreement or purchase order pursuant to which labor, materials or equipment was furnished for use in the performance of the Construction Contract;
.4 a brief description of the labor, materials or equipment furnished;
.5 the date on which the Claimant last performed labor or last furnished materials or equipment for use in the performance of the Construction Contract;
.6 the total amount earned by the Claimant for labor, materials or equipment furnished as of the date of the Claim;
.7 the total amount of previous payments received by the Claimant; and
.8 the total amount due and unpaid to the Claimant for labor, materials or equipment furnished as of the date of the Claim.

§ 16.2 Claimant. An individual or entity having a direct contract with the Contractor or with a subcontractor of the Contractor to furnish labor, materials or equipment for use in the performance of the Construction Contract. The term Claimant also includes any individual or entity that has rightfully asserted a claim under an applicable mechanic’s lien or similar statute against the real property upon which the Project is located. The intent of this Bond shall be to include without limitation in the terms “labor, materials or equipment” that part of water, gas, power, light, heat, oil, gasoline, telephone service or rental equipment used in the Construction Contract, architectural and engineering services required for performance of the work of the Contractor and the Contractor’s subcontractors, and all other items for which a mechanic’s lien may be asserted in the jurisdiction where the labor, materials or equipment were furnished.

§ 16.3 Construction Contract. The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and all changes made to the agreement and the Contract Documents.
§ 16.4 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.

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

§ 17 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.

§ 18 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: 
General Conditions of the Contract for Construction

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

Moore County New Courthouse and Renovation

THE OWNER:
(Name, legal status and address)

Moore County
Post Office Box 905
One Courthouse Square
Carthage, North Carolina 28327

THE ARCHITECT:
(Name, legal status and address)

Moseley Architects P.C.
6210 Ardrey Kell Road
The Hub at Waverly
Suite 425
Charlotte, North Carolina 28277

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This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification. For guidance in modifying this document to include supplementary conditions, see AIA Document A503™, Guide for Supplementary Conditions.
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ARTICLE 1   GENERAL PROVISIONS
§ 1.1 Basic Definitions
§ 1.1.1 The Contract Documents
The Contract Documents are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and consist of the Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of the Contract, other documents listed in the Agreement, and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive, or (4) a written order for a minor change in the Work issued by the Architect. Unless specifically enumerated in the Agreement, the Contract Documents do not include the advertisement or invitation to bid, Instructions to Bidders, sample forms, other information furnished by the Owner in anticipation of receiving bids or proposals, the Contractor’s bid or proposal, or portions of Addenda relating to bidding or proposal requirements.

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

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

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

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

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

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

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

§ 1.2 Correlation and Intent of the Contract Documents
§ 1.2.1 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all. Performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to
produce the indicated results. Notwithstanding such performance, in case of a conflict, disagreement, or ambiguity, provide the better quality of Work. In case of a conflict, disagreement, or ambiguity, provide the greater quantity of Work.

§ 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.

1.2.1.2 Plumbing, Mechanical, Fire Protection and Electrical drawings are diagrammatic, showing general locations and arrangements of piping, wiring, equipment, security and technology, and specialties; not necessarily showing all required offsets, conditions and appurtenances required for maximum practical accessibility for operation, maintenance and clearances. Coordinate this Work in order to achieve the required and intended Work and notify the Architect immediately of conditions which do not comply or will not allow for this condition.

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

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

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

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

§ 1.5 Ownership and Use of Drawings, Specifications, and Other Instruments of Service
§ 1.5.1 The Unless otherwise required by the Owner and Architect Agreement, 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, 1.9 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, including signature of receiver of such notices.

§ 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 shall 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, should such Exhibit be included in the Agreement.

§ 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.

§ 1.9 If such Exhibits are not included in the Agreement, the Architect may, with the concurrence of the Owner, furnish to the Contractor versions of the Instruments of Service in electronic form. The Contract Documents executed or identified in accordance with Section 1.1.1 shall prevail in case of an inconsistency with subsequent versions made through manipulatable electronic operations involving computers. The Contractor shall not transfer or reuse Instruments of Service in electronic or machine readable form without the prior written consent of the Architect.

ARTICLE 2   OWNER
§ 2.1 General
§ 2.1.1 The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Owner shall designate in writing a representative who shall have express authority to bind the Owner with respect to all matters requiring the Owner’s approval or authorization. The term “Owner” means the Owner or the Owner’s authorized representative.

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

§ 2.2.2 Following commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner’s obligations under the Contract only if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) the Contractor identifies in writing a reasonable concern regarding the Owner’s ability to make payment when due; or (3) a change in the Work materially changes the Contract Sum. If the Owner fails to provide such evidence, as required, within fourteen days of the Contractor’s request, the Contractor may immediately stop the Work and, in that event, shall notify the Owner that the Work has stopped. However, if the request is made because a change in the Work materially changes the Contract Sum under (3) above, the Contractor may immediately stop only that portion of the Work affected by the change until reasonable evidence is provided. If the Work is stopped under this Section 2.2.2, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor’s reasonable costs of shutdown, delay and start-up, plus interest as provided in the Contract Documents.
§ 2.2.3 After the Owner furnishes evidence of financial arrangements under this Section 2.2, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.

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

§ 2.3 Information and Services Required of the Owner

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

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

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

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

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

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

§ 2.3.6.1 At the Architect’s sole discretion, selected electronic (CAD) Drawing files may be made available for use by the Contractor after execution of the Contract for Construction, with the exception of civil grading and layout plans, if authorized by the civil consultant. Such electronic files are not part of the Contract Documents. If available, the Architect shall release them to the Contractor subject to the terms and conditions established by the Architect, to which the Contractor must agree without exception prior to release of the electronic files. Refer to www.moseleyarchitects.com for the Architect’s current Request for Electronic (CAD) Files form, which defines the applicable terms and conditions.

§ 2.4 Owner’s Right to Stop the Work

If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by Section 12.2 or repeatedly fails to carry out Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Section 6.1.3.
§ 2.5 Owner’s Right to Carry Out the Work
If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ten-day period after receipt of notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such default or neglect. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect and the Architect may, pursuant to Section 9.5.1, withhold or Amounts charged to the Contractor may, pursuant to Section 9.5.1, nullify a Certificate for Payment in whole or in part, to the extent reasonably necessary to reimburse the Owner for the reasonable cost of correcting such deficiencies, including Owner’s expenses and compensation for the Architect’s additional services made necessary by such default, neglect, or failure. If current and future payments are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner. If the Contractor disagrees with the actions of the Owner or the Architect, or the amounts claimed as costs to the Owner, the Contractor may file a Claim pursuant to Article 15.

ARTICLE 3 CONTRACTOR
§ 3.1 General
§ 3.1.1 The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor shall be lawfully licensed, if required in the jurisdiction where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term “Contractor” means the Contractor or the Contractor’s authorized representative.

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

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

§ 3.1.4 During the performance of this Contract, the Contractor will include the provisions of the foregoing Sections 3.1.4.1 and 3.1.4.2 in every Subcontract or purchase order of over ten thousand dollars ($10,000.), so that the provisions will be binding upon each Subcontractor or vendor; and furthermore, the Contractor agrees as follows:

.1 The Contractor will not discriminate against any employee or applicant for employment because of race, religion, color, sex, or national origin, except where religion, sex or national origin is a bona fide occupational qualification reasonably necessary to the normal operation of the Contractor. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices setting forth the provisions of this non-discrimination clause.

.2 The Contractor, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, will state that such Contractor is an equal opportunity employer.

.3 Notices, advertisements, and solicitations placed in accordance with federal law, rule, or regulation shall be deemed sufficient for the purpose of meeting requirements of this section.

.4 The Contractor does not, and shall not during the performance of this Contract, knowingly employ an unauthorized alien as defined in the Federal Immigration Reform and Control Act of 1986.

.5 Contractor hereby represents it is organized as a stock or non-stock corporation, limited liability company, business trust, or limited partnership or registered as a registered limited liability partnership and is authorized to transact business in the jurisdiction where the Project is located as a domestic or foreign business entity if so required by Title 13.1 or Title 50 or as otherwise required by law.

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

§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.3.4, 2.3.3, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the
purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. It is recognized that the Contractor’s review is made in the Contractor’s capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

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

§ 3.2.4 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.

§ 3.2.5 The Owner shall deduct from the Contract Sum amounts paid to the Architect for the Architect to evaluate and respond to the Contractor’s requests for information, where such information was available to the Contractor from a careful study and comparison of the Contract Documents, field conditions, other Owner-provided information, Contractor-prepared coordination drawings, or prior correspondence or documentation.

§ 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, appropriate, the Contractor shall give timely notice to the Owner and Architect, and shall propose alternative means, methods, techniques, sequences, or procedures. The Contractor shall perform the Work using its alternative means, methods, techniques, sequences, or procedures.

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

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

§ 3.4 Labor and Materials

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

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

§ 3.4.2.1 After the Contract has been executed, the Owner and the Architect will consider a formal request for substitution in lieu of those required by the Contract Documents only under and in addition to, the conditions set forth in the Contract Documents. 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 requirements of the Contract Documents;
2. represents that the Contractor will provide the same warranty for the substitution that the Contractor is required to provide under the Contract Documents;
3. certifies that the cost data presented is complete and includes all related costs under this Contract including the Architect's redesign costs, and waives all claims for additional costs and time related to the substitution which subsequently become apparent; and
4. will coordinate and perform the installation of the accepted substitute, making such changes to the Work 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 shall deduct from the Contract Sum amounts paid to the Architect for the Architect to review the Contractor’s proposed substitutions, to make agreed-upon changes in the Instruments of Service, including the Contract Documents, and to provide additional construction phase services made necessary by the Owner’s acceptance of such substitutions.

§ 3.5 Warranty

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

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

§ 3.6 Taxes

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

§ 3.7 Permits, Fees, Notices and Compliance with Laws

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

§ 3.7.1.1 Unless otherwise provided in the Contract Documents, the Contractor is responsible for obtaining utilities for the Project and providing the Work relating to Project utilities as indicated. Responsibility for payment of fees associated with providing utilities to the Project shall be as follows:

1. Any fees assessed by entities for providing permanent utilities to the Project shall be paid directly to the utility entities by Owner. These include “tap fees” and “electrical connection and service fee.” Contractor shall
coordinate the permanent utilities and the entity’s related work to comply with the construction schedule.

2 Any fees assessed by entities for providing temporary utilities to the Project for use by Contractor during construction of the Project shall be paid by the Contractor. The Contractor’s payment of fees for temporary utilities shall be included in the Base Bid and Contract Sum and will not be reimbursed by the Owner.

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

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

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

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

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

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

§ 3.8.3 Materials and equipment under an allowance shall be selected by the Owner with reasonable promptness. The Contractor shall identify the date for Owner’s selection on the critical path of the Contractor’s Construction Schedule and provide the Owner a minimum of two weeks notice before this date.
§ 3.10 Contractor's Construction and Submittal Schedules

§ 3.10.1 The Contractor, promptly after being awarded the Contract, shall submit for the Owner’s and Architect’s information a Contractor’s construction schedule for the Work. The schedule shall contain details: Unless otherwise required by the Contract Documents, the schedule shall contain details 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 Substantial Completion date and final completion date indicated in the Contract Documents. The schedule shall be revised at appropriate intervals as required by the conditions of the Work and Project.

§ 3.10.2 The Contractor, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, shall submit a submittal schedule for the Architect’s approval. The Architect’s approval shall not be binding as if given to the Contractor.

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

§ 3.10.4 The Superintendent employed by the Contractor shall have a minimum of five (5) years commercial experience as the primary Superintendent on projects of similar size and complexity as the Work. The Superintendent shall speak fluent English and clearly understand the English language. The Contractor shall submit to the Owner a resume and other supporting documentation showing that the proposed Superintendent is competent and has the minimum work experience required to execute the Work. The Owner reserves the right to request additional supporting documentation regarding the proposed Superintendent's qualifications and to require the Contractor to propose an alternate Superintendent who better meets the requirements contained in this Article, as may reasonably be determined by the Owner. The Contractor shall notify the Architect and Owner in writing of any proposed replacement of the Superintendent. The Contractor shall not replace a competent Superintendent without prior written approval from the Owner. The requirements contained in this Article shall apply to any proposed replacement Superintendent, regardless if the proposed tenure is to be temporary or permanent.

§ 3.10.5 The Contractor shall employ a Project Manager to be assigned to the Work. The Project Manager employed by the Contractor shall have a minimum of five (5) years commercial experience as Project Manager on projects of similar size and complexity as the Work. The project manager shall speak fluent English and clearly understand the English language. The Contractor shall submit to the Owner a resume and other supporting documentation showing that the proposed Project Manager is competent and has the minimum work experience required to execute the Work. The Owner reserves the right to request additional supporting documentation regarding the proposed Project Manager's qualifications and to require the Contractor to propose an alternate Project Manager who better meets the requirements contained in this Article, as may reasonably be determined by the Owner. The Contractor shall notify the Architect and Owner in writing of any proposed replacement of the Project Manager. The Contractor shall not replace a competent Project Manager without prior written approval from the Owner. The requirements contained in this Article shall apply to any proposed replacement Project Manager, regardless if the proposed tenure is to be temporary or permanent. The Project Manager shall not act as the Superintendent or replacement for the Superintendent without written approval from the Owner.
§ 3.12 Shop Drawings, Product Data and Samples

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

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

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

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

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

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

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

§ 3.12.8 The Work shall be in accordance with approved accepted 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 acceptance of Shop Drawings, Product Data, Samples, or similar submittals, unless the Contractor has specifically notified the Architect of such deviation at the time of submittal and (1) the Architect has given written approval acceptance to the specific deviation in accordance with 3.12.9 as a minor change in the Work, or (2) a
§ 3.14.2 The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or Separate Contractors by cutting, patching, or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter construction by the Owner or a Separate Contractor except with written consent of the Owner and of the Separate Contractor. Consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold, from the Owner or a Separate Contractor, its consent to cutting or otherwise altering the Work.
§ 3.15 Cleaning Up
§ 3.15.1 The Contractor shall keep the premises and surrounding area free from accumulation of waste materials and rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor’s tools, construction equipment, machinery, and surplus materials from and about the Project.

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

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

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

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

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

ARTICLE 4 ARCHITECT
§ 4.1 General
§ 4.1.1 The Architect is the person or entity retained by the Owner pursuant to Section 2.3.2 and identified as such in the Agreement. Such terms as ‘Architect-Engineer,’ ‘Engineer,’ and ‘A-E,’ if used in these Contract Documents, is intended to mean the Architect and its consultants unless otherwise intended by the context or usage of such terms. Such terms do not mean or include any design professional of the Contractor, Subcontractor, or Owner.

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

§ 4.1.3 Subject to the standard of care for applying professional judgment to information used or relied upon, Architect and its Consultants may use and rely upon design elements, technical standards, test results, and all other information ordinarily or customarily furnished or published by others, including, but not limited to, specialty contractors, manufacturers, fabricators, and suppliers.
§ 4.2 Administration of the Contract

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

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

§ 4.2.2.1 The Contractor shall reimburse the Owner for compensation paid to the Architect for additional site visits made necessary by the fault, neglect or request of the Contractor.

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

§ 4.2.4 Communications

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

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

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

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

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

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

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

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

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

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

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

ARTICLE 5 SUBCONTRACTORS
§ 5.1 Definitions
§ 5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term “Subcontractor” is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term “Subcontractor” does not include a Separate Contractor or the subcontractors of a Separate Contractor.

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

§ 5.2 Award of Subcontracts and Other Contracts for Portions of the Work
§ 5.2.1 Unless otherwise stated in the Contract Documents, the Contractor, as soon as practicable after award of the Contract, shall submit to the Owner and Architect the persons or entities proposed for each principal portion of the Work (list of proposed subcontractors), including those who are to furnish materials or equipment fabricated to a special design. The Architect shall no later than two days prior to the date of the Pre-construction Conference. Include Contractor's License number and Class for each proposed Subcontractor. Within 14 days of receipt of the information, the Architect and Contractor may notify the Contractor whether the Owner or the Architect (1) has reasonable objection to any such proposed person or entity or (2) requires additional time for review. Failure of the Owner or the Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection.
§ 5.2.2 The Contractor shall not contract with a proposed person or entity to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

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

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

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

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

1. assignment is effective only after termination of the Contract by the Owner for cause pursuant to Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor; and

2. assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

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

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

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

ARTICLE 6  CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS
§ 6.1 Owner’s Right to Perform Construction and to Award Separate Contracts
§ 6.1.1 The term “Separate Contractor(s)” shall mean other contractors retained by the Owner under separate agreements. The Owner reserves the right to perform construction or operations related to the Project with the Owner’s own forces, and with Separate Contractors retained under Conditions of the Contract substantially similar to the Contract Documents.
to those of this Contract, including those provisions of the Conditions of the Contract related to insurance and waiver of subrogation.

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

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

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

§ 6.2 Mutual Responsibility

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

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

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

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

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

§ 6.3 Owner’s Right to Clean Up

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

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 General

§ 7.1.1 Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, Construction Change Directive or order for a minor change in the Work, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents.
§ 7.1.2 A Change Order shall be based upon agreement among the Owner, Contractor, and Architect. A Construction Change Directive requires agreement by the Owner and Architect and may or may not be agreed to by the Contractor. An order for a minor change in the Work may be issued by the Architect alone.

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

§ 7.2 Change Orders
§ 7.2.1 A Change Order is a written instrument prepared by the Architect and signed by the Owner, Contractor, and Architect stating their agreement upon all of the following:
   .1 The change in the Work;
   .2 The amount of the adjustment, if any, in the Contract Sum; and
   .3 The extent of the adjustment, if any, in the Contract Time.

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

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

§ 7.3.3 If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:
   .1 Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;
   .2 Unit prices stated in the Contract Documents or subsequently agreed upon;
   .3 Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or
   .4 As provided in Section 7.4.

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

§ 7.1.2.3 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.

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

§ 7.1.2 A Change Order shall be based upon agreement among the Owner, Contractor, and Architect. A Construction Change Directive requires agreement by the Owner and Architect and may or may not be agreed to by the Contractor. An order for a minor change in the Work may be issued by the Architect alone.
§ 7.3.4-7.1.3 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 If a change in the Work results in an adjustment to the Contract Sum, the adjustment (increase or decrease) shall be based on the following, unless noted otherwise:

1. Material quantities and unit prices (separated into trades; include sales tax).
2. Labor costs (raw cost).
3. Labor burden, applied to labor only, including but not limited to, worker’s compensation and public liability, social security tax, old age and unemployment insurance, union welfare fund and fringe benefits. Contractor shall be required to substantiate the labor burden percentage applied to any change in contract amount. Labor burden percentage shall not exceed 30% in any case.
4. Construction equipment cost.
5. Overhead and profit combined (on Claims for net increase only), as defined in Section 7.3.11.
6. Cost of Premiums for Bonds (for Contractor only). Evidence of additional premium for bond shall be submitted with Claim.
7. Extended Overhead Costs (if applicable) which shall be established by pro-rating the value of supervision, temporary facility, and General Conditions and all other direct and indirect costs of Contractor included in the Contract Sum over the number of days included in the Contract Time.

§ 7.2.1 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, forth a reasonable amount. In such case, and also under Section 7.3.3.3, 7.1.2.1.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.1 shall be limited to the following:

data which shall include, at the Architect's sole discretion, a cost breakdown itemized in accordance with the current appropriate Data Book and edition of R. S. Means Company, Inc., or other source of construction industry cost data acceptable to the Architect.

1. Costs of labor, including applicable payroll taxes, fringe benefits required by agreement or custom, workers’ compensation insurance, and other employee costs approved by the Architect. Overhead shall include, but not be limited to, project management, field office personnel including supervision, superintendence, wages of timekeepers, watchmen and clerks, small tools, incidentals, general office expenses, insurance premiums, and all other expenses not included in “costs.”

2. Costs of materials, supplies, and equipment, including cost of transportation, whether incorporated or consumed. If the net value of the change results in a credit, the credit given shall be the net cost without overhead or profit (for Contractor, Subcontractor, or others; Sub-subcontractor). The cost as used herein shall include all items of labor, materials, equipment.

3. Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others; Sub-contractor). The cost as used herein shall include all items of labor, materials, equipment.

4. Costs of premiums for all bonds and insurance, permit fees, and sales, use, or similar taxes, directly related to the change and bonds.

5. Costs of supervision and field office personnel directly attributable to the change.

§ 7.3.5-7.2.2 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 advice the Architect of the Contractor’s agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.

§ 7.3.7 A Construction Change Directive signed by the Contractor indicates the Contractor’s agreement therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.
§ 7.3.8 The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Architect. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

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

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

§ 7.3. In Sections 7.2 and 7.2.1, the amount for overhead and profit combined, included in the total cost to the Owner, shall be based on the following schedule:

.1 for the Contractor, for Work performed by the Contractor’s own forces, 15 percent of the cost.
.2 for the Contractor, for Work performed by the Contractor’s Subcontractors, 5 percent of the amount due the Subcontractors.
.3 for each Subcontractor involved, for Work performed by that Subcontractor’s own forces, 15 percent of the cost.
.4 for each Subcontractor involved, for Work performed by the Subcontractor’s Sub-subcontractor, 5 percent of the amount due the Sub-subcontractor.
.5 cost to which overhead and profit is to be applied shall be determined in accordance with Section 7.2.
.6 In order to facilitate checking of quotations for extras or credits, all proposals, except those so minor that their propriety can be seen by inspection, shall be accompanied by a complete itemization of costs in the manner prescribed above. Where major cost items are changes to Subcontracts, they shall be itemized also. In no case will a change involving over $500.00 be approved without such itemization.

§ 7.4 Minor Changes in the Work

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

ARTICLE 8 TIME

§ 8.1 Definitions

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

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

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

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

§ 8.2 Progress and Completion

§ 8.2.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement, the Contractor confirms that the Contract Time is a reasonable period for performing the Work.
§ 8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, commence the Work prior to the effective date of insurance required to be furnished by the Contractor and Owner.

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

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

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

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

ARTICLE 9   PAYMENTS AND COMPLETION
§ 9.1 Contract Sum
§ 9.1.1 The Contract Sum is stated in the Agreement and, including authorized adjustments, is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents.

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

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

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

§ 9.3.1.1 As provided in Section 7.3.9, 7.1.2.4, such applications may include requests for payment on account of changes in the Work that have been properly authorized by Construction Change Directives, or by interim determinations of the Architect, but not yet included in Change Orders.

§ 9.3.1.2 Applications for Payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay a Subcontractor or supplier, unless such Work has been performed by others whom the Contractor intends to pay.
§ 9.3.1.3 Until final completion, the Owner will pay 95% of the amount due the Contractor on account of progress payments.

§ 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.

§ 9.3.2.1 Contractor shall provide invoices, package slips, or other form of supporting data for materials stored on- or off-site claimed on the progress payment, unless it can be verified through on-site observations. Maintain concise bill of materials and label materials stored on-site for ready identification and verification.

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

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

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

§ 9.5 Decisions to Withhold Certification
§ 9.5.1 The Architect may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect’s opinion the representations to the Owner required by Section 9.4.2 cannot be made. If the Architect is unable to certify payment in the amount of the Application, the Architect will notify the Contractor and Owner as provided in Section 9.4.1. If the Contractor and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect’s opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in Section 3.3.2, because of defective Work not remedied;
.2 third party claims filed or reasonable evidence indicating probable filing of such claims, unless security acceptable to the Owner is provided by the Contractor;
.3 failure of the Contractor to make payments properly to Subcontractors or suppliers for labor, materials or equipment;
.4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
.5 damage to the Owner or a Separate Contractor;
.6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or
.7 repeated failure to carry out the Work in accordance with the Contract Documents.

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

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

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

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

§ 9.6.1.1 The Owner may withhold payments to the Contractor notwithstanding the Architect’s certification if it is necessary, in the Owner’s opinion, to do so to protect the Owner from loss due to any of the reasons set forth in Sections 9.5.1.1 through 9.5.1.7.

§ 9.6.2 Payment of Subcontractors
§ 9.6.2.1 The Contractor shall pay each Subcontractor, no later than seven working 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.

§ 9.6.2.2 Within seven (7) working days after receipt of amounts paid to the Contractor by the Owner for Work performed under this Agreement, the Contractor shall do one of the following:
   a. Pay each Subcontractor for the proportional share of the total payment received from the Owner attributable to the Work performed by the respective Subcontractor under This Agreement; or
   b. Notify the Owner and Architect, and Subcontractor, in writing, of the Contractor’s intention to withhold all or part of the Subcontractor’s payment with the reason for nonpayment.

§ 9.6.2.3 The Contractor shall pay interest to each Subcontractor on all amounts owed by the Contractor that remain unpaid after seven (7) days following receipt by the Contractor of payment from the Owner for Work performed by the affected Subcontractor under this Agreement, except for amounts withheld as allowed in Section 9.6.8.1. Unless otherwise provided under the terms of this Agreement, for purposes solely of these prompt payment provisions, interest shall accrue at the rate of one percent (1%) per month.

§ 9.6.2.4 In each Subcontract, the Contractor shall include a provision requiring each Subcontractor to include or otherwise be subject to the same payment and interest requirements with respect to each lower-tier Subcontractor (Sub-Subcontractor).

§ 9.6.2.5 The Contractor’s obligation to pay interest to a Subcontractor pursuant to the prompt payment provisions is not an obligation of the Owner, and no modification shall be made to this Agreement and no cost reimbursements claim shall be made for the purpose of providing reimbursement by Owner for such interest charge.
§ 9.6.3 The Architect will, on request, furnish to a Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the Architect and Owner on account of portions of the Work done by such Subcontractor.

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

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

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

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

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

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

§ 9.8 Substantial Completion
§ 9.8.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can fully occupy or utilize the Work for its intended use or designated portion thereof, for its intended use with all of the Work’s parts and systems operable as required by the Contract Documents. Only incidental cleaning, if required beyond cleaning needed for the Owner's full occupancy or utilization, may remain for final completion.

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

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

9.8.3.1 The Architect will provide no more than one (1) inspection to determine whether the Work or a designated portion thereof has attained Substantial Completion in accordance with the Contract Documents. The Owner shall deduct from the Contract Sum amounts paid to the Architect for any additional inspections.

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

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

§ 9.9 Partial Occupancy or Use

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

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

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

§ 9.10 Final Completion and Final Payment

§ 9.10.1 Upon receipt of the Contractor’s notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection. When the Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will promptly issue a final Certificate for Payment stating that to the best of the Architect’s knowledge, information and belief, and on the basis of the Architect’s on-site visits and inspections, the Work has been completed in accordance with the Contract Documents so that the Owner can occupy or utilize the Work or designated portion thereof unless otherwise provided in the 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.

9.10.1.1 The Architect will provide no more than one (1) inspection to determine whether the Work or a designated portion thereof has attained final completion in accordance with the Contract Documents. The Owner shall deduct from the Contract Sum amounts paid to the Architect for any additional inspections.

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

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

§ 9.10.4 The making of final payment shall constitute a waiver of Claims by the Owner except those arising from .1 liens, Claims, security interests, or encumbrances arising out of the Contract and unsettled; .2 failure of the Work to comply with the requirements of the Contract Documents; .3 terms of special warranties required by the Contract Documents; or .4 audits performed by the Owner, if permitted by the Contract Documents, after final payment.

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

9.11 LIQUIDATED DAMAGES
9.11.1 The Contractor, and the Contractor’s surety shall be liable for and shall pay the Owner the sums stipulated on the Bid Form, if any, as liquidated damages for each calendar day of delay after the date established for Substantial Completion in the Contract Documents until the Work is substantially complete.

9.11.2 The Owner has established this amount as the proper measure of liquidated damages which the Owner will sustain per day by the failure of the Contractor to substantially complete the Work at the stipulated time and it is not to be construed in any sense as a penalty.
9.11.3 In addition to Liquidated Damages, the Contractor shall pay to the Owner the cost of extended architectural and engineering (including Architect’s on-site representative(s), if any, on-site) services rendered beginning at 61 days from the date of Substantial Completion required by the Contract, as adjusted if applicable, and continuously until final completion is achieved.

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY
§ 10.1 Safety Precautions and Programs
The Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the performance of the Contract.

§ 10.2 Safety of Persons and Property
§ 10.2.1 The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury, or loss to
§ 10.2.2 The Contractor shall comply with, and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities, bearing on safety of persons or property or their protection from damage, injury, or loss.

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

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

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

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

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

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

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

§ 10.3.2 Upon receipt of the Contractor’s notice, the Owner shall may obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of the material or substance or who are to perform the task of removal or safe containment of the material or substance. The Contractor and the Architect
§ 11.1.1 The Contractor shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Contractor shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Owner, Architect, and Architect’s consultants shall be named as additional insureds under the Contractor’s commercial general liability policy or as otherwise described in the Contract Documents.

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

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

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

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

§ 11.2.2 Failure to Purchase Required Property Insurance. If the Owner fails to purchase and maintain the required property insurance, with all of the coverages and in the amounts described in the Agreement or elsewhere in the Contract Documents, the Owner shall inform the Contractor in writing prior to commencement of the Work. Upon receipt of notice from the Owner, the Contractor may delay commencement of the Work and may obtain insurance that will protect the interests of the Contractor, Subcontractors, and Sub-Subcontractors in the Work. When the failure to provide coverage has been cured, § 11.2.2 Property Insurance. The Contractor shall purchase and maintain, in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located, property insurance written on a builder’s risk “all-risk” or equivalent policy form in the amount of the initial Contract Sum as well as subsequent Contract modifications thereto for the entire Work at the site on a replacement cost basis without optional deductibles. Such property insurance shall be maintained, unless otherwise agreed in writing by all persons and entities who are beneficiaries of such insurance, until final payment has been made as provided in Section 9.10 or until no person or entity other than the Owner has an insurable interest in the property required by this Section 11.3 to be covered, whichever is later. This insurance shall include interests of the Owner, the Contractor, Subcontractors and Sub-subcontractors in the Project.

or resolved, the Contract Sum and Contract Time shall be equitably adjusted. In the event the Owner fails to procure coverage, the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent the loss to the Owner would have been covered by the insurance to have been procured by the Owner. The cost of the insurance shall be charged to the Owner by a Change Order. If the Owner does not provide written notice, and the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain the required insurance, the Owner shall reimburse the Contractor for all reasonable costs and damages attributable thereto. § 11.2.3 Property insurance shall be on an “all-risk” or equivalent policy form and shall insure against the perils of fire and extended coverage and physical loss or damage including, without duplication of coverage, theft, vandalism, malicious mischief, collapse, collapse, earthquake, flood, windstorm, false work, testing and startup, temporary buildings, and debris removal, including demolition occasioned by enforcement of any applicable legal requirements, and shall cover reasonable compensation for Architect’s services and expenses required as a result of such insured loss. Coverage for other perils shall not be required unless otherwise provided in the Contract Documents.

§ 11.2.3 Notice of Cancellation or Expiration of Owner’s Required Property Insurance. Within three (3) business days of the date the Owner becomes aware of an impending or actual cancellation or expiration of any property insurance required by the Contract Documents, the Owner shall provide notice to the Contractor of such impending or actual cancellation or expiration. Unless the lapse in coverage arises from an act or omission, § 11.2.4 If the property insurance requires minimum deductibles and such deductibles are identified in the Contract Documents, the Contractor shall pay costs not covered because of such deductibles.

of the Contractor: (1) the Contractor, upon receipt of notice from the Owner, shall have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by either the Owner § 11.2.5 This property insurance shall cover portions of the Work stored off the site, and also portions of the Work in transit.

or the Contractor; (2) the Contract Time and Contract Sum shall be equitably adjusted; and (3) the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent any loss to the Owner would have been covered by the insurance had it not expired or been cancelled. If the Contractor purchases replacement coverage, the cost of the insurance shall be charged to the Owner by an appropriate Change Order. The furnishing of notice by the Owner shall not relieve the Owner of any contractual obligation to provide required § 11.2.6 Partial occupancy or use in accordance with Section 9.9 shall not commence until the insurance company or companies
providing property insurance have consented to such partial occupancy or use by endorsement or otherwise. The Owner and the Contractor shall take reasonable steps to obtain consent of the insurance company or companies and shall, without mutual written consent, take no action with respect to partial occupancy or use that would cause cancellation, lapse, or reduction of insurance.

§ 11.3 Waivers of Subrogation

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

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

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

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

§ 11.5 Adjustment and Settlement of Insured Loss

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

§ 11.5.2 Prior to settlement of an insured loss, the Owner shall notify the Contractor of the terms of the proposed settlement as well as the proposed allocation of the insurance proceeds. The Contractor shall have 14 days from receipt of notice to object to the proposed settlement or allocation of the proceeds. If the Contractor does not object, the Owner shall settle the loss and the Contractor shall be bound by the settlement and allocation. Upon receipt, the Owner shall deposit the insurance proceeds in a separate account and make the appropriate distributions. Thereafter, if no other agreement is made or the Owner does not terminate the Contract for convenience, the Owner and Contractor shall execute a Change Order for reconstruction of the damaged or destroyed Work in the amount allocated for that purpose. If the Contractor timely objects to either the terms of the proposed settlement or the allocation of the proceeds, the Owner may proceed to settle the insured loss, and any dispute between the Owner and Contractor arising out of the settlement or allocation of the proceeds shall be resolved pursuant to Article 15. Pending resolution of any dispute, the Owner may issue a Construction Change Directive for the reconstruction of the damaged or destroyed Work.
ARTICLE 12  UNCOVERING AND CORRECTION OF WORK

§ 12.1 Uncovering of Work

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

§ 12.1.2 If a portion of the Work has been covered that the Architect has not specifically requested to examine prior to its being covered, the Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, the Contractor shall be entitled to an equitable adjustment to the Contract Sum and Contract Time as may be appropriate. If such Work is not in accordance with the Contract Documents, the costs of uncovering the Work, and the cost of correction, shall be at the Contractor’s expense without change to the contract time.

§ 12.2 Correction of Work

§ 12.2.1 Before Substantial Completion

The Contractor shall promptly correct Work rejected by the Architect or Owner or failing to conform to the requirements of the Contract Documents, discovered before Substantial Completion and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Architect’s services and expenses made necessary thereby, shall be at the Contractor’s expense without change to the contract time.

§ 12.2.2 After Substantial Completion

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

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

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

§ 12.2.4 If required by the Owner and the Architect and, upon request by the Owner and prior to the expiration of one year from the date of Substantial Completion, the Architect will conduct and the Contractor shall attend a meeting with the Owner to review the facility operations and performance and the Work.

§ 12.2.5 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.

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

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

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

ARTICLE 13 MISCELLANEOUS PROVISIONS
§ 13.1 Governing Law
The Contract shall be governed by the law of the place where the Project is located, excluding that jurisdiction’s choice of law rules. If the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 15.4.located.

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

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

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

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

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

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

§ 13.4.3 If procedures for testing, inspection, or approval under Sections 13.4.1 and 13.4.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure, including those of repeated procedures and compensation for the Architect’s services and expenses, shall be at the Contractor’s expense without change to contract time.
§ 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 submitted to the Architect.

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

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

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

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT
§ 14.1 Termination by the Contractor
§ 14.1.1 The Contractor may terminate the Contract if the Work is stopped for a period of 30 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, for any of the following reasons:
   .1 Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;
   .2 An act of government, such as a declaration of national emergency, that requires all Work to be stopped;
   .3 Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents; or
   .4 The Owner has failed to furnish to the Contractor reasonable evidence as required by Section 2.2.

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

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

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

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

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

.1 Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;

.2 Accept assignment of subcontracts pursuant to Section 5.4; and

.3 Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

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

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

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

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

.1 that performance is, was, or would have been, so suspended, delayed, or interrupted, by another cause for which the Contractor is responsible; or

.2 that an equitable adjustment is made or denied under another provision of the Contract.

§ 14.4 Termination by the Owner for Convenience
§ 14.4.1 The Owner may, at any time, terminate the Contract for the Owner’s convenience and without cause.

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

.1 cease operations as directed by the Owner in the notice;

.2 take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and

.3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

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

ARTICLE 15 CLAIMS AND DISPUTES
§ 15.1 Claims
§ 15.1.1 Definition
A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, a change in the Contract Time, or other relief with respect to the terms of the Contract. The term “Claim” also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim. This Section 15.1.1 does not require the Owner to file a Claim in order to impose liquidated damages in accordance with the Contract Documents.
§ 15.1.2 Time Limits on Claims
The Owner and Contractor shall commence all Claims and causes of action against the other and arising out of or related to the Contract, whether in contract, tort, breach of warranty or otherwise, in accordance with the requirements of the binding dispute resolution method selected in the Agreement and within the period specified by applicable law, but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive all Claims and causes of action not commenced in accordance with this Section 15.1.2.

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

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

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

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

§ 15.1.5 Claims for Additional Cost
If the Contractor wishes to make a Claim for an increase in the Contract Sum, 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. Time extensions from adverse weather conditions shall not entitle the Contractor to “extended overhead” recovery.

§ 15.1.6.2.1 Weather data utilized to support claims for adverse weather conditions shall be that obtained from the National Oceanic and Atmospheric Administration (NOAA) for the nearest weather station to the Project. Adverse weather conditions are defined as measurable precipitation (MP) of 0.1 " or more, or 1.0" or more of snow or ice pellets, or freezing temperature (FT) for a day (24 hours) when the temperature remains at 32 degrees Fahrenheit or below. Only measurable precipitation (MP) or freezing temperature (FT) shall be permitted to be claimed for any one calendar day. Time extensions for adverse weather conditions shall be cumulative over the duration of the Project time and claims shall not be permitted for days for drying out of rain-soaked soil, snow accumulation, or similar weather-related conditions or resulting Project conditions.

.1 The Contractor agrees that it shall not be entitled to a time extension for normal inclement weather (weather conditions other than “adverse weather conditions”) which could have been expected at the Project locale due to
precipitation or temperature, based upon actual data from the National Oceanic and Atmospheric Administration (NOAA) for the locality closest to the Project for a five-year period preceding the date of the Contract. The Contractor acknowledges and warrants that in making its proposal or bid and Construction Schedule for the Work, it gave due care and consideration to this expected number of calendar days of inclement weather for the locale of the Project and allowed for the impact of normal inclement weather on subsequent Work. During the time of performance, should the expected number of calendar days of normal inclement weather for the locale of the Project be less than originally anticipated by the Contractor and the Owner, at the time of contracting, those days not so affected by normal inclement weather shall be considered float time in the Construction Schedule.

2. The Contractor agrees that the measure of adverse weather conditions due to MP or FT during the period covered by this Contract shall be the number of days where adverse weather conditions comply with the weather data referenced in subparagraph 15.1.6.2.1.

3. Extensions of time will be made only for days in which abnormal adverse weather criteria cited in subparagraph 15.1.6.2.1 occur.

4. If the total calendar days lost due to adverse weather conditions, from the start of the Work at the Project by the Contractor until the principal portions of the Work are enclosed, exceeds the total number of days to be expected to be lost for the same time period, a time extension, if granted, shall only be for the number of calendar days needed to equal the excess number of calendar days lost to such adverse weather conditions.

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

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

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

§ 15.2 Initial Decision
§ 15.2.1 Claims, excluding those where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2 or arising under Sections 10.3, 10.4, and 11.5, shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker, unless otherwise indicated in the Agreement. Except for those Claims excluded by this Section 15.2.1, an initial decision shall be required as a condition precedent to mediation of any Claim. If an initial decision has not been rendered within 30 working days after the Claim has been referred to the Initial Decision Maker, subject to Section 15.2.6 the party asserting the Claim may demand mediation and binding dispute resolution without a decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

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

§ 15.2.3 In evaluating Claims, the Initial Decision Maker may, but shall not be obligated to, consult with or seek information from either party or from persons with special knowledge or expertise who may assist the Initial
Init. / with a copy to Engineer. Claim by mutual agreement. All actions taken on a Claim shall be stated in writing and submitted to the other party, shall review it thoroughly, giving full consideration to its merits. The two parties shall seek to resolve the Claim the mediation. The request may be made concurrently with C. Review and Resolution: The party receiving a Claim reflects the full amount to which Contractor is entitled. that to the best of Contractor’s knowledge and belief the amount of time or money requested accurately Contractor shall certify that the Claim is made in good faith, that the supporting data are accurate and complete, and Claim. In the case of a Claim by Contractor seeking an increase in the Contract Times or Contract Price, or both, the Engineer, for its information only. The responsibility to substantiate a Claim shall rest with the party making the § 15.3.1 Claims, disputes, or other matters in controversy arising out of or related to the Contract, except those waived as provided for in Sections 9.10.4, 9.10.5, and 15.1.7, shall be subject to mediation as a condition precedent to binding dispute resolution. § 15.3.2 The parties shall endeavor to resolve their Claims by mediation which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Mediation Procedures in effect on the date of the Agreement. A request for mediation shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering Submittal of Claim: The party submitting a Claim shall deliver it directly to the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto; in the case of appeals regarding Change Proposals within 30 days of the decision under appeal. The party submitting the Claim shall also furnish a copy to the Engineer, for its information only. The responsibility to substantiate a Claim shall rest with the party making the Claim. In the case of a Claim by Contractor seeking an increase in the Contract Times or Contract Price, or both, Contractor shall certify that the Claim is made in good faith, that the supporting data are accurate and complete, and that to the best of Contractor’s knowledge and belief the amount of time or money requested accurately reflects the full amount to which Contractor is entitled. the mediation. The request may be made concurrently with C. Review and Resolution: The party receiving a Claim shall review it thoroughly, giving full consideration to its merits. The two parties shall seek to resolve the Claim through the exchange of information and direct negotiations. The parties may extend the time for resolving the Claim by mutual agreement. All actions taken on a Claim shall be stated in writing and submitted to the other party, with a copy to Engineer.
D. **Mediation:** The filing of binding dispute resolution proceedings but, in 1. At any time after initiation of a Claim, Owner and Contractor may mutually agree to mediation of the underlying dispute. The agreement to mediate shall stay the Claim submittal and response process. Such event, mediation shall proceed in advance 2. If Owner and Contractor agree to mediation, then after 60 days from such agreement, either Owner or Contractor may unilaterally terminate the mediation process, and the Claim submittal and decision process shall resume as of the date of the termination. If the mediation proceeds but is unsuccessful in resolving the dispute, the Claim submittal and decision process shall resume as of the date of the conclusion of the mediation, as determined by the mediator.

3. Owner and Contractor shall each pay one-half of the mediator’s fees and costs, binding dispute resolution proceedings, which F. **Partial Approval:** If the party receiving a Claim approves the Claim in part and denies it in part, such action shall be final and binding unless within 30 days of such action the other party invokes the following procedure; shall be stayed pending mediation. a. In the event of a Dispute, the Owner and Contractor agree to enter mediation and to work diligently to resolve the dispute. All fees and expenses of the mediation process including any mediation service shall be shared equally by Owner and Contractor.

b. If the Dispute cannot be resolved through mediation, the Owner or Contractor may then pursue resolution in the General Courts of Justice in the County of Moore and the State of North Carolina, for a period of 60 days from the date of filing, unless stayed for F. **Denial of Claim:** If efforts to resolve a Claim are not successful, the party receiving the Claim may deny it by giving written notice of denial to the other party. If the receiving party does not take action on the Claim within 90 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of the inaction, the Claim is deemed denied, thereby commencing the time for appeal of the denial. A denial of the Claim shall be final and binding unless within 30 days of the denial the other party invokes the procedure set forth in Article 17 for the final resolution of disputes.

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

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

§ 15.4.1 Arbitration

§ 15.4.1.1 A demand for arbitration shall be made no earlier than concurrently with the filing of a request for mediation, but in no event shall it be made after the date when the institution of legal or equitable proceedings based on the Claim would be barred by the applicable statute of limitations. For statute of limitations purposes, receipt of a written demand for arbitration by the person or entity administering the arbitration shall constitute the institution of legal or equitable proceedings based on the Claim.
§ 15.4.2 The award rendered by the arbitrator or arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof.

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

§ 15.4.4 Consolidation or Joinder

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

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

§ 15.4.4.3 The Owner and Contractor grant to any person or entity made a party to an arbitration conducted under this Section 15.4, whether by joinder or consolidation, the same rights of joinder and consolidation as those of the Owner and Contractor under this Agreement.
SECTION 011000 - SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 SUMMARY
A. This Section includes the following:
   1. Work covered by the Contract Documents.
   2. Type of the Contract.
   3. Work phases.
   4. Owner-furnished products.
   5. Use of premises.
   6. Owner’s occupancy requirements.
   7. Work restrictions.

1.3 WORK COVERED BY CONTRACT DOCUMENTS
A. Project Identification: Moore County New Courthouse and Existing Courthouse Renovation.
   1. Project Location: Carthage, North Carolina.
B. Owner: Moore County, North Carolina
   1. Owner’s Representative: Wayne Vest, County Manager, phone - (910) 947-4636.
D. The Work consists of the following:
   a. The Work generally consists of a new Courthouse approximately 124,000 square feet. Site improvements include excavating and grading, concrete and asphalt paving, concrete sidewalks and curbs, stormwater improvements, fencing, and landscaping. The building structure consist of steel beams, joists, columns, concrete retaining wall, and structural decking. The exterior walls consist primarily of brick and metal panels, SPF (Sprayed Polyurethane Foam), and metal stud framing. The roof consists of both low-slope membrane. Also included is a renovation of the existing courthouse interior and exterior on the same site with an elevated bridge connector between the existing and new courthouse.
   b. All sitework; including underground utilities and other miscellaneous sitework.
   c. Other work as indicated in the Contract Documents
E. Use of Professional Seals on Bidding, Procurement, and Contract Documents: For the purposes of this paragraph, the term “Regulant” refers to the individual who signs and seals parts of the Contract Documents (e.g. the Drawings and Specifications). Certain information has been excerpted verbatim from a source or sources (e.g., UL Assemblies, SMACNA details, IBC code text) which was considered or used by Regulant in preparing parts of the Contract Documents, as follows:
   1. The excerpted information was neither prepared under the direct control nor personal supervision nor created by the Regulant, as it was prepared by the source and owner of the excerpted information.
   2. For purposes of bidding, procuring, and performance of the Work, and in any event of conflicts or ambiguities between the excerpted information in the Contract Documents...
and the requirements of applicable codes and standards, provide the better quality or
greater quantity of Work which, at a minimum, complies with the requirements of the
applicable codes and standards.
3. Advise Architect immediately upon becoming aware of requirements of the Work
which are not consistent with the requirements of the excerpted information.
4. Attribution is acknowledged for information obtained and included herein verbatim
from other source or sources.
5. Regulant has taken into consideration and used certain excerpted information from
other sources which are applicable to the Contract Documents, and the Regulant
indicates by its seal that it is assuming responsibility for its services in use and
application of the excerpted information to the requirements of Work, but not for the
excerpted information itself which was prepared by others. Regulant does not indicate
by its seal that it is responsible for use or application of other information in such source
or sources which was not included herein.

1.4 TYPE OF CONTRACT
A. Project will be constructed under a single prime contract.

1.5 WORK PHASES
A. The Work shall be conducted in two phases as indicated on sheet A1.1.1:
1. Phase One: Construct new courthouse.
2. Phase Two: Renovate existing courthouse.
B. Before commencing Work of each phase, submit a schedule showing the sequence,
commencement and completion dates, and move-out and -in dates of Owner`s personnel for
all phases of the Work.

1.6 USE OF PREMISES
A. General: Contractor shall have full use of premises for construction operations, including use
of Project site, during construction period. Contractor`s use of premises is limited only by
Owner`s right to perform work or to retain other contractors on portions of Project.
B. Use of Site: Limit use of premises to work in areas indicated. Do not disturb portions of
Project site beyond areas in which the Work is indicated.
1. Limits: Confine constructions operations to Insert description of areas where work is
permitted.
   a. Limit site disturbance, including earthwork and clearing of vegetation, to 40 feet
   beyond building perimeter; 5 feet beyond primary roadway curbs, walkways,
   and main utility branch trenches; and 25 feet beyond pervious paving areas.
2. Owner Occupancy: Allow for Owner occupancy of Project site and use by the public.
3. Driveways 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.
   b. Schedule deliveries to minimize space and time requirements for storage of
materi
   ands and equipment on-site.
C. Clean all construction vehicles and motorized equipment on site so dirt and mud are not
carried onto Owner`s roads, parking lots and off-site public roadways. Keep on-site roads
and parking lots and if necessary, off-site roadways cleaned of all dirt and mud, on a daily basis.
D. Use of Existing Building: Maintain existing building in a weathertight condition throughout construction period. Repair damage caused by construction operations. Protect building and its occupants during construction period.

1.7 OWNER’S OCCUPANCY REQUIREMENTS

A. Partial Owner Occupancy: Owner will occupy the premises during entire construction period, with the exception of areas under construction. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner’s operations. Maintain existing exits, unless otherwise indicated.
   1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and authorities having jurisdiction.
   2. Provide not less than 72 hours’ notice to Owner of activities that will affect Owner’s operations.

B. 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. 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 building.
   4. On occupancy, Owner will assume responsibility for maintenance and custodial service for occupied portions of building.

1.8 WORK RESTRICTIONS

A. On-Site Work Hours – New Courthouse: Work shall be generally performed during normal business working hours of 7 a.m. to 7 p.m., Monday through Friday, except as otherwise indicated.
   1. Weekend Hours: No restrictions.
   2. Early Morning Hours: As approved by Owner.
   3. Hours for Utility Shutdowns: As approved by Owner.

B. On-Site Work Hours – Existing Courthouse: Work shall be generally performed inside the existing building during normal business working hours of 7 a.m. to 7 p.m., Monday through Friday, except as otherwise indicated.
   1. Weekend Hours: As approved in writing by the Owner.
   2. Early Morning Hours: As approved in writing by the Owner.
   3. Hours for Utility Shutdowns: As approved in writing by the Owner.
   4. Hours for Core Drilling/Insert noisy activity: As approved in writing by the Owner.

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 arranging to provide temporary utility services according to requirements indicated:
   1. Notify Owner not less than two days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without Owner's written permission.

1.9 ASBESTOS STATEMENT:
   A. No asbestos-containing materials (ACMs) shall be permitted. To the best of the Architect's knowledge, no ACMs are indicated for use in construction of this Project. Certify, in writing, that no asbestos-containing materials have been included in the Project.

1.10 GENERAL REQUIREMENTS:
   A. It is required that the Contractor and all Subcontractors carefully phase the work to permit orderly flow of vehicular traffic during construction.
   B. Construction site access, isolation of construction operations, safety measures, and other issues will be coordinated and clarified at Pre-construction conference as outlined in the Contract Documents.
   C. Provide security measures to protect the existing building during the entire contract period. Any damage to the existing buildings due to lack of security shall be repaired or replaced by the General Contractor to the satisfaction of the Owner and at no additional cost to the Owner. No increase in the completion time(s) will be allowed for any security-related problems.
   D. Coordinate and schedule security measures with the Owner.
   E. Provide self-contained toilet units in the exterior staging area. The Owner’s interior building toilet facilities shall be “off-limits” to all construction personnel.
   F. After hours and week-end work shall be coordinated in advance with the Owner.
   G. Verify all existing grades, lines, levels, and horizontal and vertical dimensions, prior to commencing construction operations. Report any errors or inconsistencies to the Architect BEFORE beginning any work on this project.
   H. Provide a Rodent and Pest Management plan. Coordinate with Owner and A/E.
   I. Soil and Sediment Erosion Control: The Contractor is required to strictly observe regulations regarding erosion and sediment control procedures. If corrective action is required and not responded to within 24 hours of notice the Owner shall reserve the right to perform the work and back charge the Contractor.

1.11 PATCH AND REPAIRING:
   A. Replace all concrete walks, curbs, gutters, paving, and topsoil and seed where such is not indicated to be disturbed, where disturbed by construction work, to the satisfaction of the Owner.

1.12 SOILS INVESTIGATION
   A. If the Bidder deems available information in soils investigation(s) to be inadequate or inaccurate, he may conduct his own investigation at his own expense. Prior to bid opening, bidder must inform the Owner and the Architect in writing of his concern and obtain permission in writing to conduct his investigation.

1.13 DRAWINGS AND SPECIFICATIONS
   A. Provide all indicated or required equipment and materials with all features normally provided with items, although all features of design and construction may not be indicated in complete details. Include all standard features and appurtenances normally provided and/or required for safe operation.
B. The Contractor shall be responsible for including all items and parts of the Work, as defined by requirements of the Contract Documents. Unless the Contract Documents specifically designate an item of part of the Work that is to be provided by a Subcontractor, then it is the sole responsibility of the Contractor to determine and allocate/assign the performance of each item or part of the Work. The Contractor shall not be entitled to any compensation or adjustment of time or to any other Claim due to any provision of the Contract Documents which assigns or allocates, or fails to assign or allocate, the performance of any item or part of the Work to any specific Subcontractor of Contractor. In no event shall the Contractor be entitled to request an interpretation or decision by, or any determination or instruction from, the Architect concerning or about any assignment or allocation of parts of the Work. The Architect will not be responsible to arbitrate or otherwise resolve any dispute or differences about such allocation or assignment between Contractor and any Subcontractors.

C. “Summary” and “Related Sections” provisions in the Specifications, if any are stated or referred to in any Specification, are provided only for general reference and for convenience, and do not limit or alter in any way the requirements for the provision of the Work in the Contract Documents. Items or parts of the Work, and related provisions of the Contract Documents, even though not listed or stated in any Summary or Related Section provision, but which are indicated elsewhere in the Contract Documents, shall be included in the Work. Even though a Summary or Related Section may not refer to, state, or list each and every part of the Contract Documents which may include provisions about a specific item or part of the Work, all of the other applicable provisions of the Contract Documents remain in full force and effect, and shall be included in determining the requirements for the Work.

1.14 CLEANING AND PROTECTION:
A. General:
   1. During handling and installation, clean and protect construction in progress and adjoining materials in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
   2. Supervise construction activities 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. Retain stored items in orderly arrangement allowing maximum access, not impeding traffic or drainage.
   4. Do not allow accumulation of scrap, debris, waste material, other items not required for construction of this work.
   5. At least twice each month, and more often if necessary, completely remove all scrap, debris, and waste material from the job site.
   6. Provide adequate storage for all items awaiting removal from the job site, observing requirements for fire protection and protection of the ecology.
B. Site:
   1. Daily, and more often if necessary, inspect the site and pick up all scrap, debris, and waste material. Remove such items to place designated for their storage.
   2. Weekly, and more often if necessary, inspect all arrangements of materials stored on the site. Restack, tidy, or otherwise service arrangements to meet requirements of subparagraph above.
   3. Maintain the site in a neat, orderly condition at all times.
C. Structures:
1. Weekly, and more often if necessary, inspect each structure and pick up all scrap, debris, and waste material. Remove such items to place designated for their storage.
2. Weekly, and more often if necessary, sweep interior spaces clean.
3. As required preparatory to installation of succeeding materials, clean structures or pertinent portions thereof to degree of cleanliness recommended by manufacturer of succeeding material, using equipment and materials required to achieve necessary cleanliness.
4. Once finish work begins, the cleaning process will be on a daily basis (and more often if necessary) at all times while finish work is being performed. “Clean”, “Cleaning” shall be interpreted as meaning free from dust and other material capable of being removed by use of reasonable effort and a hand-held broom.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 011000
SECTION 012100 – ALLOWANCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 SUMMARY
   A. Section includes administrative and procedural requirements governing allowances.
      1. Certain items are specified in the Contract Documents by allowances. Allowances have
         been established in lieu of additional requirements and to defer selection of actual
         materials and equipment to a later date when direction will be provided to the Contractor.
         If necessary, additional requirements will be issued by Change Order.

1.3 SELECTION AND PURCHASE
   A. At the earliest practical date after award of the Contract, advise Architect of the date when final
      selection and purchase of each product or system described by an allowance must be completed
      to avoid delaying the Work.
   B. At Architect's request, obtain proposals for each allowance for use in making final selections.
      Include recommendations that are relevant to performing the Work.
   C. Purchase products and systems selected by Architect from the designated supplier.

1.4 SUBMITTALS
   A. Submit proposals for purchase of products or systems included in allowances, in the form
      specified for Change Orders.
   B. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for
      use in fulfillment of each allowance.
   C. Submit time sheets and other documentation to show labor time and cost for installation of
      allowance items that include installation as part of the allowance.
   D. Coordinate and process submittals for allowance items in same manner as for other portions of
      the Work.

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

1.6 LUMP-SUM AND QUANTITY ALLOWANCES
   A. Allowance shall include cost to Contractor of specific products and materials ordered by Owner
      or selected by Architect under allowance and shall include taxes, freight, and delivery to Project
      site.
   B. Unless otherwise indicated, Contractor's costs for receiving and handling at Project site, labor,
      installation, overhead and profit, and similar costs related to products and materials ordered by
Owner or selected by Architect under allowance shall be included as part of the Contract Sum and not part of the allowance.

C. Unused Materials: Return unused materials purchased under an allowance to manufacturer or supplier for credit to Owner, after installation has been completed and accepted.
   1. If requested by Architect, retain and prepare unused material for storage by Owner. Deliver unused material to Owner's storage space as directed.

1.7 ADJUSTMENT OF ALLOWANCES

A. Allowance Adjustment: To adjust allowance amounts, prepare a Change Order proposal based on the difference between purchase amount and the allowance, multiplied by final measurement of work-in-place where applicable. If applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, and similar margins.
   1. Include installation costs in purchase amount only where indicated as part of the allowance.
   2. If requested, prepare explanation and documentation to substantiate distribution of overhead costs and other margins claimed.
   3. Submit substantiation of a change in scope of work, if any, claimed in Change Orders related to unit-cost allowances.
   4. Owner reserves the right to establish the quantity of work-in-place by independent quantity survey, measure, or count.

B. Submit claims for increased costs because of a change in scope or nature of the allowance described in the Contract Documents, whether for the purchase order amount or Contractor's handling, labor, installation, overhead, and profit.
   1. Do not include Contractor's or subcontractor's indirect expense in the Change Order cost amount unless it is clearly shown that the nature or extent of work has changed from what could have been foreseen from information in the Contract Documents.
   2. No change to Contractor's indirect expense is permitted for selection of higher- or lower-priced materials or systems of the same scope and nature as originally indicated.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

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

A. Allowance No. 1: Lump-Sum Allowance: Include the sum of $40,000 for signage referenced in Division 10 Section “Signage” for the new Courthouse.
   1. This allowance includes material cost, receiving, handling, and installation, and Contractor overhead and profit.

B. Allowance No. 2: Lump-Sum Allowance: Include the sum of $10,000 for signage referenced in Division 10 Section “Signage” for the existing Courthouse. This cost will be part of Alternate 1.
   1. This allowance includes material cost, receiving, handling, and installation, and Contractor overhead and profit.

END OF SECTION 012100
SECTION 012300 – ALTERNATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Provisions of the Contract and of the Contract Documents apply to this Section.

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 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 alternate into the Work. No other adjustments are made to the Contract Sum.

1.3 PROCEDURES
   A. Coordination: Modify 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. 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.
   C. Execute accepted alternates under the same conditions as other work of the Contract.
   D. Schedule: A schedule of alternates 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
   A. Alternate No. 1: Existing Courthouse Renovation
      1. Base Bid: Existing Courthouse will not be renovated. Bridge-Connector shall be included in the base bid.
      2. Alternate: Renovate Existing Courthouse per the drawings and specifications.
   B. Alternate No. 2: Existing Courthouse Façade Renovation
1. **Base Bid:** Existing Courthouse Façade will not be renovated except where changes are required to accommodate the Bridge-Connector.

2. **Alternate:** Renovate Existing Courthouse Façade per the drawings and specifications.

**C. Alternate No. 3: Secure Parking lot**

1. **Base Bid:** Existing parking lot on west side of site and south of the existing Register of Deeds building will not be enclosed with fencing/gates and connected to the security system.

2. **Alternate:** Existing parking lot on west side of site and south of the existing Register of Deeds building shall be enclosed with fencing/gates and connected to the security system as indicated on sheet A1.1.1.

**D. Alternate No. 4: Fourth Floor Courtroom furnishings**

1. **Base Bid:** Do not include any millwork/casework and furniture for the fourth floor courtrooms (404 and 418).

2. **Alternate:** Provide all millwork/casework and furniture for the fourth floor courtrooms (404 and 418).

**E. Alternate No. 5: Preferred Manufacturer – Stanley Security**

1. **Base Bid:** Provide any pre-approved Security Control System Contractor listed in the Division 28 specifications.

2. **Alternate:** Provide Stanley Security as the Security Control System Contractor and integrate Courthouse security with existing Stanley Security system in the Rick Rhyne Public Safety Center.

**END OF SECTION 012300**
SECTION 012500 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Provisions of the Contract and Contract Documents apply to this Section.

1.2 DEFINITIONS
   A. Substitutions: Changes in products, materials, equipment, and methods of construction from
      those required by the Contract Documents and proposed by Contractor.
      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 in order to meet other Project requirements but may offer advantage to
         Contractor or Owner.

1.3 SUBMITTALS
   A. Substitution Requests: Contractor shall request and submit a “Substitution Request Form –
      After Receipt of Bids” for all substitutions to be considered after receipt of bids.
      1. Substitution Request Form: Use the Architect’s form, which can be obtained from the
         Architect at the time of the request.
         a. The form is an electronic Word document requiring the Contractor to fill in
            “data fields.”
         b. A copy of the form is attached to the end of this Section for informational
            purposes only. Use the electronic Word document only.
      2. No substitutions will be considered unless submitted using the referenced
         “Substitution Request Form – After Receipt of Bids.”
      3. All substitutions must be submitted by the Contractor, and shall include the
         Contractor’s certification and signature.
         a. Substitution requests submitted directly from subcontractors, sub-
            subcontractors, manufacturers, vendors, installer, and suppliers will be
            rejected.
      4. Supporting data for the Substitution Request shall include:
         a. Coordination information, including a list of changes or modifications needed
            to other parts of the Work and to construction performed by Owner and
            separate contractors, which will be necessary to accommodate proposed
            substitution.
         b. Detailed comparison of significant qualities of proposed substitution 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.
         c. Product Data, including drawings and descriptions of products and fabrication
            and installation procedures.
         d. Samples, where applicable or requested.
         e. Certificates and qualification data, where applicable or requested.
         f. List of similar installations for completed projects with project names and
            addresses and names and addresses of architects and owners.
g. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.

h. Research reports evidencing compliance with building code in effect for Project.

i. Detailed comparison of Contractor’s construction schedule using proposed substitution 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.

j. Cost information, including a proposal of change, if any, in the Contract Sum.

k. 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.

l. 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.

5. Failure to submit the form, or a fully completed form, shall result in the rejection of the proposed substitution.

6. If the proposed substitution is found to be acceptable to the Architect, the request will be forwarded to the Owner for their approval.

7. If the Owner approves the substitution, it will then be included in a Change Order.

8. Only substitutions included in Change Orders shall be allowed to be included in the Work.

9. 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 advise the Owner on acceptability.

   a. Forms of Acceptance: Change Order only.

1.4 QUALITY ASSURANCE

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

1.5 PROCEDURES

   A. Coordination: Modify or adjust affected work as necessary to integrate work of the approved substitutions.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

   A. Substitutions for Cause: Submit requests for substitution immediately upon discovery of need for change, but not later than 21 days prior to time required for preparation and review of related submittals.

   1. Conditions: Architect will consider Contractor’s request for substitution when all of the following conditions are satisfied. If all of 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.
h. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

B. Substitutions for Convenience: Not allowed, unless otherwise indicated.

PART 3 - EXECUTION (NOT USED)

END OF SECTION 012500
SECTION 012600 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 SUMMARY
   A. Section includes administrative and procedural requirements for handling and processing
      Contract modifications.

1.3 MINOR CHANGES IN THE WORK
   A. Architect will issue supplemental instructions authorizing minor changes in the Work, not
      involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710,
      “Architect’s Supplemental Instructions.”

1.4 PROPOSAL REQUESTS
   A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed
      changes in the Work that may require adjustment to the Contract Sum or the Contract Time.
      If necessary, the description will include supplemental or revised Drawings and
      Specifications.
      1. 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 14 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.
      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 Division 01 Section “Substitution Procedures” if the proposed change requires substitution of one product or system for product or system specified.

1.5 ADMINISTRATIVE CHANGE ORDERS
A. Allowance Adjustment: See Division 01 Section “Allowances” for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect actual costs of allowances.
B. 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.

1.6 CHANGE ORDER PROCEDURES

1.7 CONSTRUCTION CHANGE DIRECTIVE
   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.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 012600
SECTION 012900 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 SUMMARY
A. This Section specifies administrative and procedural requirements necessary to prepare and process Applications for Payment.
B. Related Sections:
   1. Section 012100 “Allowances” for procedural requirements governing the handling and processing of allowances.
   2. Section 012200 “Unit Prices” for administrative requirements governing the use of unit prices.
   3. Section 013200 “Construction Progress Documentation” for administrative requirements governing the preparation and submittal of the Contractor’s construction schedule.
   4. Division 01 Section “Submittal Procedures” for administrative requirements governing the preparation and submittal of the submittal schedule.

1.3 SCHEDULE OF VALUES
A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor’s construction schedule.
   1. Correlate line items in the schedule of values with other required administrative forms and schedules, including the following:
      a. Application for Payment forms with continuation sheets.
      b. Submittal schedule.
      c. Items required to be indicated as separate activities in Contractor’s construction schedule.
   2. Submit the schedule of values to Architect at earliest possible date but no later than seven days before the date scheduled for submittal of initial Applications for Payment.
   3. Subschedules for Phased Work: Where the Work is separated into phases requiring separately phased payments, provide subschedules showing values correlated with each phase of payment.
B. Format and Content: Use the Project Manual table of contents format (specification section numbers and names) 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. Name of Architect.
      c. Architect’s project number.
      d. Contractor’s name and address.
      e. Date of submittal.
   2. Arrange the schedule of values in tabular form with separate columns to indicate the following for each item listed:
      a. Related Specification Section or Division.
      b. Description of the Work.
c. Name of subcontractor.
d. Name of manufacturer or fabricator.
e. Name of supplier.
f. Change Orders (numbers) that affect value.
g. Dollar value of the following, as a percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.
   1) Labor.
   2) Materials.
   3) Equipment.
3. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Provide multiple line items for principal subcontract amounts in excess of five percent of Contract Sum or as appropriate.
4. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
5. Provide 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. If required, include evidence of insurance.
6. Provide separate line items in the schedule of values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
7. Allowances: Provide a separate line item in the schedule of values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
8. Each item in the schedule of values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.
   a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the schedule of values or distributed as general overhead expense, at Contractor’s option.
9. 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.

1.4 APPLICATIONS FOR PAYMENT
   A. Each Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.
      1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.
   B. Payment Application Times: Contractor shall submit application for payment at regularly scheduled pay meetings as established at the Pre-Construction Conference. The period covered by each Application for Payment shall be clarified at the Pre-Construction Conference.
   C. Application for Payment Forms: Use AIA Document G702 and AIA Document G703 as form for Applications for Payment.
   D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.
1. Entries shall match data on the schedule of values and Contractor’s construction schedule. Use updated schedules if revisions were made.
2. Include amounts 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.
4. Indicate separate amounts for work being carried out under Owner-requested project acceleration.

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. Materials previously stored and included in previous Applications for Payment.
   b. Work completed for this Application utilizing previously stored materials.
   c. Additional materials stored with this Application.
   d. Total materials remaining stored, including materials with this Application.

F. Transmittal: Submit three signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt within 24 hours. 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. Submittal schedule (preliminary if not final).
7. List of Contractor’s staff assignments.
8. List of Contractor’s principal consultants.
11. Initial progress report.
13. Certificates of insurance and insurance policies.
15. Data needed to acquire Owner’s insurance.

H. Application for Payment at Substantial Completion: After issuing the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

I. Final Payment Application: Submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
   1. Evidence of completion of Project closeout requirements.
   2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
   3. Updated final statement, accounting for final changes to the Contract Sum.
   4. AIA Document G706, “Contractor’s Affidavit of Payment of Debts and Claims.”
   5. AIA Document G707, “Consent of Surety to Final Payment.”
   6. Evidence that claims have been settled.
   7. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
   8. Final liquidated damages settlement statement.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 012900
SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 SUMMARY
   A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
      1. General coordination procedures.
      2. Above ceiling coordination conference and coordination drawings.
      3. Coordination drawings.
      4. Requests for Information (RFIs).
      5. Project meetings.

1.3 DEFINITIONS
   A. RFI: Request from Owner, Architect, or Contractor seeking information required by or clarifications of the Contract Documents.

1.4 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, 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.

   B. 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 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, and by each temporary telephone. Keep list current at all times.

1.5 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.
      4. Where availability of space is limited, coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service,
and repair of all components, including mechanical and electrical.

B. 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.

C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:  
   1. Preparation of Contractor’s construction schedule.  
   2. Preparation of the schedule of values.  
   3. Installation and removal of temporary facilities and controls.  
   4. Delivery and processing of submittals.  
   5. Progress meetings.  
   6. Preinstallation conferences.  
   7. Project closeout activities.  
   8. Startup and adjustment of systems.

1.6 ABOVE-CEILING PRE-CONSTRUCTION CONFERENCE AND COORDINATION DRAWINGS

A. Coordination Drawings: Prior to the Above-Ceiling Pre-Construction Conference, prepare drawings where limited space availability necessitates maximum utilization of space for the proper and efficient installation of the components, materials, and systems (including, but may not be limited to: above finish ceilings; within chases and shafts; and within mechanical and electrical spaces).  
   1. Content: Project-specific information, drawn accurately to scale. Do not base Coordination Drawings on reproductions of the Contract Documents or standard printed data. Include the following information, as applicable:  
      a. Ensure components, materials, and systems are indicated where each are fully functional, operational, accessible, and complete.  
      b. Indicate relationships of components, materials, and systems with surrounding construction.  
      c. Indicate installation sequences to avoid conflicts  
      d. 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. Minor dimension changes and difficult installations will not be considered changes to the Contract.  
   2. Sheet Size: At least 8-1/2 by 11 inches but no larger than 30 by 42 inches.  
   3. Number of Copies: Submit two opaque copies. Architect will return one copy.  
      a. Coordination Drawings will not be approved by the Architect and will be considered as “information only” and will be furnished to the Owner for filing.  
      b. Submit five copies where Coordination Drawings are required for operation and maintenance manuals. Architect will retain two copies; remainder will be returned. Mark up and retain one returned copy as a Project Record Drawing.  
   4. Refer to individual Sections for Coordination Drawing requirements for Work in those Sections.
B. Above-Ceiling Pre-Construction Conference: Schedule and conduct with all affected parties present to review procedures for addressing potential conflicts, review of Coordination Drawings (if furnished) and obtain approval of each affected trade to ensure components, materials, and systems can be installed as intended prior to the Work being performed.
   1. Identify Above-Ceiling Pre-Construction Conference on the Construction Schedule as a “milestone” date.
   2. Advise the Architect of potential conflicts identified in the Coordination Drawings (if furnished) and Above-Ceiling Pre-Construction Conference.
   3. Do not proceed with construction or installation of the components, materials, and systems until potential conflicts identified have been resolved and affected parties have agreed to a remedy.

C. Remedies to address conflicts not identified in the Coordination Drawings (if furnished), Above-Ceiling Pre-Construction Conference, or otherwise addressed prior to construction or installation of the affected components, materials, and systems; or discovery of a non-workable situation without Coordination Drawings on file with the Owner, will not be considered as a basis of delay, time extension, or additional cost to the Contract.

1.7 REQUESTS FOR INFORMATION (RFIs)

A. General: Immediately on discovery of the need for additional information or interpretation of Contract Documents, Contractor shall prepare and submit an RFI in the form specified.
   1. Architect will return RFIs submitted to Architect by other entities controlled by Contractor with no response.
   2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor’s work or work of subcontractors.
   3. RFIs that would be clearly answered by simply reading the Contract Documents and that are not open to reasonable misinterpretation therefrom may be deemed "frivolous" by the Architect. The cost in time and materials to respond to frivolous RFI’s shall be the responsibility of the Contractor.

B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
   1. Project name.
   2. Project number.
   3. Date.
   4. Name of Contractor.
   5. Name of Architect.
   6. RFI number, numbered sequentially.
   7. RFI subject.
   8. Specification Section number and title and related paragraphs, as appropriate.
   9. Drawing number and detail references, as appropriate.
   10. Field dimensions and conditions, as appropriate.
   11. Contractor’s suggested resolution. If Contractor’s suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
   12. Contractor’s signature.
   13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
      a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.
C. Architect’s Action: Architect will review each RFI, determine action required, and respond. Allow seven working days for Architect’s response for each RFI. RFIs received by Architect 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 of additional information.

3. Architect’s action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to conditions of the Contract.
   a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 10 days of receipt of the RFI response.

D. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log at intervals as established. Software log with not less than the following:

1. Project name.
2. Name and address of Contractor.
3. Name and address of Architect.
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.

E. 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. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.

1.8 PROJECT MEETINGS

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

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

2. Agenda: The Architect will prepare the meeting agenda and distribute it to all invited attendees.

3. Minutes: The Architect will record significant discussions and agreements achieved. Within 7 days of the meeting the Architect will distribute the meeting minutes to the Owner, the Architect’s consultants, and to the Contractor for distribution to his personnel and attending major subcontractors, manufacturers, suppliers and other concerned parties.
B. Preconstruction Conference: Schedule a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement. Hold the conference at Project site or another convenient location. The Architect shall conduct the meeting to review responsibilities and personnel assignments.

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

2. Agenda: Discuss items of significance that could affect progress, including the following:
   a. Tentative construction schedule.
   b. Phasing.
   c. Critical work sequencing and long-lead items.
   d. Designation of key personnel and their duties.
   e. Lines of communications.
   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. Air barrier requirements.
   m. Coordination and submittal of color & finish related selections.
   n. Preparation of record documents.
   o. Use of the premises.
   p. Work restrictions.
   q. Working hours.
   r. Owner’s occupancy requirements.
   s. Responsibility for temporary facilities and controls.
   t. Procedures for moisture and mold control.
   u. Procedures for disruptions and shutdowns.
   v. Construction waste management and recycling.
   w. Parking availability.
   x. Office, work, and storage areas.
   y. Equipment deliveries and priorities.
   z. First aid.
   bb. Progress cleaning.

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

C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction. Contractor conducts conferences, records and distributes meeting minutes.

1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect and Owner's Commissioning Authority of scheduled meeting dates.
2. Agenda: Contractor will review of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
   b. Options.
   c. Related RFIs.
   d. Related Change Orders.
   e. Purchases.
   f. Deliveries.
   g. Submittals.
   h. Review of mockups.
   i. Possible conflicts.
   j. Compatibility requirements.
   k. Time schedules.
   l. Weather limitations.
   m. Manufacturer’s written instructions.
   n. Warranty requirements.
   o. Compatibility of materials.
   p. Acceptability of substrates.
   q. Air barrier requirements.
   r. Temporary facilities and controls.
   s. Space and access limitations.
   t. Regulations of authorities having jurisdiction.
   u. Testing and inspecting requirements.
   v. Installation procedures.
   w. Coordination with other work.
   x. Required performance results.
   y. Protection of adjacent work.
   z. Protection of construction and personnel.
3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
5. 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. Project Closeout Conference: Schedule and conduct a project closeout conference, at a time convenient to Owner and Architect, but no later than 90 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 Owner, Owner's Commissioning Authority, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
   3. 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. Submittal of written warranties.

d. Requirements for preparing operations and maintenance data.

e. Requirements for delivery of material samples, attic stock, and spare parts.

f. Requirements for demonstration and training.

g. Preparation of Contractor’s punch list.

h. Procedures for processing Applications for Payment at Substantial Completion and for final payment.

i. Submittal procedures.

j. Owner’s partial occupancy requirements.

k. Installation of Owner’s furniture, fixtures, and equipment.

l. Responsibility for removing temporary facilities and controls.

4. Minutes: Entity conducting meeting will record and distribute meeting minutes.

E. Progress Meetings: The Architect shall conduct progress meetings at monthly intervals.

1. Coordinate dates of meetings with preparation of payment requests.

2. Attendees: Representatives of the Owner, the Architect, and the Contractor shall be represented at each of these meetings. Design consultants, Subcontractors, suppliers, and other entities concerned with current progress or involved in planning, coordination, or performance of future activities may be invited to attend these meetings on an as needed basis to resolve specific issues. All participants at these meetings shall be familiar with Project and authorized to conclude matters relating to the Work.

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

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

   1) Review schedule for next period.

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

   1) Interface requirements.
   2) Sequence of operations.
   3) Status of submittals.
   4) Deliveries.
   5) Off-site fabrication.
   6) Access.
   7) Site utilization.
   8) Temporary facilities and controls.
   9) Progress cleaning.
  10) Quality and work standards.
  11) Status of correction of deficient items.
  12) Field observations.
  13) Status of RFIs.
14) Field Clarification. (FC)
15) Status of proposal requests.
16) Pending changes. (Potential Change Order – PCO)
17) Status of Change Orders. (CO)
18) Pending claims and disputes.
19) Documentation of information for payment requests.

4. Minutes: Architect will record and Contractor will distribute meeting minutes.

5. Reporting: Distribute minutes of the meeting to each party present and to parties who should have been present.
   a. Schedule Updating: Revise Contractor’s construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 013100
SECTION 013200 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 SUBMITTALS (for information only; no action will be taken by the Architect)
A. Submittal Schedule: Submit three copies of schedule. Arrange the following information in a tabular format:
   1. Scheduled date for each submittal.
   2. Specification Section number and title.
   3. Submittal category (action or informational).
   4. Name of subcontractor.
   5. Description of the Work covered.
   6. Scheduled date for Architect’s final release or approval.

B. Contractor’s Construction Schedule: Submit two opaque copies of initial schedule, large enough to show entire schedule for entire construction period.
   1. Submit an electronic copy of schedule, using software indicated, on CD-R, and labeled to comply with requirements for submittals. Include type of schedule (Initial or Updated) and date on label.

C. Daily Construction Reports: Submit two copies at monthly intervals.
D. Field Condition Reports: Submit two copies at time of discovery of differing conditions.
E. Special Reports: Submit two copies at time of unusual event.

1.3 COORDINATION
A. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate contractors.
B. Coordinate Contractor’s Construction Schedule with the Submittals Schedule, and other required schedules and reports.
   1. Secure time commitments for performing critical elements of the Work from parties involved.
   2. Coordinate each construction activity with other activities and schedule them in proper sequence.

PART 2 - PRODUCTS

2.1 SUBMITTAL SCHEDULE
A. Preparation: Submit a schedule of submittals, arranged in chronological order by dates required by Contractor’s Construction Schedule. Include time required for review, resubmittal, ordering, manufacturing, fabrication, and delivery when establishing dates.
   1. Coordinate Submittals Schedule with Contractor’s Construction Schedule.
      a. At Contractor’s option, show submittals on the Construction Schedule, instead of tabulating them separately.

2.2 CONTRACTOR’S CONSTRUCTION SCHEDULE (CPM SCHEDULE)
A. Procedures: Prepare precedence diagram network using AON (activity-on-node) format. Comply with procedures contained in AGC’s “Construction Planning & Scheduling.”
B. Time Frame: Extend schedule from date established for Commencement of the Work to date of Final Completion.
   1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.

C. Preliminary Network Diagram: Submit diagram within 14 days of date established for Commencement of the Work. Outline significant construction activities for the first 60 days of construction. Include skeleton diagram for the remainder of the Work based on indicated activities.

D. CPM Schedule: Prepare Contractor’s Construction Schedule using a computerized, time-scaled CPM network analysis diagram for the Work.
   1. Develop network diagram for Owner review no later than 30 days after date established for Commencement of the Work.
      a. Failure to include any work item required for performance of this Contract shall not excuse Contractor from completing all Work within applicable completion dates.
   2. Use “one workday” as the unit of time. Include list of nonworking days and holidays incorporated into the schedule.

E. Activities: Treat each story or separate area as a separate activity for each principal element of the Work. Comply with the following:
   1. Activity Duration: Define activities so no activity is longer than 20 days, unless specifically allowed by Architect.
   2. 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. Identify the minimum 30-day time period allowed for color selection activity conducted by Owner and Architect to result in project color schedule.
   4. Startup and Testing Time: As a predecessor to Substantial Completion include activities of reasonable duration for startup and testing of equipment. Schedule should include activities for individual / specific areas, not just one activity for entire project.
   5. Building Commissioning and Testing: As a predecessor to Substantial Completion include a reasonable duration period for building commissioning and testing.
   6. Substantial Completion: Indicate completion of work activities in advance of the date established for Substantial Completion, and include separate activities for Architect’s administrative procedures necessary for certification of Substantial Completion.

F. CPM Schedule Preparation and Constraints: Prepare a list of all activities required to complete the Work. Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
   1. Phasing: Arrange list of activities on schedule by phase.
   2. Work by Others: Include a separate activity for each portion of the Work performed by Owner or other contractors necessary for the completion of the Work.
   3. Owner-Furnished Products: Include a separate activity for each product. Coordinate delivery dates established by Owner with the project schedule.
4. Owner-Furnished Permanent Utilities: Include separate activities indicating when permanent utilities are required.

5. Activities and Work Restrictions: Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Include estimated time frames and show the effect of the following items on the schedule as applicable:
   a. Coordination with existing construction.
   b. Limitations of continued occupancies.
   c. Utility interruptions.
   d. Uninterruptible services.
   e. Partial occupancy before Substantial Completion.
   f. Use of premises restrictions.
   g. Provisions for future construction.
   h. Seasonal variations.
   i. Environmental control.
   j. Preparation and processing of submittals.
   k. Mobilization and demobilization.
   l. Work by Owner that may affect or be affected by Contractor’s activities.

6. Work Stages: Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
   a. Fabrication.
   b. Installation.
   c. Tests and inspections, including commissioning.
   d. Adjusting.
   e. Startup and placement into final use and operation.

7. Area Separations: 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 frame completion.
   b. Permanent building enclosure.
   c. Substantial Completion of mechanical installation.
   d. Substantial Completion of electrical installation.
   e. Substantial Completion.
   f. Final Completion.

8. 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.

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

G. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed (Commencement of the Work), Substantial Completion, and Final Completion.

H. Initial Issue of Schedule: Prepare initial network diagram from a list of straight “late finish-total float” sort. Identify critical activities. Prepare tabulated reports showing the following:
1. Description of activity.
2. Early and late start dates.
3. Early and late finish dates.
5. Total float or slack time.

I. Submittal of the Final Construction Schedule by the Contractor certifies that the work will be prosecuted in accordance with the Schedule, subject to any change therein which is implemented in accordance with the Contract Documents.

J. Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:
   1. Identification of all activities and relationships that have changed.
   2. Changes in early and late start dates.
   3. Changes in early and late finish dates.
   5. Changes in the critical path.
   6. Changes in total float or slack time.

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

L. Computer Software: Prepare schedules using a program that has been developed specifically to manage construction schedules.
   1. SureTrak Project Manager or alternate software acceptable to Owner and Architect.

2.3 RECOVERY SCHEDULE

A. Should the updated Construction Schedule show at any time during Contractor’s performance, in the sole opinion of the Owner, that the Contractor is fourteen (14) or more days behind schedule for any Specific Date, or should Contractor be required to undertake actions under the General Conditions hereof, the Contractor shall prepare a Recovery Schedule at no additional cost to the Owner (unless the sole responsibility for the event or occurrence which has caused the schedule slippage is through no fault of the Contractor) explaining and displaying how Contractor intends to reschedule the Work in order to regain compliance with the Construction Schedule during the immediate subsequent pay period.

B. Recovery Schedule Requirements:
   1. The Contractor shall prepare and submit to the Owner a one-month maximum duration Recovery Schedule, which demonstrates how the progress of the Work will return to the approved Construction Schedule at the earliest possible time. The Contractor shall prepare a Recovery Schedule to same level of detail as the Construction Schedule for a maximum duration of one month. This Recovery Schedule shall be prepared in coordination with other separate contractors on the Project.
   2. Contractor shall advise the Owner of the effectiveness of the Recovery Schedule during the schedule recovery time period. At the conclusion of the one month schedule recovery period, the Owner will direct the Contractor as follows:
      a. If the Owner determines the Contractor is still behind schedule, the Owner will direct the Contractor to prepare a Schedule Revision and comply with all of the requirements of a Schedule Revision as stated herein and the other requirements of the Contract Documents; provided, however, that nothing herein shall limit in any way the rights and remedies of the Owner as provided
2.4 SCHEDULE REVISIONS

A. Should Contractor desire to or be required under the Contract Documents to make modifications or changes in his method of operation, his sequence of Work or the durations of the activities in the Construction Schedule, the Contractor shall do so in accordance with the requirements of the Contract Documents. Revisions to the approved Construction Schedule shall be identified by the Contractor in writing and approved in writing by the Owner prior to incorporation into the approved schedule.

B. Logic modifications associated with change orders shall affect only those activities and performance dates directly concerned. Adjustments in scheduled intermediate Completion Dates or for the Contract as a whole will be considered only to the extent that there is insufficient remaining float to absorb these changes.

C. Revisions to Contractor’s Construction Schedule required under terms of this Section shall not modify the Contract Time or any Milestone Date and shall not modify or limit the Contractor’s obligations under this Contract.

D. If there are separate contractors on the Project, prior to the submission by the Contractor of proposed schedule revision, the Contractor shall meet with and gain written approval of the separate contractors to make the revisions which shall be evidenced by the signatures of said separate contractors on the proposed schedule revisions. If accepted by the Owner the revisions shall be binding upon Contractor and all separate contractors on the Project.

E. Submittal of any proposed schedule revisions by the Contractor certifies that he will prosecute the Work in accordance with the schedule revision, subject to any change therein which is implemented in accordance with the Contract Documents.

2.5 REPORTS

A. Daily Construction Reports: Prepare a daily construction report recording, at a minimum, the following information concerning events at Project site:
   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. High and low temperatures and general weather conditions.
   7. Meetings and significant decisions.
   8. Unusual events (refer to special reports).
   9. Stoppages, delays, shortages, and losses.
   10. Meter readings and similar recordings.
   11. Orders and requests of authorities having jurisdiction.
   12. Change Orders received and implemented.
   13. Construction Change Directives received and implemented.
   14. Services connected and disconnected.
   15. Equipment or system tests and startups.
   16. Partial Completions and occupancies.
   17. Substantial Completions authorized.
B. Field Condition Reports: Immediately on discovery of a difference between field conditions and the Contract Documents, prepare and submit a detailed report. Submit with a request for interpretation on CSI Form 13.2A or alternate form acceptable to Architect. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

2.6 SPECIAL REPORTS

A. General: Submit special reports directly to Owner within one day 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 CONTRACTOR’S CONSTRUCTION SCHEDULE

A. Contractor’s Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week in advance of the regularly scheduled monthly meeting designated for the review of the project schedule by the architect.

1. Revise schedule after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.

2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.

3. As the Work progresses, indicate Actual Start Dates, Actual Finish Dates and an accurate Completion Percentage for each activity.

B. Distribution: Distribute copies of approved schedule to Architect, Owner, and additional parties determined by the Contractor.

1. Post copies in Project meeting rooms and temporary field offices.

2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

END OF SECTION 013200
SECTION 013300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 SUMMARY
A. Section includes requirements for submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, Sustainable Design data, and other submittals.
B. Related Sections:
   1. Division 01 Section “Payment Procedures” for submitting Applications for Payment and the schedule of values.
   2. Division 01 Section “Construction Progress Documentation” for submitting schedules and reports, including Contractor’s construction schedule.
   3. Division 01 Section “Closeout Procedures” for submitting warranties, record documents, operation and maintenance manuals, and video recordings of demonstration of equipment and training of Owner’s personnel.

1.3 DEFINITIONS
A. Action Submittals: Written and graphic information and physical samples that require Architect’s responsive action. Action submittals are those submittals indicated in individual Specification Sections as “action submittals.”
B. Informational Submittals: Written and graphic information and physical samples that do not require Architect’s responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as “informational submittals.”
C. File Transfer Protocol (FTP): Communications protocol that enables transfer of files to and from another computer over a network and that serves as the basis for standard Internet protocols. An FTP site is a portion of a network located outside of network firewalls within which internal and external users are able to access files.

1.4 SUBMITTAL SCHEDULE
A. Submittal Schedule: Submit a schedule 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 modifications to submittals noted by the Architect and additional time for handling and reviewing submittals required by those corrections.
   1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor’s construction schedule.
   2. Initial Submittal: Submit concurrently with start-up construction schedule. 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.
   3. Final Submittal: Submit concurrently with the first complete submittal of Contractor’s construction schedule.
a. Submit revised submittal schedule to reflect changes in current status and timing for submittals.

1.5 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

A. Electronic (CADD) Files: The Contractor may request electronic (CADD) files utilizing the Architect’s Request Form.

B. Completeness: Submittals shall be complete in every respect and bound in sets. Each Submittal shall be clearly marked to show each item, component and/or optional feature proposed to be incorporated into the Project.
   1. Incomplete submittals may be returned without action. Incomplete submittal packages returned without action or for additional information are not subject to delay claims.

C. 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 different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
      a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

5. Color Selection: In individual specification sections, specific items are identified which require color/finish selections to be made by the Architect from color chart or sample submittals. The Submittal Schedule, prepared according to “Submittal Schedule” paragraph above, shall identify these required color/finish submittals. The Architect will make coordinated selections of colors/finishes for the building interior, present the resulting color concepts to the Owner for approval, and prepare the actual Color Schedule for the Work.
      a. Submittals requiring color selection must be submitted by Contractor and approved by Architect for conformance with Contract Documents prior to the start of the color selection process. When the submittals have been approved for conformance with Contract Documents, the process for color selection, presentation of color concepts, Owner approval, and Color Schedule preparation will begin.
      b. After approval of all interior color related submittals for conformance with Contract Documents, the Contractor shall allow a minimum of 60 days for the color selection, Owner’s approval process, and preparation of the Color Schedule.

D. Processing Time: Allow enough time for submittal review, including time for resubmittals, in accordance with General Conditions and as follows. 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 sufficient time 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
2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
3. Resubmittal Review: Allow sufficient time for review of each resubmittal.
4. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing or to allow for a resubmittal, if necessary.

E. Identification and Information: Identify and incorporate information in each electronic submittal file as follows:
1. Assemble complete submittal package into a single indexed file with links enabling navigation to each item.
2. Name file with submittal number or other unique identifier, including revision identifier.
3. Provide means for insertion to permanently record Contractor’s review and approval markings and action taken by Architect.
4. Include the following information on an inserted cover sheet:
   a. Project name.
   b. Date.
   c. Name and address of Architect.
   d. Name of Contractor.
   e. Name of firm or entity that prepared submittal.
   f. Name of subcontractor.
   g. Name of supplier.
   h. Name of manufacturer.
   i. Number and title of appropriate Specification Section.
   j. Drawing number and detail references, as appropriate.
   k. Location(s) where product is to be installed, as appropriate.
   l. Related physical samples submitted directly.
   m. Other necessary identification.
5. Include the following information as keywords in the electronic file metadata:
   a. Project name.
   b. Number and title of appropriate Specification Section.
   c. Manufacturer name.
   d. Product name.

F. Options: Identify options requiring selection by the Architect.

G. Deviations: Identify deviations from the Contract Documents on submittals. Submittals without deviations identified will be considered to be in compliance with all requirements.

H. Transmittal: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect will return submittals, without review, received from sources other than Contractor.
1. Transmittal Form: Use AIA G810, or other approved form.
2. On an attached separate sheet, prepared on Contractor’s letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.

I. 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. Resubmit submittals until they are marked with approval notation from Architect’s action stamp.

J. 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.

K. Use for Construction: Use only final submittals that are marked with approval notation from Architect’s action stamp.

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections. Action Submittals, for each specification section, shall be submitted as a complete package.

1. Electronic submittals are acceptable on this project. Prior to construction, the Contractor and Architect shall discuss the method for exchanging files. The Architect’s Newforma InfoExchange website and procedures can be used at no charge. If the Contractor chooses to use a different platform and methodology:
   a. The Architect may reject the methodology or platform proposed and
      1) use the Architect’s Newforma InfoExchange website, or
      2) the project team will revert to traditional hard-copy exchange.
   b. If the Contractor’s platform and methodology is acceptable, the Contractor shall bear the cost of software, licensing, training, etc., for the project team to participate.

2. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Division 01 Section “Closeout Procedures.”

3. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
   a. Provide a digital signature with digital certificate on electronically-submitted certificates and certifications where indicated.
   b. Provide a notarized statement on original paper copy certificates and certifications where indicated.

4. Test and Inspection Reports Submittals: Comply with requirements specified in Division 01 Section “Quality Requirements.”

2.2 ACTION SUBMITTALS

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 not suitable for use, submit as Shop Drawings, not as Product Data.
   2. Mark each copy of each submittal to show which products and options are applicable.
   3. Include the following information, as applicable:
      a. Manufacturer’s catalog cuts.
      b. Manufacturer’s product specifications.
c. Manufacturer’s printed and published installation instructions.

d. Standard color charts.

e. Statement of compliance with specified referenced standards.

f. Testing by recognized testing agency.

g. Application of testing agency labels and seals.

h. Notation of coordination requirements.

i. Availability and delivery time information.

4. For equipment, include the following in addition to the above, as applicable:

   a. Wiring diagrams showing 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 or concurrent 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.

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.

2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches but no larger than 30 by 42 inches.


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

1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.

2. Identification: Attach label on unexposed side of Samples that includes the following:

   a. Generic description of Sample.

   b. Product name and name of manufacturer.

   c. Sample source.

   d. Number and title of applicable Specification Section.

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

   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.
4. Samples: 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 will retain two Sample sets; remainder will be returned.
   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. Delegated-Design Services:
   1. 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.
      a. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.
   2. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally-signed PDF electronic file and three (3) 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.
      a. 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.

E. Application for Payment: Comply with requirements in Division 01 Section "Payment Procedures".

2.3 INFORMATIONAL SUBMITTALS
   A. Schedule of Values: Comply with requirements in Division 01 Section "Payment Procedures".
   B. Contractor’s Construction Schedule: Comply with requirements specified in Division 01 Section “Construction Progress Documentation.”
   C. 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.
      4. Submit subcontract list as PDF electronic file.
   D. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and...
addresses, contact information of architects and owners, and other information specified.

E. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on American Welding Society (AWS) forms. Include names of firms and personnel certified.

F. 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.

G. 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.

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

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

J. 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.

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

L. Research 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:

1. Name of evaluation organization.
2. Date of evaluation.
3. Time period when report is in effect.
4. Product and manufacturers’ names.
5. Description of product.
6. Test procedures and results.
7. Limitations of use.

M. Schedule of Tests and Inspections: Comply with requirements specified in Division 01 Section “Quality Requirements.”

N. 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.

O. 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 primers and substrate preparation needed for adhesion.

P. Field Test Reports: Submit 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.

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

2.4 CLOSEOUT SUBMITTALS (AND MAINTENANCE MATERIAL SUBMITTALS)
A. Comply with requirements specified in Division 01 Section "Closeout Procedures."
B. Maintenance Data: Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment.

PART 3 - EXECUTION

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

3.2 ARCHITECT’S ACTION
A. General: Architect will not review submittals that do not bear Contractor’s approval stamp and will return them without action.
B. Action Submittals: Architect will review each submittal, make marks to indicate corrections required, and return it. The Architect will attach a comment sheet that will indicate what “action” the Contractor shall take. “Actions” and review procedure will be clarified at the Preconstruction Conference.
C. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.
D. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval as noted from Architect.
E. Incomplete submittals are not acceptable, will be considered nonresponsive, and will be returned without review.
F. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

END OF SECTION 013300
SECTION 014000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 SUMMARY
A. Section includes administrative and procedural requirements for quality assurance and quality control.
B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
   1. Specific quality-assurance and -control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
   2. Specified tests, inspections, and related actions do not limit Contractor’s other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
   3. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.
C. Related Sections:
   1. Division 01 Section “Construction Progress Documentation” for developing a schedule of required tests and inspections.
   2. Divisions 02 through 49 Sections for specific test and inspection requirements.

1.3 DEFINITIONS
A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect.
C. Mockups: Full size physical assemblies that are constructed on-site. Mockups are constructed to verify selections made under sample submittals; to demonstrate aesthetic effects and, where indicated, qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.
   1. Integrated Exterior Mockups: Mockups of the exterior envelope erected separately from the building but on the project site, consisting of multiple products, assemblies and subassemblies.
D. Preconstruction Testing: Tests and inspections performed specifically for the Project before products and materials are incorporated into the Work to verify performance or compliance with specified criteria.
E. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.

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

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

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

I. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
   1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individ-uals, or that requirements specified apply exclusively to specific trade or trades.

J. Experienced: When used with an entity or individual, “experienced” means having successfully completed work similar in nature, size, and extent to this Project; being familiar with special requirements indicated; having complied with requirements of authorities having jurisdiction; and whose work has resulted in construction with a record of successful in-service performance.

1.4 CONFLICTING REQUIREMENTS
A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect for a decision before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.5 ACTION SUBMITTALS
A. Shop Drawings: For integrated exterior mockups, provide plans, sections, and elevations, indicating materials and size of mockup construction.
   1. Indicate manufacturer and model number of individual components.
   2. Provide axonometric drawings for conditions difficult to illustrate in two dimensions.

1.6 INFORMATIONAL SUBMITTALS
A. Contractor’s Quality-Control Plan: For quality-assurance and quality-control activities and responsibilities.

B. Contractor’s Quality-Control Manager Qualifications: For supervisory personnel.

C. Contractor’s Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility sent to authorities having jurisdiction before starting work on the following systems.
   1. Seismic-force resisting system, designated seismic system, or component listed in the designated seismic system quality assurance plan prepared by the Architect.
2. Main wind-force resisting system or a wind-resisting component listed in the wind-force resisting system quality assurance plan prepared by the Architect.

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.

1.7 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. Coordinate with Contractor’s construction schedule.

B. Quality-Control Personnel Qualifications: Engage qualified full-time personnel trained and experienced in managing and executing quality-assurance and quality-control procedures similar in nature and extent to those required for Project.

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: Include in quality-control plan 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.
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 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.

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

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, and telephone number 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 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, and telephone number 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 whether conditions, products, and installation will affect warranty.  
5. Other required items indicated in individual Specification Sections.  

D. Permits, Licenses, and Certificates: For Owner’s records, 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.  

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

F. Specialists: Certain 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 for the activities indicated.
   1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.

G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections; and where required by authorities having jurisdiction, that is acceptable to authorities.
   1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
   2. NVLAP: A testing agency accredited according to NIST’s National Voluntary Laboratory Accreditation Program.

H. 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 installation of manufacturer’s products that are similar in material, design, and extent to those indicated for this Project.

J. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:
   1. Contractor responsibilities include the following:
      a. Provide test specimens representative of proposed products and construction.
      b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
      c. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
      d. Build site-assembled test assemblies and mockups using installers who will perform same tasks for Project.
      e. When testing is complete, remove test specimens, assemblies, and mockups; do not reuse products on Project.
   2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect 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 in location and of size indicated or, if not indicated, as directed by Architect.
2. Notify Architect seven days in advance of dates and times when mockups will be constructed.
3. Employ supervisory personnel who will oversee mockup construction. Employ workers that will be employed during the construction at the Project.
4. Demonstrate the proposed range of aesthetic effects and workmanship.
5. Obtain Architect’s approval of mockups before starting work, fabrication, or construction.
   a. Allow seven days for initial review and each re-review of each mockup.
6. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
7. Demolish and remove mockups when directed, unless otherwise indicated.

L. Integrated Exterior Mockups: 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.
1. Preinstallation Conference: Conduct conference at Project site of the Contractor, contributing trades, ABAA auditor, and air barrier manufacturer’s technical representative. Advise Architect and Owner of scheduled meeting date. Review methods and procedures related to veneer systems, masonry veneer, SPF insulation, and air barrier terminations at boundaries and rough masonry openings, including, but not limited to, the following:
   a. Meet with Architect and installing trade superintendents.
   b. Review materials, methods and sequence to incorporate continuous air barrier construction in accordance with Division 01 Section “Exterior Building Enclosure Air Barrier Requirements.”
   c. Review methods and procedures related to masonry veneer installation, including sequencing of masonry flashing, air barrier materials, installation of glazed framing systems, and installation of masonry veneer. Review method for keeping air cavity free of mortar droppings.
   d. Review flashings, weep holes, cavity drainage, and condition of other construction that will affect brick veneer wall performance.
   e. Demonstrate proposed method for keeping the cavity free of mortar droppings.
   f. Confirm head anchorage of glazed framing systems at steel lintel will not penetrate or damage flashing.
   g. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.10 QUALITY CONTROL

A. Owner Responsibilities: Where quality-control services are indicated as Owner’s responsibility, Owner will engage a qualified testing agency to perform these services.
1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
2. Payment for these services will be made from testing and inspecting allowances, as authorized by Change Orders.
3. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor.

B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor’s responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.
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.
2. Where services are indicated as Contractor’s responsibility, engage a qualified testing agency to perform these 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 inspecting 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 inspecting 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.

C. Manufacturer’s Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Division 01 Section “Submission Procedures.”

D. 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.

E. 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.

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

G. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested.
Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
1. Access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
4. Facilities for storage and field curing of test samples.
5. Delivery of samples to testing agencies.
6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
7. Security and protection for samples and for testing and inspecting equipment at Project site.

H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
1. Schedule times for tests, inspections, obtaining samples, and similar activities.

I. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents as a component of the Contractor's quality-control plan. Coordinate and submit concurrently with Contractor's construction schedule. Update as the Work progresses.
1. Distribution: Distribute schedule to Owner, Architect, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

1.11 SPECIAL INSPECTIONS AND TESTS

A. Special Inspections and Tests: Owner will engage a qualified special inspector to conduct special inspections and tests required by authorities having jurisdiction as the responsibility of Owner, as indicated in Statement of Special Inspections attached to this Section, and as follows:
1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviewing the completeness and adequacy of those procedures to perform the Work.
2. Notifying Architect and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect with copy to Contractor and to authorities having jurisdiction.
4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
6. Retesting and reinspecting corrected work.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

A. 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 modifications as they occur. Provide access to test and inspection log for Architect’s reference during normal working hours.

3.2 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
1. Provide materials and comply with installation requirements specified in other Specification Sections 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 Division 01 Section “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 014000
SECTION 014200 - REFERENCES

PART I - GENERAL

1.1 RELATED DOCUMENTS
A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 DEFINITIONS
A. General: Basic Contract definitions are included in the General Conditions of the Contract. The definitions of this section are in addition to, not in place of, those found in the General Conditions.
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. “Installer”: An installer is Contractor or another entity engaged by Contractor, as an employee, subcontractor, or contractor of lower tier, to perform a particular construction operation, including installation, erection, application, and similar operations.
   1. Using a term such as “carpentry” does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as “carpenter.” It also does not imply that requirements specified apply exclusively to tradespeople of the corresponding generic name.
I. "Provide": Furnish and install, complete and ready for the intended use.
J. "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.
K. “Punch List” (AIA A201): A “punch list” is a listing of work items required by the Contract Documents which are incomplete or non-conforming. The list of observed deficiencies is compiled in the course of review to determine if the Contractor has attained Substantial Completion. It does not constitute a definitive list of remaining work items, and does not limit, amend or supersede requirements of the Contract Documents. Completion of punchlist items is a requirement to achieve Substantial Completion, in accordance with the General Conditions.
L. “Replace”: The term “replace” means to provide an acceptable like product or material in the place of a missing or unacceptable (rejected) product or material. To “replace” an unacceptable product or material includes its removal and disposal. (The term “reinstall” shall be used to indicate reuse of the original.)
M. "Written" or "Printed" when used in conjunction with manufacturer’s product handling and installation requirements means to comply with the manufacturer’s current printed and published information.

1.3 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 the date of the Contract Documents, unless otherwise indicated.

C. Conflicting Requirements: Where compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to Architect for a decision before proceeding.

1. 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 the requirements. Refer uncertainties to Architect for a decision before proceeding.

D. Copies of Standards: Each entity engaged in construction on Project must 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 the publication source and make them available on request.

E. Abbreviations and Names: Abbreviations and acronyms are frequently used in the Specifications and other Contract Documents to represent the name of a trade association, standards-developing organization, authorities having jurisdiction, or other entity in the context of referencing a standard or publication. Where abbreviations and acronyms are used in the Specifications or other Contract Documents, they mean the recognized name of these entities. Refer to Gale Research’s “Encyclopedia of Associations” or Columbia Books’ “National Trade & Professional Associations of the U.S.,” which are available in most libraries.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 014200

REFERENCES
Statement of Special Inspections

<table>
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<tr>
<th>PROJECT</th>
<th>Moore County Courthouse and Renovation</th>
</tr>
</thead>
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<tr>
<td>LOCATION</td>
<td>Carthage, NC</td>
</tr>
<tr>
<td>PERMIT APPLICANT</td>
<td>Moore County</td>
</tr>
<tr>
<td>APPLICANT’S ADDRESS</td>
<td>PO Box 905, One Courthouse Square, Carthage, NC</td>
</tr>
<tr>
<td>PERMIT NUMBER</td>
<td>TBD</td>
</tr>
<tr>
<td>ARCHITECT OF RECORD</td>
<td>Moseley Architects</td>
</tr>
<tr>
<td>STRUCTURAL ENGINEER OF RECORD</td>
<td>Moseley Architects</td>
</tr>
</tbody>
</table>

- This statement of Special Inspections is submitted as a condition for permit issuance in accordance with Section 1704.3 of the 2018 North Carolina Building Code. It includes a Schedule of Special Inspections applicable to this Project that is located on the Contract Documents, as well as the name of the Special Inspector and the identity of other testing laboratories or agencies intended to be retained for conducting these inspections.

- The Special Inspector shall keep records of all inspections, shall furnish inspection reports to the Code Official and to the Structural Engineer or Architect of Record. All discovered discrepancies shall be brought to the immediate attention of the Contractor for correction. If the discrepancies are not corrected, the discrepancies shall be brought to the attention of the Code Official and the Structural Engineer or Architect of Record. Interim reports shall be submitted to the Code Official, Owner, and Structural Engineer or Architect of Record.

- A Final Report of Special Inspections documenting completion of all required Special Inspections and correction of discrepancies noted in the interim reports shall be submitted upon completion of the inspections.

- Jobsite safety is solely the responsibility of the Contractor. Materials and activities to be inspected are not to include the Contractor’s equipment and methods used to erect or install the materials listed.

Prepared By: MOSELEY ARCHITECTS

Signature: ____________________________

Printed Name: Steven Cooke, P.E.

APPLICANT’S AUTHORIZATION

Signature: ____________________________

Date: ____________________________

BUILDING OFFICIAL’S ACCEPTANCE

Signature: ____________________________

Date: ____________________________
This statement of Contractor’s Responsibility is submitted by the Contractor as a condition for permit issuance in accordance with Section 1704.4 of the 2018 North Carolina Building Code. The contractor is responsible for the construction of the main wind or seismic force resistance system, designated seismic system(s), and wind or seismic-resisting components listed in the Statement of Special Inspections.

- The contractor acknowledges awareness of the special wind or seismic requirements contained in the Statement of Special Inspections.

- The contractor acknowledges that control will be exercised to obtain conformance with the construction documents approved by the building official.

- The contractor shall attach to this document, procedures for exercising control within the contractor’s organization, the method and frequency of reporting and the distribution of the reports.

- The contractor shall attach to this document, identification and qualifications of the person(s) exercising such control and their position(s) in the organization.

Prepared By: MOSELEY ARCHITECTS

Signature: 

Printed Name: Steven Cooke, P.E.

<table>
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<tr>
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CONTRACTOR’S AUTHORIZATION

Signature: ____________________________

Date: ____________________________

BUILDING OFFICIAL’S ACCEPTANCE

Signature: ____________________________

Date: ____________________________
SECTION 014520 - TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 SUMMARY
   A. Section Includes:
      1. Balancing Air Systems:
         a. Constant-volume air systems.
         b. Variable-air-volume systems.
      2. Balancing Hydronic Piping Systems:
         a. Constant-flow hydronic systems.
         b. Variable-flow hydronic systems.
      3. Testing, Adjusting, and Balancing Equipment:
         a. Motors.
         b. Chillers.
         c. Condensing units.
         d. Boilers.
         e. Heat-transfer coils.
      4. Testing, adjusting, and balancing existing systems and equipment.

1.3 DEFINITIONS
   B. BAS: Building automation systems.
   D. TAB: Testing, adjusting, and balancing.
   F. TAB Specialist: An independent entity meeting qualifications to perform TAB work.
   G. TDH: Total dynamic head.
1.4 PREINSTALLATION MEETINGS

A. TAB Conference: If requested by the Owner, conduct a TAB conference at Project site after approval of the TAB strategies and procedures plan to develop a mutual understanding of the details. Provide a minimum of 14 days' advance notice of scheduled meeting time and location.

   1. Minimum Agenda Items:
      b. The TAB plan.
      c. Needs for coordination and cooperation of trades and subcontractors.
      d. Proposed procedures for documentation and communication flow.

1.5 ACTION SUBMITTALS

A. Sustainable Design Submittals:
   1. TAB Report: Documentation indicating that Work complies with ASHRAE/IES 90.1, Section 6.7.2.3 - "System Balancing."

1.6 INFORMATIONAL SUBMITTALS

A. Warranty: Submit warranties indicated below.

B. Special Guarantee: Submit Special guarantee indicated below

C. Qualification Data: Within 30 days of Contractor's Notice to Proceed, submit documentation that the TAB agent and this Project's TAB team members meet the qualifications specified in "Quality Assurance" Article.

D. Contract Documents Examination Report: Within 60 days of Contractor's Notice to Proceed, submit the Contract Documents review report as specified in Part 3.


F. System Readiness Checklists: Within 90 days of Contractor's Notice to Proceed, submit system readiness checklists as specified in "Preparation" Article.

G. Examination Report: Submit a summary report of the examination review required in "Examination" Article.

H. Certified TAB reports.

I. Sample report forms.
1.7 QUALITY ASSURANCE

A. Agent Qualifications: Agent and agent’s representatives shall be certified by either AABC or NEBB.

B. The following information shall be submitted as part of the Quality Assurance Submittal:

1. Provide evidence of satisfactory completion of at least two projects of similar size and scope. Submit the following for each project:
   a. Completed testing and balancing reports for each project.
   b. If not included in the testing and balancing report, provide equipment startup checklists for each project.
   c. Owner contact for each project.
   d. Design engineer contact for each project.
   e. Architect contact for each project.

2. The architect shall determine whether the agent is qualified and the decision shall be final. Re-submittals on behalf of the same company shall not be considered.

C. TAB Conference: Meet with the Owner's and the Architect's representatives on approval of the TAB strategies and procedures plan to develop a mutual understanding of the details. Ensure the participation of TAB team members, equipment manufacturers' authorized service representatives, HVAC controls Installer, and other support personnel. Set meeting and submit TAB Conference Notification.

1. Minimum Agenda:
   a. Submittal distribution requirements.
   c. TAB plan.
   d. Work schedule and project site access requirements.
   e. Coordination and cooperation of trades and subcontractors.
   f. Coordination of documentation and communication flow.

D. TAB Reports: Use standard forms from AABC's "National Standards for TAB" or NEBB's "Procedural Standards for TAB of Environmental Systems."

E. Instrumentation Type, Quantity, and Accuracy: As described in NEBB's "Procedural Standards for TAB of Environmental Systems," Section II, "Required Instrumentation for NEBB Certification."

F. Instrumentation Calibration: Calibrate instruments at least every 6 months or more frequently if required by the instrument manufacturer.

G. ASHRAE/IES 90.1 Compliance: Applicable requirements in ASHRAE/IES 90.1, Section 6.7.2.3 - "System Balancing."
1.8 COORDINATION

A. Coordinate the efforts of work performed under other sections for operation of systems and equipment to support and assist TAB activities.

B. Notice: Provide 7 days advance notice to the Contractor and Architect for each test. Include scheduled test dates and times.

C. Perform TAB after leakage and pressure tests on air and water distribution systems have been satisfactorily completed.

1.9 FIELD CONDITIONS

A. Partial Owner Occupancy: Owner may occupy completed areas of building before Substantial Completion. Cooperate with Owner during TAB operations to minimize conflicts with Owner's operations.

1.10 WARRANTY

A. General Warranty: The national project performance guarantee indicated in this Article shall not deprive the Owner of other rights the 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.

B. Special Guarantee: Provide a guarantee on NEBB or AABC forms stating that NEBB or AABC will assist in completing the requirements of the Contract Documents if the TAB Agent fails to comply with the Contract Documents. Guarantee includes the following provisions:

1. The certified Agent has tested and balanced systems according to the Contract Documents.

2. Systems are balanced to optimum performance capabilities within design and installation limits.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems designs that may preclude proper TAB of systems and equipment.
B. Examine installed systems for balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers. Verify that locations of these balancing devices are applicable for intended purpose and are accessible.

C. Examine the approved submittals for HVAC systems and equipment.

D. Examine design data including HVAC system descriptions, statements of design assumptions for environmental conditions and systems output, and statements of philosophies and assumptions about HVAC system and equipment controls.

E. Examine ceiling plenums and underfloor air plenums used for supply, return, or relief air to verify that they are properly separated from adjacent areas. Verify that penetrations in plenum walls are sealed and fire-stopped if required.

F. Examine equipment performance data including fan and pump curves.
   1. Relate performance data to Project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.
   2. Calculate system-effect factors to reduce performance ratings of HVAC equipment when installed under conditions different from the conditions used to rate equipment performance. To calculate system effects for air systems, use tables and charts found in AMCA 201, "Fans and Systems," or in SMACNA's "HVAC Systems - Duct Design." Compare results with the design data and installed conditions.

G. Examine system and equipment installations and verify that field quality-control testing, cleaning, and adjusting specified in individual Sections have been performed.

H. Examine test reports specified in individual system and equipment Sections.

I. Examine HVAC equipment and verify that bearings are greased, belts are aligned and tight, filters are clean, and equipment with functioning controls is ready for operation.

J. Examine terminal units, such as variable-air-volume boxes, and verify that they are accessible and their controls are connected and functioning.

K. Examine strainers. Verify that startup screens have been replaced by permanent screens with indicated perforations.

L. Examine control valves for proper installation for their intended function of throttling, diverting, or mixing fluid flows.

M. Examine heat-transfer coils for correct piping connections and for clean and straight fins.

N. Examine system pumps to ensure absence of entrained air in the suction piping.

O. Examine operating safety interlocks and controls on HVAC equipment.
P. Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.

3.2 PREPARATION

A. Prepare a TAB plan that includes the following:

1. Equipment and systems to be tested.
3. Instrumentation to be used.
4. Sample forms with specific identification for all equipment.

B. Perform system-readiness checks of HVAC systems and equipment to verify system readiness for TAB work. Include, at a minimum, the following:

1. Airside:
   a. Verify that leakage and pressure tests on air distribution systems have been satisfactorily completed.
   b. Duct systems are complete with terminals installed.
   c. Volume, smoke, and fire dampers are open and functional.
   d. Clean filters are installed.
   e. Fans are operating, free of vibration, and rotating in correct direction.
   f. Variable-frequency controllers' startup is complete and safeties are verified.
   g. Automatic temperature-control systems are operational.
   h. Ceilings are installed.
   i. Windows and doors are installed.
   j. Suitable access to balancing devices and equipment is provided.

2. Hydronics:
   a. Verify leakage and pressure tests on water distribution systems have been satisfactorily completed.
   b. Piping is complete with terminals installed.
   c. Water treatment is complete.
   d. Systems are flushed, filled, and air purged.
   e. Strainers are pulled and cleaned.
   f. Control valves are functioning per the sequence of operation.
   g. Shutoff and balance valves have been verified to be 100 percent open.
   h. Pumps are started and proper rotation is verified.
   i. Pump gage connections are installed directly at pump inlet and outlet flanges or in discharge and suction pipe prior to valves or strainers.
   j. Variable-frequency controllers' startup is complete and safeties are verified.
   k. Suitable access to balancing devices and equipment is provided.
3.3 GENERAL PROCEDURES FOR TESTING AND BALANCING

A. Perform testing and balancing procedures on each system according to the procedures contained in ASHRAE 111 or SMACNA's "HVAC Systems - Testing, Adjusting, and Balancing" and in this Section.

B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary for TAB procedures.
   1. After testing and balancing, patch probe holes in ducts with same material and thickness as used to construct ducts.
   2. Install and join new insulation that matches removed materials. Restore insulation, coverings, vapor barrier, and finish according to Section 230713 "Duct Insulation," Section 230716 "HVAC Equipment Insulation," and Section 230719 "HVAC Piping Insulation."

C. Mark equipment and balancing devices, including damper-control positions, valve position indicators, fan-speed-control levers, and similar controls and devices, with paint or other suitable, permanent identification material to show final settings.

D. Take and report testing and balancing measurements in inch-pound (IP) units.

3.4 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

A. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Cross-check the summation of required outlet volumes with required fan volumes.

B. Prepare schematic diagrams of systems' "as-built" duct layouts.

C. For variable-air-volume systems, develop a plan to simulate diversity.

D. Determine the best locations in main and branch ducts for accurate duct-airflow measurements.

E. Check airflow patterns from the outdoor-air louvers and dampers and the return- and exhaust-air dampers through the supply-fan discharge and mixing dampers.

F. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.

G. Verify that motor starters are equipped with properly sized thermal protection.

H. Check dampers for proper position to achieve desired airflow path.

I. Check for airflow blockages.

J. Check condensate drains for proper connections and functioning.

K. Check for proper sealing of air-handling-unit components.

L. Verify that air duct system is sealed as specified in Section 233113 "Metal Ducts."
3.5 PROCEDURES FOR CONSTANT-VOLUME AIR SYSTEMS

A. Adjust fans to deliver total indicated airflows within the maximum allowable fan speed listed by fan manufacturer.

1. Measure total airflow.
   a. Set outside-air, return-air, and relief-air dampers for proper position that simulates minimum outdoor-air conditions.
   b. Where duct conditions allow, measure airflow by Pitot-tube traverse. If necessary, perform multiple Pitot-tube traverses to obtain total airflow.
   c. Where duct conditions are not suitable for Pitot-tube traverse measurements, a coil traverse may be acceptable.
   d. If a reliable Pitot-tube traverse or coil traverse is not possible, measure airflow at terminals and calculate the total airflow.

2. Measure fan static pressures as follows:
   a. Measure static pressure directly at the fan outlet or through the flexible connection.
   b. Measure static pressure directly at the fan inlet or through the flexible connection.
   c. Measure static pressure across each component that makes up the air-handling system.
   d. Report artificial loading of filters at the time static pressures are measured.

3. Review Record Documents to determine variations in design static pressures versus actual static pressures. Calculate actual system-effect factors. Recommend adjustments to accommodate actual conditions.

4. Obtain approval from Architect, Construction Manager, and commissioning authority for adjustment of fan speed higher or lower than indicated speed. Comply with requirements in HVAC Sections for air-handling units for adjustment of fans, belts, and pulley sizes to achieve indicated air-handling-unit performance.

5. Do not make fan-speed adjustments that result in motor overload. Consult equipment manufacturers about fan-speed safety factors. Modulate dampers and measure fan-motor amperage to ensure that no overload occurs. Measure amperage in full-cooling, full-heating, economizer, and any other operating mode to determine the maximum required brake horsepower.

B. Adjust volume dampers for main duct, submain ducts, and major branch ducts to indicated airflows.

1. Measure airflow of submain and branch ducts.
2. Adjust submain and branch duct volume dampers for specified airflow.
3. Re-measure each submain and branch duct after all have been adjusted.

C. Adjust air inlets and outlets for each space to indicated airflows.

1. Set airflow patterns of adjustable outlets for proper distribution without drafts.
2. Measure inlets and outlets airflow.
3. Adjust each inlet and outlet for specified airflow.
4. Re-measure each inlet and outlet after they have been adjusted.
D. Verify final system conditions.

1. Re-measure and confirm that minimum outdoor, return, and relief airflows are within design. Readjust to design if necessary.
2. Re-measure and confirm that total airflow is within design.
3. Re-measure all final fan operating data, rpms, volts, amps, and static profile.
4. Mark all final settings.
5. Test system in economizer mode. Verify proper operation and adjust if necessary.
6. Measure and record all operating data.
7. Record final fan-performance data.

3.6 PROCEDURES FOR VARIABLE-AIR-VOLUME SYSTEMS

A. Adjust the variable-air-volume systems as follows:

1. Verify that the system static pressure sensor is located two-thirds of the distance down the duct from the fan discharge.
2. Verify that the system is under static pressure control.
3. Select the terminal unit that is most critical to the supply-fan airflow. Measure inlet static pressure, and adjust system static pressure control set point so the entering static pressure for the critical terminal unit is not less than the sum of the terminal-unit manufacturer's recommended minimum inlet static pressure plus the static pressure needed to overcome terminal-unit discharge system losses.
4. Calibrate and balance each terminal unit for maximum and minimum design airflow as follows:
   a. Adjust controls so that terminal is calling for maximum airflow. Some controllers require starting with minimum airflow. Verify calibration procedure for specific project.
   b. Measure airflow and adjust calibration factor as required for design maximum airflow. Record calibration factor.
   c. When maximum airflow is correct, balance the air outlets downstream from terminal units.
   d. Adjust controls so that terminal is calling for minimum airflow.
   e. Measure airflow and adjust calibration factor as required for design minimum airflow. Record calibration factor. If no minimum calibration is available, note any deviation from design airflow.
   f. When in full cooling or full heating, ensure that there is no mixing of hot-deck and cold-deck airstreams unless so designed.
   g. On constant volume terminals, in critical areas where room pressure is to be maintained, verify that the airflow remains constant over the full range of full cooling to full heating. Note any deviation from design airflow or room pressure.

5. After terminals have been calibrated and balanced, test and adjust system for total airflow. Adjust fans to deliver total design airflows within the maximum allowable fan speed listed by fan manufacturer.
   a. Set outside-air, return-air, and relief-air dampers for proper position that simulates minimum outdoor-air conditions.
b. Set terminals for maximum airflow. If system design includes diversity, adjust terminals for maximum and minimum airflow so that connected total matches fan selection and simulates actual load in the building.
c. Where duct conditions allow, measure airflow by Pitot-tube traverse. If necessary, perform multiple Pitot-tube traverses to obtain total airflow.
d. Where duct conditions are not suitable for Pitot-tube traverse measurements, a coil traverse may be acceptable.
e. If a reliable Pitot-tube traverse or coil traverse is not possible, measure airflow at terminals and calculate the total airflow.

6. Measure fan static pressures as follows:
   a. Measure static pressure directly at the fan outlet or through the flexible connection.
   b. Measure static pressure directly at the fan inlet or through the flexible connection.
   c. Measure static pressure across each component that makes up the air-handling system.
   d. Report any artificial loading of filters at the time static pressures are measured.

7. Set final return and outside airflow to the fan while operating at maximum return airflow and minimum outdoor airflow.
   a. Balance the return-air ducts and inlets the same as described for constant-volume air systems.
   b. Verify that terminal units are meeting design airflow under system maximum flow.

8. Re-measure the inlet static pressure at the most critical terminal unit and adjust the system static pressure set point to the most energy-efficient set point to maintain the optimum system static pressure. Record set point and give to controls contractor.

9. Verify final system conditions as follows:
   a. Re-measure and confirm that minimum outdoor, return, and relief airflows are within design. Readjust to match design if necessary.
   b. Re-measure and confirm that total airflow is within design.
   c. Re-measure final fan operating data, rpms, volts, amps, and static profile.
   d. Mark final settings.
   e. Test system in economizer mode. Verify proper operation and adjust if necessary. Measure and record all operating data.
   f. Verify tracking between supply and return fans.

3.7 GENERAL PROCEDURES FOR HYDRONIC SYSTEMS

A. Prepare test reports for pumps, coils, and heat exchangers. Obtain approved submittals and manufacturer-recommended testing procedures. Crosscheck the summation of required coil and heat exchanger flow rates with pump design flow rate.

B. Prepare schematic diagrams of systems' "as-built" piping layouts.

C. In addition to requirements in "Preparation" Article, prepare hydronic systems for testing and balancing as follows:
1. Check liquid level in expansion tank.
2. Check highest vent for adequate pressure.
3. Check flow-control valves for proper position.
4. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.
5. Verify that motor starters are equipped with properly sized thermal protection.
6. Check that air has been purged from the system.

3.8 PROCEDURES FOR CONSTANT-FLOW HYDRONIC SYSTEMS

A. Adjust pumps to deliver total design gpm.
   1. Measure total water flow.
      a. Position valves for full flow through coils.
      b. Measure flow by main flow meter, if installed.
      c. If main flow meter is not installed, determine flow by pump TDH or exchanger pressure drop.
   2. Measure pump TDH as follows:
      a. Measure discharge pressure directly at the pump outlet flange or in discharge pipe prior to any valves.
      b. Measure inlet pressure directly at the pump inlet flange or in suction pipe prior to any valves or strainers.
      c. Convert pressure to head and correct for differences in gage heights.
      d. Verify pump impeller size by measuring the TDH with the discharge valve closed. Note the point on manufacturer's pump curve at zero flow, and verify that the pump has the intended impeller size.
      e. With valves open, read pump TDH. Adjust pump discharge valve until design water flow is achieved.

B. Adjust flow-measuring devices installed in mains and branches to design water flows.
   1. Measure flow in main and branch pipes.
   2. Adjust main and branch balance valves for design flow.
   3. Re-measure each main and branch after all have been adjusted.

C. Adjust flow-measuring devices installed at terminals for each space to design water flows.
   1. Measure flow at terminals.
   2. Adjust each terminal to design flow.
   3. Re-measure each terminal after it is adjusted.
   4. Position control valves to bypass the coil, and adjust the bypass valve to maintain design flow.
   5. Perform temperature tests after flows have been balanced.
D. For systems with pressure-independent valves at terminals:
   1. Measure differential pressure and verify that it is within manufacturer's specified range.
   2. Perform temperature tests after flows have been verified.

E. For systems without pressure-independent valves or flow-measuring devices at terminals:
   1. Measure and balance coils by either coil pressure drop or temperature method.
   2. If balanced by coil pressure drop, perform temperature tests after flows have been verified.

F. Verify final system conditions as follows:
   1. Re-measure and confirm that total water flow is within design.
   2. Re-measure final pumps' operating data, TDH, volts, amps, and static profile.
   3. Mark final settings.

G. Verify that memory stops have been set.

3.9 PROCEDURES FOR VARIABLE-FLOW HYDRONIC SYSTEMS

A. Balance systems with automatic two- and three-way control valves by setting systems at maximum flow through heat-exchange terminals, and proceed as specified above for hydronic systems.

B. Adjust the variable-flow hydronic system as follows:
   1. Verify that the differential-pressure sensor is located as indicated.
   2. Determine whether there is diversity in the system.

C. For systems with no diversity:
   1. Adjust pumps to deliver total design gpm.
      a. Measure total water flow.
         1) Position valves for full flow through coils.
         2) Measure flow by main flow meter, if installed.
         3) If main flow meter is not installed, determine flow by pump TDH or exchanger pressure drop.
      b. Measure pump TDH as follows:
         1) Measure discharge pressure directly at the pump outlet flange or in discharge pipe prior to any valves.
         2) Measure inlet pressure directly at the pump inlet flange or in suction pipe prior to any valves or strainers.
         3) Convert pressure to head and correct for differences in gage heights.
4) Verify pump impeller size by measuring the TDH with the discharge valve closed. Note the point on manufacturer's pump curve at zero flow and verify that the pump has the intended impeller size.

5) With valves open, read pump TDH. Adjust pump discharge valve until design water flow is achieved.


2. Adjust flow-measuring devices installed in mains and branches to design water flows.
   a. Measure flow in main and branch pipes.
   b. Adjust main and branch balance valves for design flow.
   c. Re-measure each main and branch after all have been adjusted.

3. Adjust flow-measuring devices installed at terminals for each space to design water flows.
   a. Measure flow at terminals.
   b. Adjust each terminal to design flow.
   c. Re-measure each terminal after it is adjusted.
   d. Position control valves to bypass the coil and adjust the bypass valve to maintain design flow.
   e. Perform temperature tests after flows have been balanced.

4. For systems with pressure-independent valves at terminals:
   a. Measure differential pressure and verify that it is within manufacturer's specified range.
   b. Perform temperature tests after flows have been verified.

5. For systems without pressure-independent valves or flow-measuring devices at terminals:
   a. Measure and balance coils by either coil pressure drop or temperature method.
   b. If balanced by coil pressure drop, perform temperature tests after flows have been verified.

6. Prior to verifying final system conditions, determine the system differential-pressure set point.

7. If the pump discharge valve was used to set total system flow with variable-frequency controller at 60 Hz, at completion open discharge valve 100 percent and allow variable-frequency controller to control system differential-pressure set point. Record pump data under both conditions.

8. Mark final settings and verify that all memory stops have been set.

9. Verify final system conditions as follows:
   a. Re-measure and confirm that total water flow is within design.
   b. Re-measure final pumps' operating data, TDH, volts, amps, and static profile.
   c. Mark final settings.
10. Verify that memory stops have been set.

D. For systems with diversity:

1. Determine diversity factor.
2. Simulate system diversity by closing required number of control valves, as approved by the design engineer.
3. Adjust pumps to deliver total design gpm.
   a. Measure total water flow.
      1) Position valves for full flow through coils.
      2) Measure flow by main flow meter, if installed.
      3) If main flow meter is not installed, determine flow by pump TDH or exchanger pressure drop.
   b. Measure pump TDH as follows:
      1) Measure discharge pressure directly at the pump outlet flange or in discharge pipe prior to any valves.
      2) Measure inlet pressure directly at the pump inlet flange or in suction pipe prior to any valves or strainers.
      3) Convert pressure to head and correct for differences in gage heights.
      4) Verify pump impeller size by measuring the TDH with the discharge valve closed. Note the point on manufacturer's pump curve at zero flow and verify that the pump has the intended impeller size.
      5) With valves open, read pump TDH. Adjust pump discharge valve until design water flow is achieved.
4. Adjust flow-measuring devices installed in mains and branches to design water flows.
   a. Measure flow in main and branch pipes.
   b. Adjust main and branch balance valves for design flow.
   c. Re-measure each main and branch after all have been adjusted.
5. Adjust flow-measuring devices installed at terminals for each space to design water flows.
   a. Measure flow at terminals.
   b. Adjust each terminal to design flow.
   c. Re-measure each terminal after it is adjusted.
   d. Position control valves to bypass the coil, and adjust the bypass valve to maintain design flow.
   e. Perform temperature tests after flows have been balanced.
6. For systems with pressure-independent valves at terminals:
a. Measure differential pressure, and verify that it is within manufacturer's specified range.
b. Perform temperature tests after flows have been verified.

7. For systems without pressure-independent valves or flow-measuring devices at terminals:
   a. Measure and balance coils by either coil pressure drop or temperature method.
   b. If balanced by coil pressure drop, perform temperature tests after flows have been verified.

8. Open control valves that were shut. Close a sufficient number of control valves that were previously open to maintain diversity, and balance terminals that were just opened.

9. Prior to verifying final system conditions, determine system differential-pressure set point.

10. If the pump discharge valve was used to set total system flow with variable-frequency controller at 60 Hz, at completion open discharge valve 100 percent and allow variable-frequency controller to control system differential-pressure set point. Record pump data under both conditions.

11. Mark final settings and verify that memory stops have been set.

12. Verify final system conditions as follows:
   a. Re-measure and confirm that total water flow is within design.
   b. Re-measure final pumps' operating data, TDH, volts, amps, and static profile.
   c. Mark final settings.

13. Verify that memory stops have been set.

3.10 PROCEDURES FOR PRIMARY-SECONDARY HYDRONIC SYSTEMS

A. Balance the primary circuit flow first.

B. Balance the secondary circuits after the primary circuits are complete.

C. Adjust pumps to deliver total design gpm.

1. Measure total water flow.
   a. Position valves for full flow through coils.
   b. Measure flow by main flow meter, if installed.
   c. If main flow meter is not installed, determine flow by pump TDH or exchanger pressure drop.

2. Measure pump TDH as follows:
   a. Measure discharge pressure directly at the pump outlet flange or in discharge pipe prior to any valves.
   b. Measure inlet pressure directly at the pump inlet flange or in suction pipe prior to any valves or strainers.
   c. Convert pressure to head and correct for differences in gage heights.
d. Verify pump impeller size by measuring the TDH with the discharge valve closed. Note the point on manufacturer’s pump curve at zero flow and verify that the pump has the intended impeller size.

e. With valves open, read pump TDH. Adjust pump discharge valve until design water flow is achieved.


D. Adjust flow-measuring devices installed in mains and branches to design water flows.

1. Measure flow in main and branch pipes.
2. Adjust main and branch balance valves for design flow.
3. Re-measure each main and branch after all have been adjusted.

E. Adjust flow-measuring devices installed at terminals for each space to design water flows.

1. Measure flow at terminals.
2. Adjust each terminal to design flow.
3. Re-measure each terminal after it is adjusted.
4. Position control valves to bypass the coil and adjust the bypass valve to maintain design flow.
5. Perform temperature tests after flows have been balanced.

F. For systems with pressure-independent valves at terminals:

1. Measure differential pressure and verify that it is within manufacturer’s specified range.
2. Perform temperature tests after flows have been verified.

G. For systems without pressure-independent valves or flow-measuring devices at terminals:

1. Measure and balance coils by either coil pressure drop or temperature method.
2. If balanced by coil pressure drop, perform temperature tests after flows have been verified.

H. Verify final system conditions as follows:

1. Re-measure and confirm that total water flow is within design.
2. Re-measure final pumps' operating data, TDH, volts, amps, and static profile.
3. Mark final settings.

I. Verify that memory stops have been set.

3.11 PROCEDURES FOR MOTORS

A. Motors 1/2 HP and Larger: Test at final balanced conditions and record the following data:

1. Manufacturer's name, model number, and serial number.
4. Phase and hertz.
5. Nameplate and measured voltage, each phase.
6. Nameplate and measured amperage, each phase.
7. Starter size and thermal-protection-element rating.
8. Service factor and frame size.

B. Motors Driven by Variable-Frequency Controllers: Test manual bypass of controller to prove proper operation.

3.12 PROCEDURES FOR CHILLERS

A. Balance water flow through each evaporator to within specified tolerances of indicated flow with all pumps operating. With only one chiller operating in a multiple chiller installation, do not exceed the flow for the maximum tube velocity recommended by the chiller manufacturer. Measure and record the following data with each chiller operating at design conditions:

1. Evaporator-water entering and leaving temperatures, pressure drop, and water flow.
2. For water-cooled chillers, condenser-water entering and leaving temperatures, pressure drop, and water flow.
3. Evaporator and condenser refrigerant temperatures and pressures, using instruments furnished by chiller manufacturer.
4. Power factor if factory-installed instrumentation is furnished for measuring kilowatts.
5. Kilowatt input if factory-installed instrumentation is furnished for measuring kilowatts.
7. For air-cooled chillers, verify condenser-fan rotation and record fan and motor data including number of fans and entering- and leaving-air temperatures.

3.13 PROCEDURES FOR CONDENSING UNITS

A. Verify proper rotation of fans.
B. Measure entering- and leaving-air temperatures.
C. Record fan and motor operating data.

3.14 PROCEDURES FOR BOILERS

A. Hydronic Boilers:

1. Measure and record entering- and leaving-water temperatures.
2. Measure and record water flow.
3. Record relief valve pressure setting.
3.15 PROCEDURES FOR HEAT-TRANSFER COILS

A. Measure, adjust, and record the following data for each water coil:
   1. Entering- and leaving-water temperature.
   2. Water flow rate.
   3. Water pressure drop for major (more than 20 gpm) equipment coils, excluding unitary equipment such as reheat coils, unit heaters, and fan-coil units.
   4. Dry-bulb temperature of entering and leaving air.
   5. Wet-bulb temperature of entering and leaving air for cooling coils.
   6. Airflow.

B. Measure, adjust, and record the following data for each electric heating coil:
   1. Nameplate data.
   2. Airflow.
   3. Entering- and leaving-air temperature at full load.
   4. Voltage and amperage input of each phase at full load.
   5. Calculated kilowatt at full load.
   6. Fuse or circuit-breaker rating for overload protection.

C. Measure, adjust, and record the following data for each steam coil:
   1. Dry-bulb temperature of entering and leaving air.
   2. Airflow.
   3. Inlet steam pressure.

D. Measure, adjust, and record the following data for each refrigerant coil:
   1. Dry-bulb temperature of entering and leaving air.
   2. Wet-bulb temperature of entering and leaving air.
   3. Airflow.

3.16 PROCEDURES FOR TESTING, ADJUSTING, AND BALANCING EXISTING SYSTEMS

A. Perform a preconstruction inspection of existing equipment that is to remain and be reused.
   1. Measure and record the operating speed, airflow, and static pressure of each fan.
   2. Measure motor voltage and amperage. Compare the values to motor nameplate information.
   3. Check the refrigerant charge.
   4. Check the condition of filters.
   5. Check the condition of coils.
   6. Check the operation of the drain pan and condensate-drain trap.
   7. Check bearings and other lubricated parts for proper lubrication.
B. Before performing testing and balancing of existing systems, inspect existing equipment that is to remain and be reused to verify that existing equipment has been cleaned and refurbished. Verify the following:

1. New filters are installed.
2. Coils are clean and fins combed.
3. Drain pans are clean.
4. Fans are clean.
5. Bearings and other parts are properly lubricated.
6. Deficiencies noted in the preconstruction report are corrected.

C. Perform testing and balancing of existing systems to the extent that existing systems are affected by the renovation work.

1. Compare the indicated airflow of the renovated work to the measured fan airflows, and determine the new fan speed and the face velocity of filters and coils.
2. Verify that the indicated airflows of the renovated work result in filter and coil face velocities and fan speeds that are within the acceptable limits defined by equipment manufacturer.
3. If calculations increase or decrease the airflow rates and water flow rates by more than 5 percent, make equipment adjustments to achieve the calculated rates. If increase or decrease is 5 percent or less, equipment adjustments are not required.
4. Balance each air outlet.

3.17 TOLERANCES

A. Set HVAC system's airflow rates and water flow rates within the following tolerances:

1. Supply, Return, and Exhaust Fans and Equipment with Fans: 0 to plus 10 percent.
2. Air Outlets: Plus or minus 10 percent.
3. Return Inlets: Plus or minus 10 percent.
4. Exhaust Inlets: 0 to plus 10 percent.
5. Heating-Water Flow Rate: Plus or minus 5 percent.
6. Cooling-Water Flow Rate: Plus or minus 5 percent.
7. Unless indicated otherwise: plus or minus 10 percent.

B. Maintaining pressure relationships as designed shall have priority over the tolerances specified above.

3.18 PROGRESS REPORTING

A. Initial Construction-Phase Report: Based on examination of the Contract Documents as specified in "Examination" Article, prepare a report on the adequacy of design for systems balancing devices. Recommend changes and additions to systems balancing devices to facilitate proper performance measuring and balancing. Recommend changes and additions to HVAC systems and general construction to allow access for performance measuring and balancing devices.
B. Status Reports: Prepare monthly progress reports to describe completed procedures, procedures in progress, and scheduled procedures. Include a list of deficiencies and problems found in systems being tested and balanced. Prepare a separate report for each system and each building floor for systems serving multiple floors.

3.19 FINAL REPORT

A. General: Prepare a certified written report; tabulate and divide the report into separate sections for tested systems and balanced systems.

1. Include a certification sheet at the front of the report's binder, signed and sealed by the certified testing and balancing engineer.
2. Include a list of instruments used for procedures, along with proof of calibration.
3. Certify validity and accuracy of field data.

B. Final Report Contents: In addition to certified field-report data, include the following:

1. Pump curves.
2. Fan curves.
3. Manufacturers' test data.
4. Field test reports prepared by system and equipment installers.
5. Other information relative to equipment performance; do not include Shop Drawings and Product Data.

C. General Report Data: In addition to form titles and entries, include the following data:

1. Title page.
2. Name and address of the TAB specialist.
3. Project name.
4. Project location.
5. Architect's name and address.
6. Engineer's name and address.
7. Contractor's name and address.
9. Signature of TAB supervisor who certifies the report.
10. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.
11. Summary of contents including the following:
   a. Indicated versus final performance.
   b. Notable characteristics of systems.
   c. Description of system operation sequence if it varies from the Contract Documents.
12. Nomenclature sheets for each item of equipment.
13. Data for terminal units, including manufacturer's name, type, size, and fittings.
14. Notes to explain why certain final data in the body of reports vary from indicated values.
15. Test conditions for fans and pump performance forms including the following:
a. Settings for outdoor-, return-, and exhaust-air dampers.
b. Conditions of filters.
c. Cooling coil, wet- and dry-bulb conditions.
d. Face and bypass damper settings at coils.
e. Fan drive settings including settings and percentage of maximum pitch diameter.
f. Inlet vane settings for variable-air-volume systems.
g. Settings for supply-air, static-pressure controller.
h. Other system operating conditions that affect performance.

D. System Diagrams: Include schematic layouts of air and hydronic distribution systems. Present each system with single-line diagram and include the following:

1. Quantities of outdoor, supply, return, and exhaust airflows.
2. Water and steam flow rates.
3. Duct, outlet, and inlet sizes.
4. Pipe and valve sizes and locations.
5. Terminal units.

E. Air-Handling-Unit Test Reports: For air-handling units with coils, include the following:

1. Unit Data:
   a. Unit identification.
   b. Location.
   c. Make and type.
   d. Model number and unit size.
   e. Manufacturer's serial number.
   f. Unit arrangement and class.
   g. Discharge arrangement.
   h. Sheave make, size in inches, and bore.
   i. Center-to-center dimensions of sheave and amount of adjustments in inches.
   j. Number, make, and size of belts.
   k. Number, type, and size of filters.

2. Motor Data:
   a. Motor make, and frame type and size.
   b. Horsepower and rpm.
   c. Volts, phase, and hertz.
   d. Full-load amperage and service factor.
   e. Sheave make, size in inches, and bore.
   f. Center-to-center dimensions of sheave and amount of adjustments in inches.

3. Test Data (Indicated and Actual Values):
   a. Total airflow rate in cfm.
   b. Total system static pressure in inches wg.
   c. Fan rpm.
d. Discharge static pressure in inches wg.
e. Filter static-pressure differential in inches wg.
f. Preheat-coil static-pressure differential in inches wg.
g. Cooling-coil static-pressure differential in inches wg.
h. Heating-coil static-pressure differential in inches wg.
i. Outdoor airflow in cfm.
j. Return airflow in cfm.
k. Outdoor-air damper position.
l. Return-air damper position.
m. Vortex damper position.

F. Apparatus-Coil Test Reports:

1. Coil Data:
   a. System identification.
b. Location.
c. Coil type.
d. Number of rows.
e. Fin spacing in fins per inch o.c.
f. Make and model number.
g. Face area in sq. ft..
h. Tube size in NPS.
i. Tube and fin materials.
j. Circuited arrangement.

2. Test Data (Indicated and Actual Values):
   a. Airflow rate in cfm.
b. Average face velocity in fpm.
c. Air pressure drop in inches wg.
d. Outdoor-air, wet- and dry-bulb temperatures in deg F.
e. Return-air, wet- and dry-bulb temperatures in deg F.
f. Entering-air, wet- and dry-bulb temperatures in deg F.
g. Leaving-air, wet- and dry-bulb temperatures in deg F.
h. Water flow rate in gpm.
i. Water pressure differential in feet of head or psig.
j. Entering-water temperature in deg F.
k. Leaving-water temperature in deg F.
l. Refrigerant expansion valve and refrigerant types.
m. Refrigerant suction pressure in psig.
n. Refrigerant suction temperature in deg F.
o. Inlet steam pressure in psig.

G. Gas- and Oil-Fired Heat Apparatus Test Reports: In addition to manufacturer's factory startup equipment reports, include the following:

1. Unit Data:
   a. System identification.
b. Location.
c. Make and type.
d. Model number and unit size.
e. Manufacturer's serial number.
f. Fuel type in input data.
g. Output capacity in Btu/h.
h. Ignition type.
i. Burner-control types.
j. Motor horsepower and rpm.
k. Motor volts, phase, and hertz.
l. Motor full-load amperage and service factor.
m. Sheave make, size in inches, and bore.
n. Center-to-center dimensions of sheave and amount of adjustments in inches.

2. Test Data (Indicated and Actual Values):

a. Total airflow rate in cfm.
b. Entering-air temperature in deg F.
c. Leaving-air temperature in deg F.
d. Air temperature differential in deg F.
e. Entering-air static pressure in inches wg.
f. Leaving-air static pressure in inches wg.
g. Air static-pressure differential in inches wg.
h. Low-fire fuel input in Btu/h.
i. High-fire fuel input in Btu/h.
j. Manifold pressure in psig.
k. High-temperature-limit setting in deg F.
l. Operating set point in Btu/h.
m. Motor voltage at each connection.
n. Motor amperage for each phase.
o. Heating value of fuel in Btu/h.

H. Electric-Coil Test Reports: For electric furnaces, duct coils, and electric coils installed in central-station air-handling units, include the following:

1. Unit Data:

a. System identification.
b. Location.
c. Coil identification.
d. Capacity in Btu/h.
e. Number of stages.
f. Connected volts, phase, and hertz.
g. Rated amperage.
h. Airflow rate in cfm.
i. Face area in sq. ft..
j. Minimum face velocity in fpm.

2. Test Data (Indicated and Actual Values):
a. Heat output in Btu/h.
b. Airflow rate in cfm.
c. Air velocity in fpm.
d. Entering-air temperature in deg F.
e. Leaving-air temperature in deg F.
f. Voltage at each connection.
g. Amperage for each phase.

I. Fan Test Reports: For supply, return, and exhaust fans, include the following:

1. Fan Data:
   a. System identification.
   b. Location.
   c. Make and type.
   d. Model number and size.
   e. Manufacturer's serial number.
   f. Arrangement and class.
   g. Sheave make, size in inches, and bore.
   h. Center-to-center dimensions of sheave and amount of adjustments in inches.

2. Motor Data:
   a. Motor make, and frame type and size.
   b. Horsepower and rpm.
   c. Volts, phase, and hertz.
   d. Full-load amperage and service factor.
   e. Sheave make, size in inches, and bore.
   f. Center-to-center dimensions of sheave, and amount of adjustments in inches.
   g. Number, make, and size of belts.

3. Test Data (Indicated and Actual Values):
   a. Total airflow rate in cfm.
   b. Total system static pressure in inches wg.
   c. Fan rpm.
   d. Discharge static pressure in inches wg.
   e. Suction static pressure in inches wg.

J. Round, Flat-Oval, and Rectangular Duct Traverse Reports: Include a diagram with a grid representing the duct cross-section and record the following:

1. Report Data:
   a. System and air-handling-unit number.
   b. Location and zone.
   c. Traverse air temperature in deg F.
   d. Duct static pressure in inches wg.
   e. Duct size in inches.
   f. Duct area in sq. ft.
g. Indicated airflow rate in cfm.
h. Indicated velocity in fpm.
i. Actual airflow rate in cfm.
j. Actual average velocity in fpm.
k. Barometric pressure in psig.

K. Air-Terminal-Device Reports:

1. Unit Data:
   a. System and air-handling unit identification.
   b. Location and zone.
   c. Apparatus used for test.
   d. Area served.
   e. Make.
   f. Number from system diagram.
   g. Type and model number.
   h. Size.
   i. Effective area in sq. ft..

2. Test Data (Indicated and Actual Values):
   a. Airflow rate in cfm.
   b. Air velocity in fpm.
   c. Preliminary airflow rate as needed in cfm.
   d. Preliminary velocity as needed in fpm.
   e. Final airflow rate in cfm.
   f. Final velocity in fpm.
   g. Space temperature in deg F.

L. System-Coil Reports: For reheat coils and water coils of terminal units, include the following:

1. Unit Data:
   a. System and air-handling-unit identification.
   b. Location and zone.
   c. Room or riser served.
   d. Coil make and size.
   e. Flowmeter type.

2. Test Data (Indicated and Actual Values):
   a. Airflow rate in cfm.
   b. Entering-water temperature in deg F.
   c. Leaving-water temperature in deg F.
   d. Water pressure drop in feet of head or psig.
   e. Entering-air temperature in deg F.
   f. Leaving-air temperature in deg F.
M. Pump Test Reports: Calculate impeller size by plotting the shutoff head on pump curves and include the following:

1. Unit Data:
   a. Unit identification.
   b. Location.
   c. Service.
   d. Make and size.
   e. Model number and serial number.
   f. Water flow rate in gpm.
   g. Water pressure differential in feet of head or psig.
   h. Required net positive suction head in feet of head or psig.
   i. Pump rpm.
   j. Impeller diameter in inches.
   k. Motor make and frame size.
   l. Motor horsepower and rpm.
   m. Voltage at each connection.
   n. Amperage for each phase.
   o. Full-load amperage and service factor.
   p. Seal type.

2. Test Data (Indicated and Actual Values):
   a. Static head in feet of head or psig.
   b. Pump shutoff pressure in feet of head or psig.
   c. Actual impeller size in inches.
   d. Full-open flow rate in gpm.
   e. Full-open pressure in feet of head or psig.
   f. Final discharge pressure in feet of head or psig.
   g. Final suction pressure in feet of head or psig.
   h. Final total pressure in feet of head or psig.
   i. Final water flow rate in gpm.
   j. Voltage at each connection.
   k. Amperage for each phase.

N. Instrument Calibration Reports:

1. Report Data:
   a. Instrument type and make.
   b. Serial number.
   c. Application.
   d. Dates of use.
   e. Dates of calibration.
3.20 VERIFICATION OF TAB REPORT

A. The TAB specialist's test and balance engineer shall conduct the inspection in the presence of Construction Manager.

B. Construction Manager shall randomly select measurements, documented in the final report, to be rechecked. Rechecking shall be limited to either 10 percent of the total measurements recorded or the extent of measurements that can be accomplished in a normal 8-hour business day.

C. If rechecks yield measurements that differ from the measurements documented in the final report by more than the tolerances allowed, the measurements shall be noted as "FAILED."

D. If the number of "FAILED" measurements is greater than 10 percent of the total measurements checked during the final inspection, the testing and balancing shall be considered incomplete and shall be rejected.

E. If TAB work fails, proceed as follows:
   1. TAB specialists shall recheck all measurements and make adjustments. Revise the final report and balancing device settings to include all changes; resubmit the final report and request a second final inspection.
   2. If the second final inspection also fails, Owner may contract the services of another TAB specialist to complete TAB work according to the Contract Documents and deduct the cost of the services from the original TAB specialist's final payment.
   3. If the second verification also fails, design professional may contact AABC Headquarters regarding the AABC National Performance Guaranty.

F. Prepare test and inspection reports.

3.21 ADDITIONAL TESTS

A. Within 90 days of completing TAB, perform additional TAB to verify that balanced conditions are being maintained throughout and to correct unusual conditions.

B. Seasonal Periods: If initial TAB procedures were not performed during near-peak summer and winter conditions, perform additional TAB during near-peak summer and winter conditions.

C. When requested, provide up to two 32 hours by the technician that provided services under this Section to support commissioning.

END OF SECTION 014520
SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Provisions of the Contract and of the Contract Documents apply to this Section.

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

1.3 USE CHARGES
   A. General: Installation and removal of and use charges for temporary facilities 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, Architect, occupants of Project, testing agencies, and authorities having
      jurisdiction.
   B. Sewer Service: Pay sewer-service use charges for sewer usage by all entities for
      construction operations.
   C. Water Service: Pay water-service use charges for water used by all entities for construction
      operations.
   D. Electric Power Service: Pay electric-power-service use charges for electricity used by all
      entities for construction operations.
   E. Water and Sewer Service from Existing System: Water from Owner’s existing water system
      is available for use without metering and without payment of use charges. Provide
      connections and extensions of services as required for construction operations.
   F. Electric Power Service from Existing System: Electric power from Owner’s existing system
      is available for use without metering and without payment of use charges. Provide
      connections and extensions of services as required for construction operations.

1.4 INFORMATIONAL SUBMITTALS
   A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for
      construction personnel.
   B. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities
      having jurisdiction. Indicate Contractor personnel responsible for management of fire-
      prevention program.
   C. Moisture-Protection Plan: Describe procedures and controls for protecting materials and
      construction from water absorption and damage.
      1. Describe delivery, handling, and storage provisions for materials subject to water
         absorption or water damage.
      2. Indicate procedures for discarding water-damaged materials, protocols for mitigating
         water intrusion into completed Work, and replacing water-damaged Work.
      3. Indicate sequencing of work that requires water, such as sprayed fire-resistive
         materials, plastering, and terrazzo grinding, 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.
   D. Dust- and HVAC-Control Plan: Submit coordination drawing and narrative that indicates
      the dust- and HVAC-control measures proposed for use, proposed locations, and proposed
      time frame for their operation. Identify further options if proposed measures are later
determined to be inadequate. 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.
5. Other dust-control measures.

1.5 QUALITY ASSURANCE
A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

1.6 PROJECT CONDITIONS
A. 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 before Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS

2.1 MATERIALS
A. 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. Contractor may provide either fixed or portable fencing to suit conditions. For portable fencing, provide concrete or galvanized steel bases for supporting posts.
B. Polyethylene Sheet: Reinforced, fire-resistive sheet, 10-mil minimum thickness, with flame-spread rating of 15 or less per ASTM E 84 and passing NFPA 701 Test Method 2.
C. Dust-Control Adhesive-Surface Walk-off Mats: Provide mats minimum 36 by 60 inches.
D. 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.

2.2 TEMPORARY FACILITIES
A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading. Provide landing, stairway, handrails and guardrails in accordance with requirement of local building inspector.
   1. Drinking water and private toilet.
   2. Heating and cooling equipment necessary to maintain a uniform indoor temperature of 68 to 72 deg F.
   3. Lighting fixtures sufficient to maintain average illumination of 20 fc at desk height.
B. Common-Use Field Office: Of sufficient size to accommodate needs of Owner, Architect, and construction personnel office activities and to accommodate Project meetings specified in other Division 01 Sections. Keep office clean and orderly. Furnish and equip offices as follows:
1. Furniture required for Project-site documents including file cabinets, plan tables, plan racks, and bookcases.

2. Conference room of sufficient size to accommodate meetings of 10 individuals. Provide electrical power service and 120-V ac duplex receptacles, with no fewer than one receptacle on each wall. Furnish room with conference table, chairs, and 4-foot-square tack and marker boards.

3. Maintain the following materials, specified elsewhere, in the field office available to Architect and Owner’s representative at all times:
   a. Maintain up-to-date set of Contract Documents, including FCs, RFI$s, PCO$s and COs.
   b. Maintain up-to-date set of reviewed final shop drawings.
   c. Maintain up-to-date Contractor’s Progress Schedule.

C. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.
   1. Store combustible materials apart from building.

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

B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.
   1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
   2. Heating Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.
   3. The contractor shall have the responsibility to operate the heaters in a manner that provides a safe working environment as well as maintaining the required temperatures for performance of the work.
   4. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 8 at each return-air grille in system and remove at end of construction and clean HVAC system as required in Division 01 Section “Closeout Procedures.”

C. Air-Filtration Units: Primary and secondary HEPA-filter-equipped portable units with four-stage filtration. Provide single switch for emergency shutoff. Configure to run continuously.

PART 3 - EXECUTION

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

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

3.2 TEMPORARY UTILITY INSTALLATION
A. General: Install temporary service or connect to existing service.
1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.

B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.
   1. Connect temporary sewers to municipal system as directed by authorities having jurisdiction.

C. Water Service: Connect to Owner’s existing water service facilities. Clean and maintain water service facilities in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.

D. Sanitary Facilities: Provide temporary toilets, wash facilities, drinking water, and hand sanitizer for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
   1. Toilets: Install self-contained toilet units. Shield toilets to ensure privacy. Provide separate facilities for male and female personnel.
   2. Disposable Supplies: Provide toilet tissue, paper towels, paper cups, and similar disposable materials for each facility. Maintain adequate supply. Provide covered waste containers for disposal of used material.
   3. Wash Facilities: Install wash facilities supplied with potable water at convenient locations for personnel who handle materials that require wash up. Dispose of drainage properly. Supply cleaning compounds appropriate for each type of material handled.
      a. Provide safety showers, eyewash fountains, and similar facilities for convenience, safety, and sanitation of personnel.
   4. Drinking-Water: Bottled-water, drinking-water units, or drinking water fountains connected to permanent or temporary potable water source.
   5. Hand Sanitizer: Provide hand sanitizer stations adjacent to each toilet, wash facility, and in each construction trailer.

E. 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. Select equipment that will not have a harmful effect on completed installations or elements being installed.
   1. Provide measures and equipment to meet warranty requirements of interior woodwork, specified in Division 06 and 12 Sections.

F. 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 area 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.

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

1. Provide dehumidification systems when required to reduce substrate moisture levels to level required to allow installation or application of finishes.

H. Electric Power Service: Connect to Owner’s existing electric power service. Maintain equipment in a condition acceptable to Owner.

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

1. Connect temporary service to Owner’s existing power source, as directed by Owner.

J. 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. If permanent lighting is not available at time of installation of interior finishes, provide temporary lighting that simulates permanent lighting conditions during installation of interior finishes.

K. Telephone/Cable Service: Provide temporary telephone service in common-use facilities for use by all construction personnel. Install one telephone line for each field office.

1. Provide additional telephone lines for the following:
   a. Provide a dedicated telephone line for each facsimile machine in each field office.

2. At each telephone, post a list 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. Engineers’ offices.
   g. Owner’s office.
   h. Principal subcontractors’ field and home offices.

3. Provide superintendent with cellular telephone or portable two-way radio for use when away from field office.

L. Electronic Communication Service: Provide high speed Internet service for use by all construction forces.

3.3 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:

1. Provide construction for temporary offices, shops, and sheds located within construction area or within 30 feet of building lines that is noncombustible according to ASTM E 136. 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.

B. Temporary Construction Entrance: Construct and maintain construction entrance adequate for construction operations. Locate temporary construction entrance as indicated on Drawings.

C. 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.

D. Parking: Areas shall be designated by Owner at Pre-construction Conference.

E. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.
   1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.
   2. Remove snow and ice as required to minimize accumulations.

F. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.
   1. Identification Signs: Provide Project identification signs as indicated on Drawings.
   2. Temporary Signs: Provide other 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 touchup signs so they are legible at all times.

G. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with progress cleaning requirements in Division 01 Section “Execution.”

H. 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.

I. Existing Elevator Use: Use of Owner’s existing elevators will be permitted, provided elevators are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore elevators to condition existing before initial use, including replacing worn cables, guide shoes, and similar items of limited life.
   1. Do not load elevators beyond their rated weight capacity.
   2. Provide protective coverings, barriers, devices, signs, or other procedures to protect elevator car and entrance doors and frame. If, despite such protection, elevators become damaged, engage elevator Installer to restore damaged work so no evidence remains of correction work. Return items that cannot be refinished in field to the shop, make required repairs and refinish entire unit, or provide new units as required.

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

K. Existing Stair Usage: Use of Owner’s existing 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.

L. Temporary Use of Permanent Stairs: Use of new stairs for construction traffic will be permitted, provided stairs are protected and finishes restored to new condition at time of Substantial Completion.

3.4 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 Division 01 Section “Summary.”

C. Temporary Erosion and Sedimentation Control: Comply with requirements specified in Division 31 Sections and indicated on Civil Drawings.

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

F. Pest Control: Before deep foundation work has been completed, 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 environmentally safe materials.

G. Temporary Site Enclosure Fence: Before construction operations begin, furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.
   1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations.
   2. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Furnish one set of keys to Owner.

H. Security Enclosure and Lockup: Install 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 work day.

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

J. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.

K. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.
   1. Where heating or cooling is needed and permanent enclosure is incomplete, insulate temporary enclosures.

L. Temporary Partitions: Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by Owner and tenants from fumes and noise.
   1. Construct security enclosure dustproof partitions with gypsum wallboard with joints taped on occupied side, and fire-retardant-treated plywood on construction operations side.
   2. Construct non-secure dustproof partitions with two layers of 6-mil polyethylene sheet on each side. Cover floor with two layers of 6-mil polyethylene sheet, extending sheets 18 inches up the sidewalls. Overlap and tape full length of joints. Cover floor with fire-retardant-treated plywood.
   a. Construct vestibule and airlock at each entrance through temporary partition with not less than 48 inches between doors. Maintain water-dampened foot
mats in vestibule.
3. Where fire-resistance-rated temporary partitions are indicated or are required by authorities having jurisdiction, construct partitions according to the rated assemblies.
4. Insulate partitions to control noise transmission to occupied areas.
5. Seal joints and perimeter. Equip partitions with gasketed dustproof doors and security locks where openings are required.
6. Protect air-handling equipment.
7. Provide walk-off mats at each entrance through temporary partition.
8. Provide doors in temporary partitions where needed for egress, to the satisfaction of the Building Inspector.

M. Protect HVAC equipment and ductwork from intrusion of dust, dirt and debris during construction operations.
1. Refer to Division 23 Section “Air Filters” for construction filter requirements for protection of mechanical duct systems during construction.
2. Cap ends of existing inactive ductwork with 6-mil polyethylene sheet.
3. Subject to Owner approval, install filter media having a MERV of at least 8 according to ASHRAE 52.2 at each active return-air inlet in the limits of construction. A complete set of temporary filters must be installed prior to and at the completion of the temporary use of the system(s). Change filters every two weeks of system(s) temporary operation or as directed by the Architect and/or Owner due to building environmental conditions. The filters to be utilized during the temporary operation shall be the same size as specified for permanent operation. Wrapping of equipment with filter media will not be permitted
4. The Architect must observe and approve the conditions of the building before temporary filters are removed at Substantial Completion.
5. Testing and balancing shall not be performed when dust, dirt or debris-generating activities are occurring.

N. 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. Store combustible materials in containers in fire-safe locations.
2. Prohibit smoking in construction areas.
3. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
4. 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.
5. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.
6. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire-protection facilities, stairways, and other access routes for firefighting.

3.5 MOISTURE AND MOLD CONTROL
A. Contractor’s Moisture-Protection Plan: Avoid trapping water in finished work. Document visible signs of mold that may appear during construction.

B. Exposed Construction Phase: 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 Phase: 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, replace, or clean stored or installed material that begins to grow mold.
7. Perform work in a sequence that allows any wet materials adequate time to dry before enclosing the material in drywall or other interior finishes.

D. Controlled Construction Phase of Construction: 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 permanent HVAC system to control humidity.
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 are considered defective.
   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 materials that can not be completely restored to their manufactured moisture level within 48 hours.

3.6 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Maintenance: Maintain facilities in good operating condition until removal.
   1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage and violations with federal, state, local regulations.

C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.

D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work,
clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.

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.”

END OF SECTION 015000
SECTION 016000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 SUMMARY
   A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers’ standard warranties on products; special warranties; and equivalent products.

1.3 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. Products salvaged or recycled from other projects are not considered new products.
      3. Equivalent Product: Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that are equivalent to or exceed those of specified product.

   B. Basis-of-Design Product Specification: A specification in which a specific manufacturer’s product is named and accompanied by the words "basis-of-design product" or "basis-of-design standard", including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating equivalent products of additional manufacturers named in the specification.

1.4 ACTION SUBMITTALS
   A. Equivalent Product Requests: Submit request for consideration of each equivalent product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
      1. Include data to indicate compliance with the requirements specified in “Equivalent Products” Article.
      2. Architect’s Action: If necessary, Architect will request additional information or documentation for evaluation of an equivalent product request. Architect will notify Contractor of approval or rejection of proposed equivalent product request.

   B. Basis-of-Design Product Specification Submittal: Comply with requirements in Division 01 Section “Submittal Procedures.” Show compliance with requirements.

1.5 QUALITY ASSURANCE
   A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product equivalent with products previously selected, even if previously selected products were also options.
1.6 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. 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 to determine that products are undamaged and properly protected.

C. Storage:
1. Store products to allow for inspection and measurement of quantity or counting of units.
2. Store materials in a manner that will not endanger Project structure.
3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
4. Store foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
5. Comply with product manufacturer’s written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
6. Protect stored products from damage and liquids from freezing.
7. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner’s construction forces, if any. Coordinate location with Owner.

1.7 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 warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for 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 with the Specifications, prepare a written document using indicated form properly executed.
3. Refer to Divisions 02 through 49. Sections for specific content requirements and particular requirements for submitting special warranties.

C. 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.

B. Product Selection Procedures:
   1. Products:
      a. Restricted List: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Equivalent products or substitutions for Contractor’s convenience will not be considered.
      b. Nonrestricted List: 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. Comply with requirements in “Equivalent Products” Article for consideration of an unnamed product.
   2. Manufacturers:
      a. Restricted List: Where Specifications include a list of manufacturers’ names, provide a product by one of the manufacturers listed that complies with requirements. Equivalent products or substitutions for Contractor’s convenience will not be considered.
      b. Nonrestricted List: 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. Comply with requirements in “Equivalent Products” Article for consideration of an unnamed manufacturer’s product.
   3. 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 an equivalent product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in “Equivalent Products” Article for consideration of an unnamed product by one of the other named manufacturers.

C. Visual Matching Specification: Where Specifications require “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 full range” or 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 both standard and premium items.

2.2 EQUIVALENT PRODUCTS

A. Conditions for Consideration: Architect will consider Contractor’s request for equivalent product when all of the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:

1. Evidence that the proposed product does not require revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.

2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.

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.

PART 3 - EXECUTION (NOT USED)

END OF SECTION 016000
SECTION 017300 - EXECUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 SUMMARY
A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:
   2. Field engineering and surveying.
   3. Installation of the Work.
   4. Cutting and patching.
   5. Coordination of Owner-installed products.
   6. Progress cleaning.
   7. Starting and adjusting.
   8. Protection of installed construction.

1.3 DEFINITIONS
A. Cutting: Removal of in-place construction necessary to permit installation or performance of other work.
B. Patching: Fitting and repair work required to restore construction to original conditions after installation of other work.

1.4 INFORMATIONAL SUBMITTALS
A. Qualification Data: For land surveyor.
B. Certificates: Submit certificate signed by land surveyor certifying that location and elevation of improvements comply with requirements.
C. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.

1.5 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. 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, notify Architect of locations and details of cutting and await directions from the Architect before proceeding. Shore, brace, and support structural element 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. Operational elements include, but are not limited to, the following:
      a. Primary operational systems and equipment.
b. Fire separation assemblies.
c. Air or smoke barriers.
d. Fire-suppression systems.
e. Mechanical systems piping and ducts.
f. Control systems.
g. Communication systems.
h. Conveying systems.
i. Electrical wiring systems.
j. 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. Other construction elements include, but are not limited to, the following:
   a. Water, moisture, or vapor barriers.
   b. Membranes and flashings.
   c. Exterior curtain-wall construction.
   d. Equipment supports.
   e. Piping, ductwork, vessels, and equipment.
   f. Noise- and vibration-control elements and systems.

4. Visual Elements: Do not cut and patch construction 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.

C. Manufacturer's Installation Instructions: Comply with manufacturer's current printed and published (written) instructions and recommendations for storing and installing products and equipment in applications indicated. Maintain copies on-site

1.6 WARRANTY

A. 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.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Comply with requirements specified in other Sections.
   1. For all battery-operated devices, provide batteries rated for operation for at least one year.

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 the Architect for the visual and functional performance of in-place materials.
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, and water-service piping; underground electrical services, 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. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
   2. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
   3. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
   4. 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 that is necessary to adjust, move, or relocate existing utility structures, utility 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 caused by differing field conditions outside the control of the Contractor, submit a request for information to Architect according to requirements in Division 01 Section "Project Management and Coordination."
E. Coordinate setting drawings, diagrams, templates, instructions, and directions for installation of anchorages in the construction.
F. Coordinate delivery of items to Project site.

3.3 CONSTRUCTION LAYOUT
A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are
discovered, notify Architect promptly.

B. General: Engage a land surveyor to lay out the Work using accepted surveying practices.
   1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
   2. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
   3. Inform installers of lines and levels to which they must comply.
   4. Check the location, level and plumb, of every major element as the Work progresses.
   5. Notify Architect when deviations from required lines and levels exceed allowable tolerances.
   6. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.

C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.

D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.

E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

3.4 FIELD ENGINEERING

A. Identification: Owner will identify existing benchmarks, control points, and property corners.

B. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
   1. Do not change or relocate existing benchmarks or control points without prior written approval of Architect. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Architect before proceeding.
   2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.

C. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.
   1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
   2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
   3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.

3.5 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
   1. Make vertical work plumb and make horizontal work level.
2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.

3. Conceal pipes, ducts, and wiring in finished areas, unless otherwise indicated.


B. Comply with manufacturer’s written instructions and recommendations for installing products in applications indicated.
   1. Where batteries are not provided with battery-operated devices, install batteries.

C. Install products at the time and under conditions that will ensure the best possible results. 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.

E. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.

F. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

G. 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.
   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.

H. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

I. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

J. Alignment With Existing Construction: Align finish faces of infill and abutting construction with adjacent faces of existing construction unless indicated otherwise. Where such work is shown to be a different thickness from existing construction, align to the corridor or most public side unless indicated otherwise.

3.6 CUTTING AND PATCHING

A. Cutting and Patching, General: Employ skilled workers to perform cutting 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.

B. Temporary Support: Provide temporary support of work to be cut.

C. 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.
D. Adjacent Occupied Areas: Where interference with use of adjacent occupied areas or interruption of free passage to adjacent occupied areas is unavoidable, coordinate cutting and patching in accordance with requirements of Division 01 Section “Summary.”

E. 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 minimize interruption to occupied areas.

F. 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: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
   4. Masonry: Remove existing brick in whole units using hand tools. Minimize disturbance of existing masonry indicated to remain.
   5. Excavating and Backfilling: Comply with requirements in applicable Division 31 Sections where required by cutting and patching operations.
   6. 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.
   7. New Masonry Openings: Cut back existing masonry for new openings; remove whole masonry units to suit opening size indicated. Cut masonry unit jambs are not acceptable. Do not remove excessive amounts of existing masonry.
   8. Pattern Finishes: Carefully cut the existing finish material to a joint, pattern line, or similar feature to help hide patching work.
   9. Proceed with patching after construction operations requiring cutting are complete.

G. 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. 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 minimize evidence of patching and refinishing.
      a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
      b. Restore damaged pipe covering to its original condition.
   3. Remove miscellaneous hangers, exposed nails not serving as fasteners, and similar protrusions; remove adhesive residue and tape; fill anchorage holes; and otherwise patch and restore surface to be a uniform substrate suitable for applied finishes.
   4. 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. Provide additional coats until patch blends with adjacent surfaces.

5. New Masonry Openings: Tooth in new matching masonry to build opening size required. Incorporate new lintel where required.

6. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.

7. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition.

8. Concrete Floor to Receive Terrazzo Flooring: Concrete shall be cured for a minimum of 28 days. Do not use curing agents. Locate construction and control joints in concrete to align with joint and divider locations indicated on terrazzo floor pattern drawing.

a. Substrate Tolerance: Concrete sub-floor shall be level with a maximum variation from level of 1/8-inch in 10 feet.

9. Terrazzo and Other Multi-Component Finishes: Match components, including, but not limited to, metal strips, cement, stone chips, flecks, and matrix. Grind, polish, seal, coat, and otherwise finish to match the texture and surface of adjacent finish and blend as approved by the Architect.

10. Tile: Match tile, grout, and accessories and blend to adjacent work as approved by the Architect.

11. Roof Penetrations: Patch roof in a manner that restores enclosure to a weathertight condition. Patch existing roof openings removed from service. Provide water-tight penetrations and flashing at new roof openings. Cut and patch roofing by methods and with materials so as not to void existing warranties.

H. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.7 OWNER-INSTALLED PRODUCTS

A. Site Access: Provide access to Project site for Owner’s construction personnel.

B. Coordination: Coordinate construction and operations of the Work with work performed by Owner’s construction personnel.

1. Construction Schedule: Inform Owner of Contractor’s preferred construction schedule for Owner’s portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify Owner if changes to schedule are required due to differences in actual construction progress.

2. Preinstallation Conferences: Include Owner’s construction personnel at preinstallation conferences covering portions of the Work that are to receive Owner’s work. Attend preinstallation conferences conducted by Owner’s construction personnel if portions of the Work depend on Owner’s construction.

3.8 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.

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. Utilize containers intended for holding waste materials of type to be stored.
4. Coordinate progress cleaning for joint-use areas where more than one installer has worked.

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 in Finished Areas: 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 Division 01 Section "Construction Waste Management and Disposal."

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 assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.9 STARTING AND ADJUSTING

A. Coordinate startup and adjusting of equipment and operating components with requirements in Division 01 Section "General Commissioning Requirements."

B. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

C. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.

D. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

E. Manufacturer’s Field Service: Comply with qualification requirements in Division 01 Section "Quality Requirements."
3.10 PROTECTION OF INSTALLED CONSTRUCTION
   A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
   B. Comply with manufacturer’s written instructions for temperature and relative humidity.

3.11 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.
   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. Replace failing batteries.
   E. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION 017300
SECTION 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 SUMMARY
A. This Section includes administrative and procedural requirements for the following:
   1. Recycling non-hazardous demolition and construction waste.
   2. Disposing of non-hazardous demolition and construction waste.

1.3 DEFINITIONS
A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
   B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.
   C. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.
   D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.

1.4 SUBMITTALS
A. Waste Management Plan: Submit 3 copies of a fully complete plan within 30 days of date established for commencement of the Work.
   B. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit three copies of report. Include the following information:
   1. Spreadsheet tabulating total waste material, quantities diverted and means by which each material is diverted, and statement that requirements for the credit have been met. Architect will assist with preparation of spreadsheet or upon request provide one to be used for project.
   2. All records substantiating the information reported on the spreadsheet, including manifests, weight tickets, receipts, and invoices. Records must be legible and must indicate the date issued, the waste material donated, the weight (in tons) or volume (in cubic yards) of material, and the name, address, and phone number of the receiving entity. The following records must be submitted:
      a. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.
      b. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.
      c. Recycling and Processing Facility Records: Indicate receipt and acceptance of recycled waste by recycling and processing facilities licensed to accept them. Include manifests, weight, tickets, receipts, and invoices.
      d. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
C. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

1.5 QUALITY ASSURANCE
A. Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification program.
B. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.
C. Waste Management Conference: Conduct conference at Project site to comply with requirements in Division 1 Section “Project Management and Coordination.” Review methods and procedures related to waste management including, but not limited to, the following:
   1. Review and discuss waste management plan including responsibilities of Waste Management Coordinator.
   2. Review requirements for documenting quantities of each type of waste and its disposition.
   3. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
   4. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
   5. Review waste management requirements for each trade.

1.6 WASTE MANAGEMENT PLAN
A. General: Develop a waste management plan. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.
   1. The Waste Management Plan shall contain the following information, as a minimum:
      a. A spreadsheet, which lists:
         1) Each waste stream leaving the site (example: steel, concrete, cardboard, trash).
         2) The name and address of the receiving entity.
         3) Contact name and phone number at the receiving entity.
      b. A narrative, which describes:
         1) Who is the primary person responsible for implementing the CWM plan.
         2) What wastes must be separated for recycling.
         3) How hazardous wastes are to be handled.
         4) How the construction waste management plan, including updates, will be communicated to all involved parties (example: CWM will be on the agenda of all construction progress meetings).
         5) How the construction waste management plan will be enforced.
         6) How data will be tracked and filed (important: receipts must be legible and must include the name of the hauler, the date hauled, the material hauled, the weight or volume of material hauled).
PART 2 - PRODUCTS

2.1 RESOURCES
A. The Architect will provide a list of potential resources upon request, for information purposes. The Architect does not recommend or approve any of the listed entities. See also U.S. General Services Administration (GSA) online Construction Waste Management Database: http://www.wbdg.org/tools/cwm.php

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION
A. General: Implement waste management plan as approved by Architect. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.
   1. Comply with Division 01 Section “Temporary Facilities and Controls” for operation, termination, and removal requirements.
B. Waste Management Coordinator: Designate a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan. Coordinator shall be present at Project site full time for duration of Project.
C. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work occurring at Project site.
   1. Distribute waste management plan to everyone concerned within three days of submittal return.
   2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.
D. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
   1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.
   2. Comply with Division 01 Section “Temporary Facilities and Controls” for controlling dust and dirt, environmental protection, and noise control.

3.2 RECYCLING DEMOLITION AND CONSTRUCTION WASTE, GENERAL
A. General: Recycle paper and beverage containers used by on-site workers.
B. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to Contractor.
C. Procedures:
   1. Provide appropriately marked containers or bins for controlling recyclable waste until they are removed from Project site. Include list of acceptable and unacceptable materials at each container and bin. Inspect containers and bins for contamination and remove contaminated materials if found.
   2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water.
   3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
   4. Store components off the ground and protect from the weather.
5. Remove recyclable waste off Owner’s property and transport to recycling receiver or processor.

3.3 DISPOSAL OF WASTE

A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.
   1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
   2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: Do not burn waste materials.

C. Disposal: Transport waste materials off Owner’s property and legally dispose of them.

END OF SECTION 017419
SECTION 017700 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 SUMMARY
A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
   1. Substantial Completion procedures.
   2. Final completion procedures.
   3. Warranties.
   4. Final cleaning.
   5. Repair of the Work.
B. Related Requirements:
   1. Division 01 Section “Payment Procedures” for requirements for Applications for Payment for Substantial and Final Completion.
   2. Division 01 Section “Execution” for progress cleaning of Project site.
   3. Division 01 Section “Project Record Documents” for submitting record Drawings, record Specifications, and record Product Data.
   4. Divisions 02 through 33 Sections for specific closeout and special cleaning requirements for products of those Sections.

1.3 ACTION SUBMITTALS
A. Product Data: For cleaning agents.
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: From authorities having jurisdiction.
B. Certificate of Insurance: For continuing coverage.
C. Field Report: For pest control inspection.

1.5 MAINTENANCE MATERIAL SUBMITTALS
A. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.

1.6 ABOVE-CEILING WORK
A. Complete above-ceiling work prior to installation of finish ceilings. Coordinate with the Owner’s third-party contractors, such as data network and security systems, if any.
B. Complete or correct deficiencies, if any, noted by Architect, Owner and local authorities having jurisdiction or confirm with Architect that any such deficiencies may be completed or corrected at a later date without obstructing installation of ceilings.
C. Coordinate with local authorities having jurisdiction to obtain required above-ceiling reviews. Complete or correct above-ceiling work to comply with directives issued by the reviewing authorities. Upon completion or correction, certify in writing that all the items cited by reviewing authority have been completed or corrected and submit copies to the
local authority, Owner, and Architect.

D. Following completion of Items A, B and C above, the ceiling may be “enclosed.” Coordinate installation of acoustical ceiling hold-down clips, if any, with late stage activities such as HVAC testing and balancing and data network testing.

1.7 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. Substantial Completion shall be for entire scope of Work (for example, both building and sitework) unless Owner has previously agreed to an alternative arrangement.

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, final completion construction photographic documentation, damage or settlement surveys, property 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 Owner. Label with manufacturer’s name and model number where applicable.
   a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain signature of Owner’s agent for receipt of submittals.

5. Submit test/adjust/balance records.

6. 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. Advise Owner of pending insurance changeover requirements.

2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner’s personnel of changeover in security provisions.

3. Complete startup and testing of systems and equipment. Demonstrate that air and water systems are balanced and that automatic temperature control system is in control of all equipment as indicated. This may require separate demonstrations if controls cannot be tested for applicable seasons of the year.

4. Submit written certification that all special inspections have been completed.

5. Submit written certification that all Building Commissioning has been completed, and as required by the appropriate Sections.

6. Submit written certification that testing/adjusting/balancing operations have been completed, and that systems are operational and under control in conformance with
requirements of Division 01.
7. Complete testing of the electronic security and related detention equipment demonstrating security control.
8. Perform preventive maintenance on equipment used prior to Substantial Completion.
9. Instruct Owner’s personnel in operation, adjustment, and maintenance of products, equipment, and systems.
10. Advise Owner of changeover in heat and other utilities.
11. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
12. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
13. Complete final cleaning requirements, including touchup painting.
14. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

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 will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor’s list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.
1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for final completion.

1.8 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 Division 01 Section "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 pest-control final inspection report.

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 will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.
1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. In the event that the Work is not complete at the time of reinspection, the Contractor shall be liable for the costs of additional reinspections by the Architect in accordance with the General Conditions.
1.9  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 interior in numbered order of Architect’s finish schedule.
   2. Organize items applying to each space by major element, including categories for ceiling, 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.
      d. Name of Contractor.
      e. Page number.
   4. Submit list of incomplete items in the following format:

1.10  SUBMITTAL OF PROJECT WARRANTIES

A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated, or when delay in submittal of warranties might limit Owner’s rights under warranty.

B. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.

C. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.
   1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
   2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
   3. Identify each binder on the front and spine with the typed or printed title “WARRANTIES,” Project name, and name of Contractor.
   4. Warranty Electronic File: Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide bookmarked table of contents at beginning of document.

D. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1  MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially
hazardous to health or property or that might damage finished surfaces.

PART 3 - EXECUTION

3.1 DEMONSTRATION AND TRAINING

A. Instruction: Instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system. Provide a “classroom training” session to review O&M manuals and basic equipment operation, and a separate “demonstration” of actual equipment for both operation and maintenance procedures. Video-record training and demonstration sessions in digital CD format and provide three copies to Owner. Conduct training sessions for one of each type of equipment. Conduct demonstrations for each individual equipment item unless Owner accepts demonstrations of a representative number of repetitive items in lieu of individual tests for each item. Do not schedule demonstrations of Division 21, 22, 23, 25 and 26 systems and equipment until associated testing, adjusting and balancing has been completed and approved.

1. Provide instructors experienced in operation and maintenance procedures and in Owner training.
2. Provide instruction at mutually agreed-on times. For equipment that requires seasonal operation, provide similar instruction at the start of each season.
3. Schedule training with Owner with at least seven days' advance notice.
4. Coordinate instructors training schedules, including providing notification of dates, times, length of instruction, and course content.
5. Provide preliminary O&M manuals to serve as the basis for User training.
6. Maintain formal record of dates, names of attendees, duration of each training session and material covered. Video-record all training sessions (in digital CD format) and provide three copies of the CD’s to Owner for future use. Verify audio pickup is sufficient for future playback use by Owner’s personnel. Utilize microphones where necessary. Repeat all training where audio is unintelligible.
7. Obtain Owner’s Representative’s signed acceptance of individual training programs.
8. Refer to other Sections for specific information concerning training requirements.

B. Program Structure: Develop an instruction program that includes individual training modules for each system and each piece of equipment not part of a system. For each training module, develop a learning objective and teaching outline. Include instruction for the following:

1. System design and operational philosophy.
2. Review of documentation.
3. Operations.
4. Adjustments.
5. Troubleshooting.
7. Repair.

3.2 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.
1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:
   a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
   b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
   c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
   d. Remove tools, construction equipment, machinery, and surplus material from Project site.
   e. Remove snow and ice to provide safe access to building.
   f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
   g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
   h. Sweep concrete floors broom clean in unoccupied spaces.
   i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer’s recommendations if visible soil or stains remain.
   j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscurring materials. Polish mirrors and glass, taking care not to scratch surfaces.
   k. Remove labels that are not permanent.
   l. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
   m. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
   n. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grilles.
   o. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter on inspection.
   p. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
   q. Leave Project clean and ready for occupancy.

C. Pest Control: Comply with pest control requirements in Division 01 Section “Temporary Facilities and Controls.” Prepare written report.

D. Construction Waste Disposal: Comply with waste disposal requirements in Division 01 Section “Construction Waste Management and Disposal.”
3.3 REPAIR OF THE WORK

A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.

B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.

1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.

2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that already show evidence of repair or restoration.
   a. Do not paint over “UL” and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.

3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.

4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

END OF SECTION 017700
SECTION 017823 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 SUMMARY
   A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
      1. Operation and maintenance documentation directory.
      2. Emergency manuals.
      3. Operation manuals for systems, subsystems, and equipment.
      4. Product maintenance manuals.
      5. Systems and equipment maintenance manuals.

1.3 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.

1.4 CLOSEOUT SUBMITTALS
   A. Manual Content: Operations and maintenance manual content is specified in individual Specification Sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.
      1. Architect will comment on whether content of operations and maintenance submittals are acceptable.
      2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.
   B. Format: Submit operations and maintenance manuals in the following format:
         a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically linked operation and maintenance directory.
         b. Enable inserted reviewer comments on draft submittals.
      2. Three paper copies. Include a complete operation and maintenance directory. Enclose title pages and directories in clear plastic sleeves. Architect will return two copies.
   C. Initial Manual Submittal: Submit draft copy of each manual at least 30 days before commencing demonstration and training. Architect 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 will return copy with comments.
      1. Correct or revise each manual to comply with Architect’s comments. Submit copies of each corrected manual within 15 days of receipt of Architect’s comments and prior to commencing demonstration and training.
PART 2 - PRODUCTS

2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY
A. Directory: Prepare a single, comprehensive directory of emergency, operation, and maintenance data and materials, listing items and their location to facilitate ready access to desired information. Include a section in the directory for each of the following:
   1. List of documents.
   2. List of systems.
   3. List of equipment.
   4. Table of contents.
B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.
C. 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.
D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.
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.”

2.2 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS
A. Organization: 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.
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 Architect.
   7. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
   8. 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. 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: Enable bookmarking of 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.

F. 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, and subject matter of contents. 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.
   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.

2.3 EMERGENCY MANUALS
A. Content: Organize manual into a separate section for each of the following:
   1. Type of emergency.
   2. Emergency instructions.
   3. Emergency procedures.

B. 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.
5. Power failure.
7. System, subsystem, or equipment failure.
8. Chemical release or spill.

C. 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.

D. 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.

2.4 OPERATION MANUALS

A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
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.

B. 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.

C. 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.
7. Seasonal and weekend operating instructions.
8. Required sequences for electric or electronic systems.
9. Special operating instructions and procedures.

D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

2.5 PRODUCT MAINTENANCE MANUALS
A. 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.

B. 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.

C. Product Information: Include the following, as applicable:
   1. Product name and model number.
   2. Manufacturer’s name.
   3. Color, pattern, and texture.
   5. Reordering information for specially manufactured products.

D. 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.

E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

F. 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.

2.6 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS
A. 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 warranty and bond information, as described below.

B. 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
C. Manufacturers’ Maintenance Documentation: Manufacturers’ maintenance documentation including the following information for each component part or piece of equipment:
   1. Standard maintenance instructions and bulletins.
   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.

D. 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.

E. 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.

F. 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.

G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.

H. 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.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals.

B. 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.

C. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

D. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.
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.

E. Manufacturers’ Data: Where manuals contain manufacturers’ standard printed data, 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.

1. 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.

F. 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 operation and maintenance manuals.

2. Comply with requirements of newly prepared record Drawings in Division 01 Section “Project Record Documents.”

G. Comply with Division 01 Section “Closeout Procedures” for schedule for submitting operation and maintenance documentation.

END OF SECTION 017823
SECTION 017839 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 SUMMARY
   A. Section includes administrative and procedural requirements for project record documents, including the following:
      1. Record Drawings.
      2. Record Specifications.
      3. Record Product Data.
      4. Miscellaneous record submittals.

1.3 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 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 prints.
            2) Print each drawing, whether or not changes and additional information were recorded.
   B. Record Specifications: Marked-up Specifications, including addenda and contract modifications.
   C. Record Product Data: (Not required for project.)
   D. Reports: Submit written report weekly indicating items incorporated into project record documents concurrent with progress of the Work, including revisions, concealed conditions, field changes, product selections, and other notations incorporated.

PART 2 - PRODUCTS

2.1 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.
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 below first floor.
   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. Field records for variable and concealed conditions.
   n. 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 sets 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, Field Clarifications, RFI’s, alternate numbers, Change Order numbers, and similar identification, where applicable.

B. Record Digital Data Files: Immediately before inspection for Certificate of Substantial Completion, review marked-up record prints with Architect. When authorized, prepare a full set of corrected digital data files of the Contract Drawings, as follows:

2. Incorporate changes and additional information previously marked on record prints. Delete, redraw, and add details and notations where applicable.
3. Refer instances of uncertainty to Architect for resolution.
   a. See Division 01 Section “Submittal Procedures” for requirements related to use of Architect's digital data files.
   b. Architect will provide data file layer information. Record markups in separate layers.

C. Format: Identify and date each record Drawing; include the designation “PROJECT RECORD DRAWING” in a prominent location.

1. Record Prints: Organize record prints and newly prepared record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
   a. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital
data file.

3. Identification: As follows:
   a. Project name.
   b. Date.
   c. Designation “PROJECT RECORD DRAWINGS” in a prominent location.
   d. Name of Architect.
   e. Name of Contractor.

2.2 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. Note related Change Orders and record Drawings where applicable.
   B. Format: Submit record Specifications as annotated PDF electronic file.

2.3 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 annotated PDF electronic file or scanned PDF electronic file(s) of marked-up paper copy of marked-up miscellaneous record submittals.
      1. Include miscellaneous record submittals directory organized by Specification Section number and title, electronically linked to each item of miscellaneous record submittals.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE
   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. Maintenance of Record Documents and Samples: Store record documents and Samples in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Architect’s reference during normal working hours.

END OF SECTION 017839
SECTION 017900 - DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 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.

1.3 INFORMATIONAL SUBMITTALS
A. Instruction Program: Submit outline of 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. Attendance Record: For each training module, submit list of participants and length of instruction time.

1.4 CLOSEOUT SUBMITTALS
A. Demonstration and Training Video Recordings: 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.
      b. Name and address of videographer.
      c. Name of Architect.
      d. Name of Contractor.
      e. Date of video 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.

1.5 QUALITY ASSURANCE
A. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Division 01 Section “Quality Requirements,” experienced in operation and maintenance procedures and training.
B. Videographer Qualifications: A professional videographer who is experienced photographing demonstration and training events similar to those required.

1.6 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. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Architect.

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.

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. 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.

2. 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.

3. 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.

4. Adjustments: Include the following:
   a. Alignments.
   b. Checking adjustments.
   c. Noise and vibration adjustments.
   d. Economy and efficiency adjustments.
5. Troubleshooting: Include the following:
   a. Diagnostic instructions.
   b. Test and inspection procedures.

6. Maintenance: Include the following:
   a. Inspection procedures.
   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.

7. 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 “Operation and Maintenance Data.”
   B. Set up instructional equipment at instruction location.

3.2 INSTRUCTION
   A. Engage qualified instructors to instruct Owner’s personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
      1. Owner will furnish Contractor with names and positions of participants.
   B. 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 Architect, with at least seven days’ advance notice.
   C. 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.
   D. 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: Engage a qualified commercial videographer to 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.
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 DVD that describes the following for each Contractor involved on the Project, arranged according to Project table of contents:
      a. Name of Contractor/Installer.
      b. Business address.
      c. Business phone number.
      d. Point of contact.
      e. E-mail address.

C. Audio Levels: Verify audio pickup is sufficient for clear understanding. Utilize microphones where necessary.

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. Preproduced Video Recordings: Provide video recordings used as a component of training modules in same format as recordings of live training.

END OF SECTION
SECTION 018000 – COMMISSIONING

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

B. ASHRAE Standard 90.1 (edition as referenced in Div. 23000 specifications)
ASHRAE Guideline 0-2005 – The Commissioning Process

1.2 SUMMARY

A. Section includes general requirements that apply to implementation of commissioning without regard to specific systems, assemblies, or components.

B. Commissioning is systematic processes to provide documented confirmation that building systems perform according to the criteria set forth in the design intent and satisfy the owner’s operational needs. This is achieved by beginning in the design phase and documenting design intent and continuing through construction, acceptance and the warranty period with actual verification of performance. The commissioning process shall coordinate the traditionally separate functions of system documentation, equipment startup, control system calibration, testing and balancing, functional performance testing and O&M training. The Commissioning process shall comply with ASHRAE Guidelines 0-2005 and 1.1-2007.

C. Commissioning during the construction phase is intended to achieve the following specific objectives according to the Contract Documents:

1. Verify that applicable equipment and systems are installed according to the manufacturer’s recommendations and to industry accepted minimum standards and that they receive adequate operational checkout by installing contractors.
2. Verify and document proper performance of equipment and systems.
3. Verify that O&M documentation left on site is complete.

D. The commissioning process does not take away from or reduce the responsibility of the system designers or installing contractors to provide a finished and fully functioning product.

E. Abbreviations. The following are common abbreviations used in the Specifications. Definitions are found in Section 1.3.

\[
\begin{align*}
A/E & \rightarrow \text{Architect and Design Engineers} \\
CxA & \rightarrow \text{Commissioning Authority} \\
CC & \rightarrow \text{Controls Contractor} \\
Cx & \rightarrow \text{Commissioning} \\
Sub-contractors – Subcontractors to General Contractor \\
EC & \rightarrow \text{Electrical Contractor} \\
VC & \rightarrow \text{Verification Checklist} \\
FPT & \rightarrow \text{Functional Performance Test}
\end{align*}
\]
1.3 DEFINITIONS

A. **Acceptance Phase.** Phase of construction after startup and initial checkout when functional performance tests, O&M documentation review and training occurs.

B. **Approval.** Acceptance that a piece of equipment or system has been properly installed and is functioning in the tested modes according to the Contract Documents.

C. **Architect/Engineer (A/E):** The prime consultant (architect) and sub-consultants who comprise the design team, generally the HVAC mechanical designer/engineer and the electrical designer/engineer.

D. **CxA:** Commissioning Authority who will be providing “Fundamental Commissioning” services on this project. The CxA directs and coordinates the day-to-day commissioning activities. The CxA does not take an oversight role like the CM but will be involved during the construction phase as outlined in this specification.

E. **Datalogging:** Monitoring flows, currents, status, pressures, etc. of equipment using stand-alone dataloggers separate from the control system.

F. **Deferred Functional Performance Tests:** FPTs that are performed later, after project acceptance, due to partial occupancy, equipment, seasonal requirements, design or other site conditions that disallow the test from being performed.

G. **Deficiency:** A condition in the installation or function of a component, piece of equipment or system that is not in compliance with the Contract Documents (that is, does not perform properly or is not complying with the design intent)

H. **Factory Testing:** Testing of equipment on-site or at the factory-by-factory personnel (not to be done by sales representatives) with an Owner’s representative present.

I. **Functional Performance Test (FPT):** Test of the dynamic function and operation of equipment and systems using manual (direct observation) or monitoring methods. Functional testing is the dynamic testing of systems (rather than just components) under full operation (e.g., the chiller pump is tested interactively with the chiller functions to see if the pump ramps up and down to maintain the differential pressure setpoint). Systems are tested under various modes, such as during low cooling or heating loads, high loads, component failures, unoccupied, varying outside air temperatures, fire alarm, power failure, etc. The systems are run through all the control system’s sequences of operation and components are verified to be responding as the sequences state. Traditional air or water test and balancing (TAB) is not functional testing, in the commissioning sense of the word. TAB’s primary work is setting up the system flows and pressures as specified, while functional testing is verifying that which has already been set up. The commissioning authority develops the functional test procedures in a sequential written form, coordinates, oversees and documents the actual testing, which is usually performed by the installing contractor or vendor. FPTs are performed after pre-functional checklists and startups are complete.

J. **General Contractor (GC):** The prime contractor for this project. Generally, refers to all the GC’s sub-contractors as well. Also referred to as the Contractor, in some contexts.
K. **Indirect Indicators**: Indicators of a response or condition, such as a reading from a control system screen reporting a damper to be 100% closed.

L. **Manual Test**: Using hand-held instruments, immediate control system readouts or direct observation to verify performance (contrasted to analyzing monitored data taken over time to make the “observation”).

M. **Monitoring**: The recording of parameters (flow, current, status, pressure, etc.) of equipment operation using dataloggers or the trending capabilities of control systems.

N. **Non-Compliance**: See Deficiency.

O. **Non-Conformance**: See Deficiency.

P. **Over-written Value**: Writing over a sensor value in the control system to see the response of a system (e.g., changing the outside air temperature value from 50F to 75F to verify economizer operation). See also “Simulated Signal.”

Q. **Verification Checklist (VC)**: A list of items to inspect and elementary component tests to conduct to verify proper installation of equipment, provided by the CxA to the GC & sub-contractors. Verification checklists are primarily static inspections and procedures to prepare the equipment or system for initial operation (e.g., belt tension, oil levels OK, labels affixed, gages in place, sensors calibrated, etc.). However, some checklist items entail simple testing of the function of a component, a piece of equipment or system (such as measuring the voltage imbalance on a three phase pump motor of a chiller system). Verification checklists augment and are combined with the manufacturer’s start-up checklist. Even without a commissioning process, contractors typically perform some, if not many, of the verification checklist items a commissioning authority will recommend. However, few contractors document in writing the execution of these checklist items. Therefore, for most equipment, the contractors execute the checklists on their own. The commissioning authority only requires that the procedures be documented in writing, and does not witness much of the verification checklist, except for larger or more critical pieces of equipment.

1.4 **COORDINATION**

A. **Commissioning Team**: The members of the commissioning team consist of the Commissioning authority (CxA), the Owner's Representative (OR), the designated representative of the Owner’s General Contractor (GC), the Architect and Design Engineers (particularly the mechanical engineer), the Mechanical Contractor (MC), the Electrical Contractor (EC), the TAB representative, the Controls Contractor (CC), any other installing sub-contractors or suppliers of equipment. If known, the Owner’s building or plant operator/engineer is also a member of the commissioning team.

B. **Management**: The CxA is hired by the owner directly. The CxA directs and coordinates the commissioning activities and the reports to the OR. All members work together to fulfill their contracted responsibilities and meet the objectives of the Contract Documents.

C. **Scheduling**: The CxA will work with the GC according to established protocols to schedule the commissioning activities. The CxA will provide sufficient notice to the GC for scheduling commissioning activities. The GC will integrate all commissioning activities into the master schedule. All parties will address scheduling problems and make necessary notifications in a timely manner in order to expedite the commissioning process. The CxA will provide the initial
1.5 COMMISSIONING PROCESS

A. Commissioning Process. The following narrative provides a brief overview of the typical commissioning tasks during construction and the general order in which they occur.

1. Commissioning during construction begins with a scoping meeting conducted by the CxA where the commissioning process is reviewed with the commissioning team members.

2. Additional meetings will be required throughout construction, scheduled by the CxA with necessary parties attending, to plan, scope, coordinate, schedule future activities and resolve problems. It is anticipated that monthly commissioning meetings will occur for this project thru-out the construction duration.

3. Equipment documentation is submitted to the CxA during normal submittals, including detailed start-up procedures.

4. The CxA works with the sub-contractors in developing startup plans and startup documentation formats, including providing the Sub-contractors with verification checklists to be completed, during the startup process.

5. In general, the checkout and performance verification proceeds from simple to complex; from component level to equipment to systems and intersystem levels with verification checklists being completed before the functional performance testing.

6. The sub-contractors, under their own direction, execute and document the verification checklists and perform startup and initial checkout. The CxA documents that the checklists and startup were completed according to the approved plans. This may include the CxA witnessing start-up of selected equipment.

7. The CxA develops specific equipment and system functional performance test procedures. The Sub-contractors review the procedures.

8. The procedures are executed by the sub-contractors, under the direction of, and documented by the CxA.

9. Items of non-compliance in material, installation or setup are corrected at the sub-contractor’s expense and the system retested.

10. Commissioning is completed before Designers’ Final Inspection.

1.6 COMMISSIONING TEAM

A. Members Appointed by Contractor(s): Individuals, each having the authority to act on behalf of the entity he or she represents, explicitly organized to implement the commissioning process through coordinated action. The commissioning team shall consist of, but not be limited to, the General Contractor (GC) and representatives of the GC, including Project superintendent and sub-contractors, installers, suppliers, and specialists deemed appropriate by the CxA.

B. Members Appointed by Owner:

1. Representatives of the facility user and operation and maintenance personnel.

2. The Owners Representative.

3. Architect and engineering design professionals.
1.7 OWNER'S RESPONSIBILITIES

A. Assign operation and maintenance personnel and schedule them to participate in commissioning team activities.

B. Attend commissioning scoping meetings and additional meetings as necessary.

1.8 OWNERS REPRESENTATIVE'S RESPONSIBILITIES

A. The Owner's Representative (OR) shall represent the Owner during the commissioning process as follows:
   1. Manage the contract of the A/E and GC.
   2. Arrange for facility operating and maintenance personnel to attend various field commissioning activities and field training sessions.
   3. Provide final approval for the completion of the commissioning work.
   4. Ensure that any seasonal or deferred testing and any deficiency issues are addressed.
   5. Attend commissioning scoping meetings and additional meetings as necessary.

1.9 ARCHITECT/ENGINEERS (A/E) RESPONSIBILITIES

A. The AE shall participate in and perform commissioning process activities including, but not limited to, the following:
   1. Attend the commissioning scoping meeting and selected commissioning team meetings.
   2. Perform normal submittal review, construction observation, as-built drawing preparation, O&M manual preparation, etc., as contracted.
   3. Provide the CxA design narrative and sequence documentation within the limits of the A/E contract scope of services. The designers shall assist (along with the contractors) in clarifying the operation and control of commissioned equipment in areas where the specifications, control drawings or equipment documentation is not sufficient for writing detailed testing procedures.
   4. Coordinate resolution of system deficiencies identified during commissioning, according to the contract documents.
   5. Review and approve in writing, the functional performance test procedures submitted by the CxA, prior to testing.
   6. Review and approve the O&M manuals. A/E shall distribute the approved O&M manuals to the OR for O&M personnel use for training of systems installed.
   7. Coordinate resolution of design non-conformance and design deficiencies identified during warranty-period commissioning.
   8. Participate in the resolution of non-compliance, non-conformance and design deficiencies identified during commissioning during warranty-period commissioning.

1.10 GENERAL CONTRACTOR (GC) RESPONSIBILITIES

A. The GC shall participate in and perform commissioning process activities including, but not limited to the following:
   1. Facilitate the coordination of the commissioning work by the CxA. GC shall ensure that commissioning activities are being scheduled into the master project schedule.
2. Attend commissioning scoping meetings and other commissioning team meetings.

3. Perform the normal review of submittals. Prepare and submit final as-builts in accordance with design intent documentation for inclusion in the O&M manuals and issue to A/E for review. The O&M manuals shall be issued to the A/E team within 60 days, from the time of equipment submittal approval by the A/E.

4. Furnish a copy of all construction documents, addenda, requests for information, change orders and approved submittals and shop drawings related to commissioned equipment to the CxA.

5. Review and approve in writing, the functional performance test procedures submitted by the CxA, prior to testing.

6. Review commissioning progress and execute deficiency reports.

7. Coordinate the resolution of non-compliance and design deficiencies identified in all phases of commissioning.

8. Attend commissioning scoping meetings with sub-contractors and any additional meetings as necessary.

9. Develop the criteria for Owners O&M personnel training and coordinate the sub-contractors, certified manufactures reps to the times and dates of training with approval by OR, prior to training. The GS shall provide an audio and video recording of all training sessions and shall deliver the training videos to the owner as part of the close out documentation. The warranty period will commence once the Owners O&M personnel have been properly trained and the OR / CxA have approved the training a success.

10. Provide coordination drawings of all trades overlaid on one drawing as required by the engineer of record for their approval.

1.11 GENERAL CONTRACTOR’S SUB-CONTRACTOR’S RESPONSIBILITIES

A. Contractor shall assign representatives with expertise and authority to act on its behalf and shall schedule them to participate in and perform commissioning process activities including, but not limited to, the following:

1. Evaluate performance deficiencies identified in test reports and, in collaboration with entity responsible for system and equipment installation, recommend corrective action.

2. Cooperate with the CxA for resolution of issues recorded in the Issues Log.

3. Attend commissioning team meetings when scheduled.

4. Integrate and coordinate commissioning process activities with construction schedule.

5. Review commissioning progress and deficiency reports.

6. Review and accept construction checklists provided by the CxA.

7. Review and approve in writing, the functional performance test procedures submitted by the CxA, prior to testing.

8. Complete commissioning process test procedures.

9. Include the cost of commissioning coordination including sub-contractors in the total contract price.

10. Coordinate the training of the Owner’s personnel using a pre-approved agenda and provide the times and dates of this training to the Owner.

11. Provide a list of final settings, setpoints, ranges, and schedules as required by the CxA.

12. From the design documents provide red-line drawings that are edited and updated diagrams for the chilled, hot, & domestic water piping systems and the supply, return, & exhaust air ducted systems, the building management control system, and the lighting control systems.

B. The Equipment Suppliers’ Responsibilities shall assign representatives with expertise and authority to act on its behalf and shall schedule them to participate in and perform commissioning process activities including, but not limited to, the following:
1. Provide all requested submittal data, including detailed start-up procedures and specific responsibilities of the Owner to keep warranties in force.
2. Assist in equipment testing per agreements with sub-contractors.
3. Include all special tools and instruments (only available from vendor, specific to a piece of equipment) required for testing equipment according to these Contract Documents in the base bid price to the GC.
4. Through the GC they supply products to, analyze specified products and verify that the designer has specified the newest most updated equipment reasonable for this project’s scope and budget.
5. Provide information requested by CxA regarding equipment sequence of operation and testing procedures.
6. Review test procedures for equipment installed by factory representatives.
7. Attend commissioning scoping meetings and additional meetings as necessary.
8. All required factory start-ups will be done by a factory trained technician and not a representative firm or salesman.

1.12 CxA’s RESPONSIBILITIES

A. The CxA is not responsible for design concept, design criteria, compliance with codes, design or general construction scheduling, cost estimating, or construction management. The CxA may assist with problem-solving, non-conformance or deficiencies, but ultimately that responsibility resides with the general contractor and the A/E. The primary role of the CxA is to develop and coordinate the execution of a testing plan, observe and document performance; that systems are functioning in accordance with the documented design intent and in accordance with the Contract Documents. The GC will provide all tools or the use of tools to start, check-out and functionally test equipment and systems, except for specified testing with portable data-loggers, which shall be supplied and installed by the CxA. The CxA responsibilities shall:

1. Coordinate and direct the commissioning activities using consistent protocols and forms, centralized documentation, clear and regular communications and consultations with all necessary parties, frequently updated timelines and schedules, and provide technical expertise.
2. Coordinate the commissioning work with the GC and ensures that the commissioning activities are being scheduled into the master schedule.
3. Plan and conduct a commissioning scoping meeting and other commissioning meetings.
4. Review shop drawing submittals for commissioned equipment and provide CxA comments to the design engineer for review and, if applicable, inclusion in the combined submittal review response.
5. Request and review additional information required to perform commissioning tasks, including, contractor start-up and checkout procedures.
6. Before startup, gather and review the current control sequences and interlocks and work with contractors and design engineers until sufficient clarity has been obtained, in writing, to be able to write detailed testing procedures.
7. Write and distribute the verification checklists (VCs) and the functional performance tests (FPTs).
8. Discuss the start-up and initial systems checkout plan with the subcontractors.
9. Perform site visits, as necessary, to observe component and system installations. Attend selected planning and job-site meetings to obtain information on construction progress. Review construction meeting minutes for revisions/substitutions relating to the commissioning process. Assist in resolving any discrepancies.
10. Approve pre-functional tests and checklist completion by reviewing pre-functional checklist reports and by selected site observation and spot checking the VCs.
11. Approve systems startup by reviewing start-up reports and by selected site observation.
12. Review air and water systems balancing by reviewing completed TAB reports.
13. With necessary assistance and review from installing contractors, write the functional performance test procedures for equipment and systems. This may include energy management control system trending, stand-alone datalogger monitoring or manual functional testing. Submit draft FPTs to the GC and the design team for review and approval.
15. Provide the GC with written progress reports and test results with recommended actions.
16. Provide a final commissioning report.

1.13 SYSTEMS TO BE COMMISSIONED

A. The following checked systems will be commissioned in this project.

1. Mechanical System
   a. Major Equipment (Tested at 100%):
      (4) Air-handling units.
      (1) Air-cooled chiller and (4) pumps
      (2) Condensing boilers and (2) pumps
      (1) Dedicated Outside Air System
      (2) Computer room units
      HVAC Controls System
   b. Minor Equipment (Tested at 25%)
      (18) hot-water VAV boxes
      (16) hot-water unit heaters
      (9) DX split-systems
      (54) Exhaust fans
      (13) Electric Unit Heaters

2. Plumbing System
   (6) Electric Water Heaters

3. Lighting System
   (1) Lighting Control System

PART 2 – PRODUCTS

2.1 TEST EQUIPMENT

A. All standard testing equipment required to perform startup and initial checkout and required functional performance testing shall be provided by the Division contractor for the equipment being tested. For example, the mechanical contractor of Division 23 shall ultimately be responsible for all standards testing equipment for the HVAC system and controls system in Division 23, except for equipment specific to and used by TAB in their commissioning responsibilities. Two-way radios shall be provided by the Division Contractor.

B. Special equipment, tools and instruments (only available from vendor, specific to a piece of equipment) required for testing equipment, according to these Contract Documents shall be included in the base bid price to the GC and left on site.
C. All testing equipment shall be of sufficient quality and accuracy to test and/or measure system performance with the tolerances specified in the Specifications. If not otherwise noted, the following minimum requirements apply: Temperature sensors and digital thermometers shall have a certified calibration within the past year to accuracy of 0.5°F and a resolution of + or - 0.1°F. Pressure sensors shall have an accuracy of + or - 2.0% of the value range being measured (not full range of meter) and have been calibrated within the last year. All equipment shall be calibrated according to the manufacturer’s recommended intervals and when dropped or damaged. Calibration tags shall be affixed or certificates readily available.

PART 3 – EXECUTION

3.1 MEETINGS

A. Scoping Meeting: Within 60 days of commencement of construction, the CxA will schedule, plan and conduct a commissioning scoping meeting with the entire commissioning team in attendance. Meeting minutes will be distributed to all parties by the CxA.

B. The CxA will conduct construction progress meetings; these meetings will cover coordination, deficiency resolution and planning issues with the GC & Sub-contractors. The CxA will plan these meetings and will minimize unnecessary time being spent by Sub-contractors. These meetings will be scheduled as necessary determined by the CxA.

3.2 REPORTING

A. The CxA will regularly communicate with all members of the commissioning team, keeping them apprised of commissioning progress and scheduling changes through e-mails or reports.

B. Testing or review approvals and non-conformance and deficiency reports are made regularly with the review and testing as described in later sections.

C. A final summary report by the CxA will be provided to the OR, focusing on evaluating commissioning process issues and identifying areas where the process could be improved. All acquired documentation, logs, minutes, reports, deficiency lists, communications, findings, unresolved issues, etc., will be compiled in appendices and provided with the summary report.

3.3 SUBMITTALS

A. The CxA will provide independent reviews of the submittal shop drawings for equipment included in the commissioning scope. These reviews will be integrated into the normal submittal process and protocol of the construction team, and comments will be provided to the design engineer for inclusion in a combined submittal review. At minimum, the reviews will require the equipment manufacturer and model number, the manufacturer’s printed installation and detailed start-up procedures, full sequences of operation, O&M data, performance data, any performance test procedures, control drawings and details of owner contracted tests. In addition, the installation and checkout materials that are actually shipped inside the equipment and the actual field checkout sheet forms to be used by the factory or field technicians shall be submitted to the Commissioning authority. All documentation requested by the CxA will be included by the sub-contractors in their O&M manual contributions.

B. The CxA may request additional design narrative information from the A/E and Controls Contractor, depending on the completeness of the design intent documentation and sequences provided with the Specifications.
C. These submittals to the CxA do not constitute compliance for O&M manual documentation. The O&M manuals are the responsibility of the Contractor.

3.4 START-UP, VERIFICATION CHECKLISTS AND INITIAL CHECKOUT

A. The following procedures apply to all equipment to be commissioned, according to Section 1.13, Systems to be commissioned.

B. General. Verification checklists are important to ensure that the equipment and systems are hooked up and operational. It ensures that functional performance testing (in-depth system checkout) may proceed without unnecessary delays. The pre-functional testing for a given system must be successfully completed prior to formal functional performance testing of equipment or sub-systems of the given system.

C. Start-up and Initial Checkout Plan. The CxA may assist the commissioning team members responsible for startup of any equipment. The primary role of the CxA in this process is to ensure that there is written documentation that each of the manufacturer-recommended procedures have been completed. Parties responsible for prefunctional checklists and startup are identified in the commissioning scoping meeting and in the checklist forms. The GC, sub-contractors, and manufacturer’s technicians shall be responsible for executing functional performance tests for their representative equipment and systems.

1. The CxA develops verification checklists for all equipment and/or systems to be commissioned and delivers the checklists to the GC for completion. These checklists indicate required procedures to be executed as part of startup and initial checkout of the systems and the party responsible for their execution.

2. These checklists and tests are provided by the CxA to the GC. The CxA determines which trade is responsible for executing and documenting each of the line item tasks and notes that trade on the form. Each form will have more than one trade responsible for its execution.

3. The sub-contractor responsible for the purchase of the equipment develops the full startup plan by combining (or adding to) the CxA’s checklists with the manufacturer’s detailed startup and checkout procedures from the O&M manual and the normally used field checkout sheets. The plan will include checklists and procedures with specific boxes or lines for recording and documenting the checking and inspections of each procedure and a summary statement with a signature block at the end of the plan. The start-up plan could consist of something as simple as:
   a. The CxA’s pre-functional checklists.
   b. The manufacturer’s standard written start-up procedures copied from the installation manuals with check boxes by each procedure & a signature block added by hand at the end.
   c. The manufacturer’s normally used field checkout sheets.

4. The subcontractor submits the full startup plan to the CxA for review and approval.

5. The CxA reviews and approves the procedures and the format for documenting them, noting any procedures that need to be added.

6. The full start-up procedures and the approval form may be provided to the GC for review and approval, depending on management protocol.

D. Sensor and Actuator Calibration.
1. All field-installed temperature, relative humidity, CO, CO2 and pressure sensors and gages, and all actuators (dampers and valves) on all equipment shall be calibrated using the methods described below. Alternate methods may be used if approved by the Owner before-hand. All test instruments shall have had a certified calibration within the last 12 months. Sensors installed in the unit at the factory with calibration certification provided need not be field calibrated.

2. All procedures used shall be fully documented on the prefunctional checklists or other suitable forms, clearly referencing the procedures followed and written documentation of initial, intermediate and final results.


   a. All Sensors: Verify that all sensor locations are appropriate and away from causes of erratic operation. Verify that sensors with shielded cable are grounded only at one end. For sensor pairs that are used to determine a temperature or pressure difference, make sure they are reading within 0.2°F of each other for temperature and within a tolerance equal to 2% of the reading, of each other, for pressure. Tolerances for critical applications may be tighter.

   b. Sensors without Transmitters--Standard Application: Make a reading with a calibrated test instrument within 6 inches of the site sensor. Verify that the sensor reading (via the permanent thermostat, gage or building automation system (BAS) is within the tolerances in the table below of the instrument-measured value. If not, install offset in BAS, calibrate or replace sensor.

   c. Sensors with Transmitters--Standard Application: Disconnect sensor. Connect a signal generator in place of sensor. Connect ammeter in series between transmitter and BAS control panel. Using manufacturer’s resistance-temperature data simulate minimum desired temperature. Adjust transmitter potentiometer zero until 4 mA is read by the ammeter. Repeat for the maximum temperature matching 20 mA to the potentiometer span or maximum and verify at the BAS. Record all values and recalibrate controller as necessary to conform with specified control ramps, reset schedules, proportional relationship, reset relationship and P/I reaction. Reconnect sensor. Make a reading with a calibrated test instrument within 6 inches of the site sensor. Verify that the sensor reading (via the permanent thermostat, gage or building automation system (BAS) is within the tolerances in the table below of the instrument-measured value. If not, replace sensor and repeat. For pressure sensors, perform a similar process with a suitable signal generator.

   d. Critical Applications. For critical applications (process, manufacturing, etc.) more rigorous calibration techniques may be required for selected sensors. Describe any such methods used on an attached sheet.

<table>
<thead>
<tr>
<th>Sensor</th>
<th>Required Tolerance (+/-)</th>
<th>Sensor</th>
<th>Required Tolerance (+/-)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooling coil, and chilled water</td>
<td>0.4F</td>
<td>Flow rates, water</td>
<td>4% of design</td>
</tr>
<tr>
<td>temperatures</td>
<td></td>
<td>Relative humidity</td>
<td>4% of design</td>
</tr>
<tr>
<td>AHU wet bulb or dew point</td>
<td>2.0F</td>
<td>Combustion flue temps</td>
<td>5.0F</td>
</tr>
<tr>
<td>Hot water coil and boiler water</td>
<td>1.5F</td>
<td>Oxygen or CO2 monitor</td>
<td>0.1 % pts</td>
</tr>
<tr>
<td>temperatures</td>
<td></td>
<td>CO monitor</td>
<td>0.01 % pts</td>
</tr>
<tr>
<td>Outside air, space air, duct air</td>
<td>0.4F</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

COMMISSIONING 018000-11
4. Valve and Damper Stroke Setup and Check
   a. For all valve and damper actuator positions checked, verify the actual position against the BAS readout.
   b. Set pumps or fans to normal operating mode. Command valve or damper closed, visually verify that valve or damper is closed and adjust output zero signal as required. Command valve or damper open, verify position is full open and adjust output signal as required. Command valve or damper to a few intermediate positions. If actual valve or damper position does not reasonably correspond, replace actuator.

5. Closure for heating coil valves (NO): Set heating setpoint 20°F above room temperature. Observe valve open. Remove control air or power from the valve and verify that the valve stem and actuator position do not change. Restore to normal. Set heating setpoint to 20°F below room temperature. Observe the valve close. Restore to normal.

6. Closure for cooling coil valves (NC): Set cooling setpoint 20°F above room temperature. Observe the valve close. Remove control air or power from the valve and verify that the valve stem and actuator position do not change. Restore to normal. Set cooling setpoint to 20°F below room temperature. Observe valve open. Restore to normal.

E. Execution of Verification Checklists and Startup.

1. Four weeks prior to startup of equipment, the sub-contractors and vendors shall schedule startup and checkout with the GC and CxA. The performance of the prefunctional checklists, startup and checkout are directed and executed by the sub-contractors or vendor. When checking off prefunctional checklists, signatures may be required of other subcontractors to verify completion of their work.
2. The CxA shall observe, at minimum, the procedures for each piece of primary equipment, unless there are multiple units, in which case a sampling strategy will be used as approved by the Owner.
3. For lower-level components of equipment, (e.g., VAV boxes, sensors, controllers), the CxA shall observe a sampling of the prefunctional and start-up procedures. The sampling procedures amounts are indicated in section 1.13.
4. The Sub-contractors and vendors shall execute startup and provide the CxA with a signed and dated copy of the completed start-up and prefunctional tests and checklists.
5. Only individuals that have direct knowledge and witnessed that a line item task on the prefunctional checklist was actually performed shall initial or check that item off. It is not acceptable for witnessing supervisors to fill out these forms.

F. Deficiencies, Non-Conformance and Approval in Checklists and Startup.

1. The Sub-contractors shall clearly list any outstanding items of the initial start-up and prefunctional procedures that were not completed successfully, at the bottom of the procedures form or on an attached sheet. The procedures form and any outstanding deficiencies are provided to the CxA within two days of test completion.
2. The CxA reviews the report and submits either a non-compliance report or an approval form to the Sub-contractor or GC. The CxA shall work with the Sub-contractors and vendors to correct and retest deficiencies or uncompleted items. The CxA will involve the GC and others as necessary. The installing Sub-contractors or vendors shall correct all areas that are deficient or incomplete in the checklists and tests in a timely manner and shall notify the CxA as soon as outstanding items have been corrected and resubmit an updated start-up report and a Statement of Correction on the original non-compliance report. When satisfactorily completed, the CxA recommends approval of the execution of the checklists and startup of each system to the GC using a standard form.

3. Items left incomplete, which later cause deficiencies or delays during functional testing may result in back charges to the responsible party. Refer to Part 3.6.B.5 herein for details.

3.5 FUNCTIONAL PERFORMANCE TESTING

A. This sub-section applies to all commissioning functional testing for all divisions.

B. The specific system functional performance tests (with required modes and sequences to be tested) will be developed after complete review of the control shop drawings and discussion with the Engineer-of-Record (EOR).

C. The parties responsible to execute each test are the installing contractors, controls contractor, and associated vendors, manufacturer’s representatives and technicians.

D. Objectives and Scope. The objective of functional performance testing is to demonstrate that each system is operating according to the documented design intent and Contract Documents. Functional testing facilitates bringing the systems to full dynamic operation. Additionally, during the testing process, areas of deficient performance are identified and corrected, improving the operation and functioning of the systems.

1. In general, each system should be operated through all modes of operation (seasonal, occupied, unoccupied, warm-up, cool-down, part- and full-load) where there is a specified system response. Verifying each sequence in the sequences of operation is required. Proper responses to such modes and conditions as power failure, freeze condition, low oil pressure, no flow, equipment failure, etc. shall also be tested.

2. Development of Test Procedures. Before test procedures are written, the CxA shall obtain all requested documentation and a current list of change orders affecting equipment or systems, including an updated points list, program code, control sequences and parameters. The CxA shall develop specific test procedures and forms to verify and document proper operation of each piece of equipment and system. Each sub-contractor or vendor responsible to execute a test shall provide limited assistance to the CxA in developing the procedures review (answering questions about equipment, operation, sequences, etc.). Prior to execution, the CxA shall provide a copy of the test procedures to the sub-contractor(s) who shall review the tests for feasibility, safety, equipment and warranty protection. The CxA will submit these tests to the A/E for review and approval.

3. The CxA shall review owner-contracted, factory testing or required owner acceptance tests which the CxA is not responsible to oversee, including documentation format, and shall determine what further testing or format changes may be required to comply with the Specifications. Redundancy of testing shall be minimized.
4. The purpose of any given specific test is to verify and document compliance with the stated criteria of acceptance given on the test form.

5. The test procedure forms developed by the CxA shall include (but not be limited to) the following information:

   a. System and equipment or component name(s)
   b. Equipment location and ID number
   c. Unique test ID number, and reference to unique prefunctional checklist and start-up documentation ID numbers for the piece of equipment
   d. Date
   e. Project name
   f. Participating parties
   g. Required pre-test field measurements
   h. Instructions for setting up the test.
   i. Specific step-by-step procedures to execute the test, in a clear, sequential and repeatable format
   j. Acceptance criteria of proper performance with a Yes / No check box to allow for clearly marking whether or not proper performance of each part of the test was achieved.
   k. A section for comments
   l. Signatures and date block for the CxA.

E. Test Methods.

1. Functional performance testing and verification may be achieved by manual testing (persons manipulate the equipment and observe performance) or by monitoring the performance and analyzing the results using the control system’s trend log capabilities or by stand-alone dataloggers. The final functional performance test protocols, as developed by the CxA, shall specify which methods shall be used for each test. The CxA may substitute specified methods or require an additional method to be executed, other than what was specified, with the approval of the GC. The CxA will determine which method is most appropriate for tests that do not have a method specified.

2. Overwritten Values. Overwriting sensor values to simulate a condition, such as overwriting the outside air temperature reading in a control system to be something other than it really is, shall be allowed, but shall be used with caution and avoided when possible. Such testing methods often can only test a part of a system, as the interactions and responses of other systems will be erroneous or not applicable. Simulating a condition is preferable. e.g., for the above case, by heating the outside air sensor with a hair blower rather than overwriting the value or by altering the appropriate setpoint to see the desired response. Before simulating conditions or overwriting values, sensors, transducers and devices shall have been calibrated.

3. Simulated Signals. Using a signal generator which creates a simulated signal to test and calibrate transducers and DDC constants is generally recommended overusing the sensor to act as the signal generator via simulated conditions or overwritten values.

4. Altering Setpoints. Rather than overwriting sensor values, and when simulating conditions is difficult, altering setpoints to test a sequence is acceptable. For example, to see the AC compressor lockout work at an outside air temperature below 55˚F, when the outside air temperature is above 55˚F, temporarily change the lockout setpoint to be 2˚F above the current outside air temperature.
5. Indirect Indicators. Relying on indirect indicators for responses or performance shall be allowed only after visually and directly verifying and documenting, over the range of the tested parameters, that the indirect readings through the control system represent actual conditions and responses. Much of this verification is completed during pre-functional testing.

6. Setup. Each function and test shall be performed under conditions that simulate actual conditions as close as is practically possible. The sub-contractor executing the test shall provide all necessary materials, system modifications, etc. to produce the necessary flows, pressures, temperatures, etc. necessary to execute the test according to the specified conditions. At completion of the test, the sub-contractor shall return all affected building equipment and systems, due to these temporary modifications, to their pre-test condition.

7. Sampling. Multiple identical pieces of non-life-safety or otherwise non-critical equipment may be functionally tested using a sampling strategy. Significant application differences and significant sequence of operation differences in otherwise identical equipment invalidates their common identity. A small size or capacity difference, alone, does not constitute a difference. The specific recommended sampling rates for each type of equipment will be dictated by the CxA. It is noted that no sampling by sub-contractors is allowed in pre-functional checklist execution.

a. A common sampling strategy referenced in the Specifications as the “xx% Sampling — yy% Failure Rule” is defined by the following example:

\[
xx = \text{the percent of the group of identical equipment to be included in each sample.}
\]
\[
yy = \text{the percent of the sample that if failing, will require another sample to be tested.}
\]

b. The example below describes a 20% Sampling—10% Failure Rule.

1) Randomly test at least 20% (xx) of each group of identical equipment. In no case test less than three units in each group. This 20%, or three, constitute the “first sample.”

2) If 10% (yy) of the units in the first sample fail the functional performance tests, test another 20% of the group (the second sample).

3) If 10% of the units in the second sample fail, test all remaining units in the whole group.

4) If at any point, frequent failures are occurring and testing is becoming more troubleshooting than verification, the CxA may stop the testing and require the responsible sub-contractor to perform and document a checkout of the remaining units, prior to continuing with functionally testing the remaining units.

F. Coordination and Scheduling. The Sub-contractors shall provide sufficient notice [2 weeks] to the CxA regarding their completion schedule for the prefunctional checklists and startup of all equipment and systems. The CxA will schedule functional tests through the GC and affected Sub-contractors. The CxA shall direct, witness and document the functional testing of all equipment and systems. The Sub-contractors shall execute the tests.

1. In general, functional testing is conducted after pre-functional testing and all startups have been satisfactorily completed. The control system is sufficiently tested and approved by the CxA before it is used for TAB or to verify performance of other components or systems. The air balancing and water balancing is completed and debugged before
functional testing of air-related or water-related equipment or systems. The TAB Report has been approved by the Engineer of Record. Testing proceeds from components to sub-systems to systems. When the proper performance of all interacting, individual systems has been achieved, the interface or coordinated responses between systems is checked.

G. Test Equipment. To be provided by contractors.

H. Problem Solving. The CxA will recommend solutions to problems found, however the burden of responsibility to solve, correct and retest problems is with the GC, Sub-contractors and A/E.

3.6 DOCUMENTATION, NON-CONFORMANCE AND APPROVAL OF TESTS

A. Documentation. The CxA shall witness and document the results of all functional performance tests using the specific procedural forms developed for that purpose. Prior to testing, these forms are provided to the GC for review and approval and to the Sub-contractors for review. The CxA will include the filled out forms in the O&M manuals.

B. Non-Conformance.

1. The CxA will record the results of the functional test on the procedure or test form. All deficiencies or non-conformance issues shall be noted and reported to the GC on a standard non-compliance form.

2. Corrections of minor deficiencies identified may be made during the tests at the discretion of the CxA. In such cases the deficiency and resolution will be documented on the procedure form.

3. Every effort will be made to expedite the testing process and minimize unnecessary delays, while not compromising the integrity of the procedures. However, the CxA will not be pressured into overlooking deficient work or loosening acceptance criteria to satisfy scheduling or cost issues, unless there is an overriding reason to do so at the request of the Owner.

4. As tests progress and a deficiency are identified, the CxA discusses the issue with the executing contractor.

a. When there is no dispute on the deficiency and the sub-contractor accepts responsibility to correct it:
   1) The CxA documents the deficiency and the sub-contractor’s response and intentions and they go on to another test or sequence. After the day’s work, the CxA submits the non-compliance reports to the GC for signature, if required. A copy is provided to the sub-contractor and CxA. The sub-contractor corrects the deficiency, signs the statement of correction at the bottom of the non-compliance form certifying that the equipment is ready to be retested & sends it back to CxA.
   2) The CxA reschedules the test and the test is repeated.

b. If there is a dispute about a deficiency, regarding whether it is a deficiency or who is responsible:
   1) The deficiency shall be documented on the non-compliance form with the Sub-contractor’s response and a copy given to the GC and to the sub-contractor’s representative assumed to be responsible.
   2) Resolutions are made at the lowest management level possible. Other parties are brought into the discussions as needed. Final interpretive authority is with the A/E. Final acceptance authority is with the PM.
   3) The CxA documents the resolution process.
4) Once the interpretation and resolution have been decided, the appropriate party corrects the deficiency, signs the statement of correction on the non-compliance form and provides it to the CxA. The CxA reschedules the test and the test is repeated until satisfactory performance is achieved.

5. **Cost of Retesting**
   a. The cost for the sub-contractor to retest a prefunctional or functional test, if they are responsible for the deficiency shall be theirs. If they are not responsible, any cost recovery for retesting costs shall be negotiated with the GC.
   b. For a deficiency identified, not related to any prefunctional checklist or start-up fault, the following shall apply: The CxA and GC will direct the retesting of the equipment once at no “charge” to the GC for their time. However, the CxA’s time for a second retest will be charged to the GC, who may choose to recover costs from the responsible sub-contractor.
   c. The time for the CxA to direct any retesting required because a specific pre-functional checklist or start-up test item, reported to have been successfully completed, but determined during functional testing to be faulty, will be back charged to the GC, who may choose to recover costs from the party responsible for executing the faulty pre-functional test.

6. The GC shall respond in writing to the CxA and at least as often as commissioning meetings are being scheduled concerning the status of each apparent outstanding discrepancy identified during commissioning. Discussion shall cover explanations of any disagreements and proposals for their resolution.

7. The CxA retains the original non-conformance forms until the end of the project.

8. Any required retesting by any contractor shall not be considered a justified reason for a claim of delay or for a time extension by the prime contractor.

C. **Failure Due to Manufacturer Defect.** If 10%, or three, whichever is greater, of identical pieces (size alone does not constitute a difference) of equipment fail to perform to the Contract Documents (mechanically or substantively) due to manufacturing defect, not allowing it to meet its submitted performance spec, all identical units may be considered unacceptable by the CM or OR. In such case, the GC shall provide the Owner with the following:

1. Within one week of notification from the GC or OR, the GC’s manufacturer’s representative shall examine all other identical units making a record of the findings. The findings shall be provided to the CxA or OR within two weeks of the original notice.

2. Within two weeks of the original notification, the GC or manufacturer shall provide a signed and dated, written explanation of the problem, cause of failures, etc. and all proposed solutions which shall include full equipment submittals. The proposed solutions shall not significantly exceed the specification requirements of the original installation.

3. The CxA or OR will determine whether a replacement of all identical units or a repair is acceptable.

4. Two examples of the proposed solution will be installed by the GC will be allowed to test the installations for up to one week, upon which the CxA or OR will decide whether to accept the solution.
5. Upon acceptance, the GC and/or manufacturer shall replace or repair all identical items, at
their expense and extend the warranty accordingly, if the original equipment warranty
had begun. The replacement/repair work shall proceed with reasonable speed beginning
within one week from when parts can be obtained.

D. Approval. The CxA notes each satisfactorily demonstrated function on the test form. Formal
approval of the functional test is made later after review by the CxA if necessary. The CxA
recommends acceptance of each test to the GC using a standard form. The GC gives final
approval on each test using the same form, providing a signed copy to the CxA and OR.

3.7 DEFERRED TESTING

A. Unforeseen Deferred Tests. If any check or test cannot be completed due to the building
structure, required occupancy condition or other deficiency, execution of checklists and
functional testing may be delayed upon approval of the OR. These tests will be conducted in the
same manner as the seasonal tests as soon as possible. Services of necessary parties will be
negotiated.

B. Seasonal Testing. During the warranty period, seasonal testing (tests delayed until weather
conditions are closer to the system’s design) shall be completed as part of this contract. The CxA
shall coordinate this activity. Tests will be executed, documented and deficiencies corrected by
the appropriate Sub-contractors, with facilities staff and the CxA witnessing. Any final
adjustments to the O&M manuals and as-builds due to the testing will be made.

3.8 TRAINING OF OWNER PERSONNEL

A. The GC shall be responsible for training coordination and scheduling and ultimately for
ensuring that training is completed. GC shall ensure that certified factory manufacturers
representatives [no salesman] are present for training of Owners Personnel in the field and
classroom setting.

1. Each Sub-contractor and vendor responsible for training will submit a written training
plan to the A/E for review and approval prior to training. The plan will cover the following
elements:
   a. Equipment (included in training)
   b. Intended audience
   c. Location of training
   d. Objectives
   e. Subjects covered (description, duration of discussion, special methods,
      etc.)
   f. Duration of training on each
      subject
   g. Instructor for each subject
   h. Methods (classroom lecture, video, site walk-through, actual operational
demonstrations, written handouts, etc.)
   i. Instructor and qualifications
   j. For the primary HVAC equipment, the Controls Contractor shall provide a short
discussion of the control of the equipment during the mechanical training
conducted by others.
2. The GC develops an overall training plan and coordinates and schedules, with the A/E & OR, the overall training is for all systems. The GC is responsible for providing an audio and video recording of each training session. The OR develops criteria for determining that the training was satisfactorily completed. The GC will sign the approval form at each of the training sessions. A copy of the sign-in sheets from each training class to be given to the CxA.

3.9 OPERATION AND MAINTENANCE MANUALS

A. Standard O&M Manuals.

1. The specific content and format requirements for the standard O&M manuals are to be detailed by the engineer of record. The GC shall submit five copies of the complete operating and maintenance manuals to the A/E & OR for review within 60 calendar days after approval of equipment submittals/shop drawings. These O&M manuals shall include cooling system, heating system, supply air systems, exhaust systems and electrical distribution system. These shall show major pieces of equipment such as pumps, chillers, boilers, control valves, expansion tanks, coils, service valves, switchboards, motor control centers, panel boards, etc.

2. One copy will be returned to the GC within 30 days after receipt by the A/E.

3. The GC shall submit corrected final approved manuals prior to functional performance testing & training of Owners Personnel. Prior to final submittal, the A/E shall review the O&M manuals (in addition to the initial draft O&M manual), and documentation, with redline as-builts, for systems that were commissioned to verify compliance with the specifications. The A/E will also review each piece of equipment warranty and verify that all requirements to keep the warranty valid are clearly stated. This work does not supersede the A/E’s review of the O&M manuals according to the A/E’s contract.

3.10 WRITTEN WORK PRODUCTS

A. The commissioning process generates a number of written work products. In summary, the written products are:

<table>
<thead>
<tr>
<th>Product</th>
<th>Developed By</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Cx specification</td>
<td>CxA</td>
</tr>
<tr>
<td>2. Equipment - shop drawings &amp; submittals</td>
<td>GC &amp; Sub-contractors</td>
</tr>
<tr>
<td>3. Commissioning milestones</td>
<td>CxA with GC &amp; Sub-contractors</td>
</tr>
<tr>
<td>4. Verification Checklists</td>
<td>CxA</td>
</tr>
<tr>
<td>5. Startup and initial checkout plan</td>
<td>GC &amp; Sub-contractors, CxA to review</td>
</tr>
<tr>
<td>6. Startup and initial checkout forms filled out</td>
<td>GC &amp; Sub-contractors, CxA to review</td>
</tr>
<tr>
<td>7. Final TAB report</td>
<td>GC &amp; TAB, EOR &amp; CxA to review</td>
</tr>
<tr>
<td>8. Deficiencies Reports {as needed}</td>
<td>CxA</td>
</tr>
<tr>
<td>9. Functional Performance Tests</td>
<td>CxA with GC, Sub-contractors, A/E, &amp; OR</td>
</tr>
<tr>
<td>10. O&amp;M manuals issue to Owner &amp; A/ E</td>
<td>GC &amp; Sub-contractors</td>
</tr>
<tr>
<td>11. O&amp;M manuals reviewed</td>
<td>A/E</td>
</tr>
<tr>
<td>12. Overall training plan</td>
<td>GC w/ Factory Representatives</td>
</tr>
<tr>
<td>13. Specific training agendas</td>
<td>GC &amp; Sub-contractors</td>
</tr>
<tr>
<td>14. Final commissioning report</td>
<td>CxA</td>
</tr>
</tbody>
</table>
B. Final Report Details: The final commissioning report shall include an executive summary, list of participants and roles, brief building description, overview of commissioning and testing scope and a general description of testing and verification methods. For each piece of commissioned equipment, the report should contain the disposition of the commissioning authority regarding the adequacy of the equipment, documentation and training meeting the contract documents in the following areas:

1. Equipment meeting the equipment specifications, 2) Equipment installation, 3) Functional performance and efficiency, 4) Equipment documentation and design intent, and 5) Operator training. All outstanding non-compliance items shall be specifically listed. Recommendations for improvement to equipment or operations, future actions, commissioning process changes, etc. shall also be listed. Each non-compliance issue shall be referenced to the specific functional test, inspection, trend log, etc. where the deficiency is documented. The functional performance and efficiency section for each piece of equipment shall include a brief description of the verification method used (manual testing, BAS trend logs, data loggers, etc.) and include observations and conclusions from the testing.

END OF SECTION 018000
SECTION 018119 - INDOOR AIR QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 SUMMARY
   A. Provide Indoor Air Quality (IAQ) Management Plan to remain in force during the construction period.

1.3 SUBMITTAL
   A. Construction Indoor Air Quality Management Plan (CIAQM Plan).

PART 2 - OBJECTIVES DURING CONSTRUCTION

2.1 PROTECTION
   A. Store all materials and equipment in a protected area (inside warehouse or storage trailer). Protect materials and equipment that are too large or heavy to store in a trailer from water and dirt/dust/debris.
      1. OPTION: When stored outside, provide two layers of minimum 8-mil poly on the ground and elevate equipment or material a minimum of 4 inches to allow water to run off. Secure top and sides with two layers of 8-mil poly to prevent water penetration and dust/dirt accumulation.
   B. Protect HVAC equipment from dust and odors. Do not store equipment in areas near painting, pressure washing, or excavation. Do not operate equipment during cutting or grinding of masonry or concrete.
      1. Refer to Division 23 for construction filter requirements for protection of mechanical duct systems during construction.
      2. Clean ductwork when installed. Cap ends with poly during construction to prevent contamination.
      3. Do not operate HVAC system until the exterior walls, roof, glass, doors and building filters are properly installed.
      4. If air handlers must be used during construction, provide filtration media with a Minimum Efficiency Reporting Value (MERV) of 8 at each air-handling unit. Provide specified prefilters and final filters for operation during construction or install temporary 4-inch MERV 8 filters at each return air grille for operation during construction.
      5. Replace all filtration media immediately prior to Substantial Completion.
         a. Filtration media installed in air-handling units shall have a Minimum Efficiency Reporting Value (MERV) of 8.
      6. Do not perform Testing and Balancing until dust or odor generating activities are completed.

2.2 SOURCE CONTROL
   A. Minimize IAQ contaminants introduced by construction materials.
B. Store waste construction materials a minimum of 30 feet away from the building.
C. Do not smoke within 30 feet of the exterior building perimeter.

2.3 PATHWAY INTERRUPTION
A. Provide barriers to contain construction areas to allow a portion of the building to be cleaned and then operate the HVAC system in that cleaned area. Acceptable barriers include dust curtains and temporary walls.
   1. Protect areas of the building in which HVAC is operational by physical barriers from areas of the building not acceptable for operation of the HVAC system.
B. Maintain areas within 30 feet of outdoor air intakes free of dust, dirt, debris, and volatile materials while the HVAC system is in operation.

2.4 HOUSEKEEPING
A. As dust accumulates at the Site, it can become airborne when disturbed by nearby activity. Similarly, spills or excess applications of products containing solvents will increase odors at the Site. Leaving the Site wet or damp for more than a day could result in the growth of mold and bacteria. Therefore, Site cleanup and maintenance is important to maintaining good IAQ during construction.
B. Perform the following to control contaminants at the Site:
   1. Suppress dust with wetting agents or sweeping compounds
   2. Provide an efficient dust collection method (e.g. a damp rag, wet mop, or vacuum equipped with a high efficiency particulate arrester (HEPA) filter or wet scrubber).
   3. Remove spills or excess applications of solvent-containing products immediately. Provide low-VOC emitting spot removers and cleaning agents near occupied areas.
   4. Remove accumulated water and keep work areas as dry as possible, including the use of dehumidification, if necessary.
   5. Once building is enclosed, vacuum with HEPA filtered vacuum cleaners to prevent settled dust from becoming airborne again.
   6. Protect porous materials from exposure to moisture. Replace items that remain damp for more than four hours.

END OF SECTION 018119
SECTION 018317 - EXTERIOR BUILDING ENCLOSURE AIR BARRIER REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 SUMMARY
A. This section includes administrative and procedural requirements for accomplishing an airtight building enclosure that controls infiltration or exfiltration of air, including but may not be limited to:
   1. The airtight components of the building enclosure and the joints, junctures and transitions between materials, products, and assemblies forming the air-tightness of the exterior building enclosure shall be “the air barrier system.”
   2. Coordinate between trades, schedule and sequence the Work, and provide preconstruction meetings, inspections, tests, and related actions.
   3. Reports performed by Contractor, independent agencies, and governing authorities.
   4. Construct the building enclosure with a continuous air barrier system to control air leakage into (infiltration) and out of (exfiltration) conditioned spaces. The air barrier system shall have the following characteristics:
      a. Continuous, with all joints sealed.
      b. Structurally supported to withstand positive and negative air pressures applied to the building enclosure.
      c. Connections between:
         1) Foundation and walls.
         2) Walls and windows and doors.
         3) Different wall systems.
         4) Wall and roof.
         5) Walls, floors, and roofs across construction joints, control joints and expansion joints.
         6) Walls, floors and roofs to utility, pipe and duct penetrations.
   5. Make all penetrations of the air barrier membrane or system and paths of air infiltration / exfiltration air-tight.

1.3 RESPONSIBILITIES
A. Contractor responsibilities:
   1. Coordinate affected trades and sequence construction to ensure continuity of the air barrier system, joints, junctures, and transitions between materials and assemblies of materials and products, from substructure to walls to roof.
      a. Coordinate the sequence of activities to accommodate required services with a minimum of delay.
      b. Coordinate activities to avoid the necessity of removing and replacing construction to accommodate inspections and tests.
   2. Provide quality assurance procedures, testing and verification as required.
      a. Schedule times for inspections, tests, taking samples, and similar activities.
   3. Facilitate inspections, tests, and other quality-control services required.
      a. Cooperate with agencies performing required inspections, tests, and similar services, and provide reasonable auxiliary services as requested.
      b. Notify the agency sufficiently in advance of operations to permit assignment of personnel.
c. Services include, but are not limited to, the following:
   1) Provide access to the Work.
   2) Furnish incidental labor and facilities necessary to facilitate inspections and tests.
   3) Take adequate quantities of representative samples of materials that require testing or assist the agency in taking samples.
   4) Deliver samples to testing laboratories.
   5) Provide security and protection of samples and test equipment at the Project Site.
4. Organize pre-installation conference and preconstruction meetings between the trades involved in the whole building’s air barrier system to discuss where each trade begins and ends and the responsibility and sequence of installation of all the air-tight joints, junctures, and transitions between materials, products and assemblies of products specified in the different sections, to be installed by the different trades.
5. Provide mockup of exterior wall assembly as required.
6. Coordinate the Work and trades to provide an airtight building enclosure.
   a. Continuity of the air barrier materials and products with joints to provide assemblies.
   b. Continuity of all exterior enclosure assemblies with joints and transition materials to provide an exterior enclosure air barrier system.
   c. Specific quality-control requirements for individual construction activities are also indicated in other applicable sections of the specifications. Ensure each subcontractor is adequately and satisfactorily performing the quality assurance documentation, tests and procedures required by each such section.
   d. Inspections, tests, and related actions do not limit Contractor’s quality-control procedures that facilitate compliance with Contract Document requirements.
   e. Requirements to provide an airtight exterior building enclosure is not limited by quality-control services performed by Architect, Owner, or authorities having jurisdiction and are not limited by provisions of this section.

1.4 PERFORMANCE REQUIREMENTS
A. Materials: Used for the air barrier system in the opaque envelope shall have an air permeance not to exceed 0.004 cfm/ft² under a pressure differential of 0.3 in. water (1.57psf) (0.02 L/s.m² @ 75 Pa) when tested in accordance with ASTM E 2178.
B. Assemblies of materials and components: Shall have an air permeance not to exceed 0.04 cfm/ft²p under a pressure differential of 0.3 in. water (1.57psf) (0.15 L/s.m² @ 75 Pa) when tested in accordance with ASTM E 2357.

1.5 SUBMITTALS
A. Submit a written report of each inspection, test, or similar service performed by the air barrier manufacturer’s technical representative, to the Owner, Architect, and Contractor.
   1. Report Data: Written reports of each inspection, test, or similar service shall include, but may not be limited to, the following:
      a. Date of issue.
      b. Project title and number.
      c. Name, address, and telephone number of testing agency.
      d. Dates and locations of samples and tests or inspections.
      e. Names of individuals making the inspection or test.
      f. Designation of the Work and test method.
      g. Identification of product and Specification Section.
h. Complete inspection or test data.
i. Test results and an interpretation of test results.
j. Ambient conditions at the time of sample taking and testing.
k. Comments or professional opinion on whether inspected or tested Work complies with Contract Document requirements.
l. Name and signature of laboratory inspector.
m. Recommendations on retesting.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 REPAIR AND PROTECTION

A. Upon completion of inspection, testing, sample taking and similar services, repair damaged construction and restore substrates and finishes.

B. Protect construction exposed by or for quality-control service activities, and protect repaired construction.

C. Repair and protect the Work, regardless of the assignment of responsibility for inspection, testing, or similar services.

END OF SECTION 018317
AIR BARRIER SYSTEM PRE-INSTALLATION CONFERENCE GUIDE

Purpose:

Few building construction components require the coordinated activities of more different trades on the construction, design, and management teams than an air barrier system. Once an air barrier has been covered, any remedies for problems with the components or installation can be costly and time-consuming.

Contractor and subcontractors must have a working knowledge of the air barrier installation, proper sequencing, and must work toward a common goal. Through the use of the integrated mockup panel and this Pre-Installation Conference Guide, gaining such knowledge should be enhanced.

Source: Much of this checklist utilizes content from Tremco’s “Air Barrier Project Management – Pre-Construction Meeting Checklist” document.

Contractor may request an electronic version of this document for editing purposes and for your use.

Send a copy of this guide to the affected trades and/or attendees so they can attend the Conference prepared to discuss these topics and to fill in as much of this information as possible prior to the meeting, or be prepared to fill them in at the meeting.

Checklist:

Submit and/or complete the following prior to conducting the Pre-Installation Conference. Confirm any additional submittal requirements with the relevant specification sections. Check those items below that you have completed or received “Approved” submittals from the Architect. Delete those that do not apply.

☐ Product data
☐ Shop drawings
☐ Product Certificates
☐ Product test reports
☐ Installer qualifications
☐ Samples
☐ Compatibility docs
☐ Integrated mockup
☐ Quality Assurance Program
☐ ABAA certifications
☐ Warranty sample
☐ __________________________
☐ Air Barrier System Subcontractor reviewed submittals of other indicated/specified trade(s)
Mandatory Attendees:

Attendance by the following parties and affected trades is mandatory. Identify and ensure any other trades or parties involved or affected by the installation of the air barrier system components are also present. Check those below who actually attend the meeting. Delete those that do not apply.

- Owner and/or Owner’s representative
- Owner’s Testing Agency (if hired to inspect ABS)
- Air barrier installer / subcontractor
- Air barrier manufacturer’s technical representative
- Window opening subcontractor
- Exterior Insulation subcontractor
- Exterior Metal Panel subcontractor
- Steel frame (hollow metal) subcontractor
- ________________________________
- ________________________________

Review of relevant Project Contract Specification Sections:

Review the Contract Specifications and identify and note any modifications that may be necessary, so all parties understand what is required of them. Submit any modifications via appropriate supplemental documents (FC or PCO). Edit specification sections below to match those of this Project.

<table>
<thead>
<tr>
<th>Spec Section</th>
<th>Modifications (if any)</th>
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<tbody>
<tr>
<td>018317</td>
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<td>072726</td>
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<td>072727</td>
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</tbody>
</table>
Review of relevant Project Contract Drawings:

Review the Contract Drawings and identify and note any modifications that may be necessary, so all parties understand what is required of them. Submit any modifications via appropriate supplemental documents (FC or PCO).

<table>
<thead>
<tr>
<th>Project Contract Drawing or Detail Number</th>
<th>Modifications (if any)</th>
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</table>
Review of relevant Project Shop/Submittal Drawings:

Review the submittals and identify and note any modifications that may be necessary, so all parties understand what is required of them. Resubmit those submittals that have not been approved by the Architect.

<table>
<thead>
<tr>
<th>Project Submittal / Shop Drawing Reference</th>
<th>Modifications (if any)</th>
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</table>
**Review of Products:**

Review the type of air barrier system that will be provided on the Project and identify each component. Delete those that do not apply.

<table>
<thead>
<tr>
<th>Component</th>
<th>Actual Product to be provided for Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPF insulation – field of wall</td>
<td></td>
</tr>
<tr>
<td>SPF insulation (wall) – voids / cracks / shims</td>
<td></td>
</tr>
<tr>
<td>SPF insulation – field of roof</td>
<td></td>
</tr>
<tr>
<td>Fluid-applied membrane – Permeable - wall</td>
<td></td>
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<tr>
<td>Fluid-applied membrane – Impermeable - wall</td>
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<tr>
<td>Self-adhered membrane – Permeable - wall</td>
<td></td>
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<tr>
<td>Self-adhered membrane – Impermeable - wall</td>
<td></td>
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<tr>
<td>Self-adhered membrane – Permeable - roof</td>
<td></td>
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<tr>
<td>Self-adhered membrane – Impermeable - roof</td>
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<tr>
<td>Transition membrane – self-adhered</td>
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<tr>
<td>Primer</td>
<td></td>
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<tr>
<td>Mastic / Termination sealant</td>
<td></td>
</tr>
</tbody>
</table>
**Construction tie-in responsibility:**

Air barrier systems are successful when a full building envelope/enclosure – without penetrations, voids, holes, gaps, and cracks – is complete. This is critical when numerous trades are involved in the tying-in of the air barrier system to all facets of the exterior building envelope. Utilize the table below to ensure everyone knows who is responsible for the indicated tie-in.

<table>
<thead>
<tr>
<th>Tie-in Area</th>
<th>Subcontractor responsible for tie-in</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exterior footing to exterior foundation wall</td>
<td></td>
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<tr>
<td>Exterior foundation to exterior wall</td>
<td></td>
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<tr>
<td>Slab-on-grade to wall (exterior and interior)</td>
<td></td>
</tr>
<tr>
<td>Slab-on-grade joints</td>
<td></td>
</tr>
<tr>
<td>Slab-on-grade penetrations</td>
<td></td>
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<tr>
<td>Exterior wall to steel frame/hollow metal (e.g., doors and windows)</td>
<td></td>
</tr>
<tr>
<td>Exterior walls to aluminum frames (e.g., windows and louvers)</td>
<td></td>
</tr>
<tr>
<td>Different exterior wall systems (e.g., masonry to metal)</td>
<td></td>
</tr>
<tr>
<td>Exterior head-of-wall to sloping roof</td>
<td></td>
</tr>
<tr>
<td>Parapet walls to roof</td>
<td></td>
</tr>
<tr>
<td>Exterior wall joints</td>
<td></td>
</tr>
<tr>
<td>Exterior shelf angles</td>
<td></td>
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<tr>
<td>Exterior steel lintels</td>
<td></td>
</tr>
<tr>
<td>Exterior wall penetrations (e.g., pipes, ducts)</td>
<td></td>
</tr>
<tr>
<td>Roof penetrations</td>
<td></td>
</tr>
<tr>
<td>Roof perimeter</td>
<td></td>
</tr>
</tbody>
</table>
Compatibility review:

Each trade/installer shall identify materials that may have potential compatibility issues. For example, some membranes may be subject to decomposing when placed in contact with other materials or components, especially sealants and primers; or may deteriorate if left exposed to the elements and are not protected. Delete those trades/installers that do not apply to this Project.

<table>
<thead>
<tr>
<th>Trade / Installer</th>
<th>Issues / Resolutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air barrier</td>
<td></td>
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<tr>
<td>Window</td>
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<tr>
<td>Steel frame (hollow metal)</td>
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<tr>
<td>CFMF-S</td>
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<tr>
<td>Exterior Metal Panels</td>
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<tr>
<td>Waterproofing</td>
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<tr>
<td>Masonry</td>
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<tr>
<td>Roofing</td>
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<tr>
<td>Sheathing</td>
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<tr>
<td>Concrete</td>
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<tr>
<td>Insulation</td>
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<td>Flexible Flashing</td>
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<tr>
<td>Metal Flashing</td>
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<tr>
<td>Structural steel</td>
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</tbody>
</table>

Substrate primer considerations:

Indicate whether the substrate for the air barrier material requires the use of a primer, and if so, identify the actual product to be used on the Project. Delete those that do not apply.

<table>
<thead>
<tr>
<th>Substrate</th>
<th>Yes</th>
<th>No</th>
<th>Product</th>
</tr>
</thead>
<tbody>
<tr>
<td>CMU</td>
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<tr>
<td>Sheathing</td>
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<td>Concrete</td>
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<tr>
<td>Precast</td>
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<tr>
<td>Metal Panels</td>
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<tr>
<td>Roof substrate board</td>
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<tr>
<td>Flexible Flashing</td>
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<td>Metal Flashing</td>
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<tr>
<td>Waterproofing</td>
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<tr>
<td>Steel frame / hollow metal</td>
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<tr>
<td>Structural steel</td>
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</tbody>
</table>
**MOORE COUNTY NEW COURTHOUSE AND RENOVATION**  
**CARTHAGE, NORTH CAROLINA**  
Architect’s Project No: 582405

### Substrate preparation considerations:

Indicate whether the substrate for the air barrier material requires special treatment or preparation (e.g., flush joints in CMU), and if so, identify the method to be used on the Project. Delete those that do not apply.

<table>
<thead>
<tr>
<th>Substrate</th>
<th>Yes</th>
<th>No</th>
<th>Method / Procedure</th>
<th>Subcontractor responsible</th>
</tr>
</thead>
<tbody>
<tr>
<td>CMU</td>
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<tr>
<td>Sheathing</td>
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<td>Concrete</td>
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<td>Metal Panels</td>
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<tr>
<td>Roof substrate board</td>
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<tr>
<td>Window frames</td>
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<tr>
<td>Flexible Flashing</td>
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<td>Metal Flashing</td>
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<tr>
<td>Waterproofing</td>
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<tr>
<td>Steel frame / hollow metal</td>
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<td>Structural steel</td>
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</tbody>
</table>

### Joint considerations:

It is critical for all joints, gaps, voids, cracks, seams, etc. to be sealed/closed for the air barrier to function properly (based on air barrier manufacturer’s instructions). If applicable, indicate the method to be used to close the joints and who is responsible. Delete those that do not apply.

<table>
<thead>
<tr>
<th>Type of joint</th>
<th>Method used to close joint</th>
<th>Subcontractor responsible</th>
</tr>
</thead>
<tbody>
<tr>
<td>CMU</td>
<td></td>
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<tr>
<td>Sheathing</td>
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<tr>
<td>Concrete</td>
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<td>Precast</td>
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<td>Metal Panels</td>
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<tr>
<td>Roof substrate board</td>
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<tr>
<td>Window frames</td>
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<td></td>
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<tr>
<td>Steel (hollow metal) frames</td>
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<tr>
<td>Head-of-wall</td>
<td></td>
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<tr>
<td>Omitted CMU block</td>
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</tbody>
</table>
### Installation temperatures:

A major factor in contributing to a successful air barrier system installation is to monitor and install the components within the proper temperature ranges and weather conditions. Indicate below the proper temperature range for each component; the procedure for maintaining the proper temperature range; and the party responsible for maintaining the proper temperature range in accordance with the requirements. Delete those that do not apply.

<table>
<thead>
<tr>
<th>Component</th>
<th>Proper temperature range</th>
<th>Procedure and Subcontractor responsible</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPF insulation – field of wall</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPF insulation (wall) – voids / cracks / shims</td>
<td></td>
<td></td>
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<tr>
<td>SPF insulation – field of roof</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fluid-applied membrane – Permeable - wall</td>
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<tr>
<td>Fluid-applied membrane – Impermeable - wall</td>
<td></td>
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<tr>
<td>Self-adhered membrane – Permeable - wall</td>
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<tr>
<td>Self-adhered membrane – Impermeable - wall</td>
<td></td>
<td></td>
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<tr>
<td>Self-adhered membrane – Permeable - roof</td>
<td></td>
<td></td>
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<tr>
<td>Self-adhered membrane – Impermeable - roof</td>
<td></td>
<td></td>
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<tr>
<td>Transition membrane – self-adhered</td>
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<tr>
<td>Primer</td>
<td></td>
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<tr>
<td>Mastic / Termination sealant</td>
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</tbody>
</table>
Air barrier protection:

The air barrier system shall be protected during construction. Indicate below how the components will be protected (method used), by whom, and when. Delete those that do not apply.

<table>
<thead>
<tr>
<th>Component</th>
<th>Method used for protection</th>
<th>Subcontractor</th>
<th>When</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPF insulation – field of wall</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>SPF insulation (wall) – voids / cracks / shims</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>SPF insulation – field of roof</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Fluid-applied membrane – Permeable - wall</td>
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<tr>
<td>Fluid-applied membrane – Impermeable - wall</td>
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<td>Self-adhered membrane – Permeable - wall</td>
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<td>Self-adhered membrane – Impermeable - wall</td>
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<tr>
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<tr>
<td>Transition membrane – self-adhered</td>
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<td>Primer</td>
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</tr>
<tr>
<td>Mastic / Termination sealant</td>
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</tbody>
</table>
Air barrier repair:
Discuss how any damage, including but not limited to, accidental holes in the air barrier system, will be repaired – and by whom. Indicate the actual product to be used to perform any repairs in the air barrier components. Delete those that do not apply.

<table>
<thead>
<tr>
<th>Component</th>
<th>Product to be used for repair</th>
<th>Subcontractor responsible</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPF insulation – field of wall</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPF insulation (wall) – voids / cracks / shims</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPF insulation – field of roof</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fluid-applied membrane – Permeable - wall</td>
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<tr>
<td>Fluid-applied membrane – Impermeable -wall</td>
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<tr>
<td>Self-adhered membrane – Permeable - wall</td>
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<tr>
<td>Self-adhered membrane – Impermeable -wall</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-adhered membrane – Permeable - roof</td>
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<td></td>
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<tr>
<td>Self-adhered membrane – Impermeable -roof</td>
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<tr>
<td>Transition membrane – self-adhered</td>
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<tr>
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<td></td>
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<tr>
<td>Mastic / Termination sealant</td>
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</tbody>
</table>
Insulation secured to or over air barrier material:

Address any concerns or issues of installing insulation over the air barrier material (foundation, walls, and roof), such as preparation, securing, or fastening methods. Delete those that do not apply.

<table>
<thead>
<tr>
<th>Insulation type</th>
<th>Method for securement</th>
<th>Concerns (if any)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPF</td>
<td></td>
<td></td>
</tr>
<tr>
<td>XPS</td>
<td></td>
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<tr>
<td>Polyiso</td>
<td></td>
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<tr>
<td>EPS</td>
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<tr>
<td>EPX</td>
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</tbody>
</table>

CFMF-S locations: Delete if they do not apply.

Where CFMF-S is a component in the exterior wall assembly, the air barrier installer may need to mark the material itself to indicate where the framing is located. The insulation subcontractor, in turn (when the insulation is not the air barrier), may need to transfer those marks onto the insulation. If any of the above is required, discuss and identify below. Delete those that do not apply.

<table>
<thead>
<tr>
<th>Component</th>
<th>Subcontractor responsible for location marks, if necessary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sheathing</td>
<td></td>
</tr>
<tr>
<td>Air Barrier</td>
<td></td>
</tr>
<tr>
<td>Insulation</td>
<td></td>
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</tbody>
</table>

Other considerations or comments:

____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________

END OF AIR BARRIER SYSTEM PRE-INSTALLATION CONFERENCE GUIDE
SECTION 024119 - SELECTIVE STRUCTURE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 DEFINITIONS
A. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged or removed and reinstalled.
B. (Remove and) Reinstall: Carefully detach items from existing construction, prepare for reuse, and reinstall where indicated.
C. Existing (to Remain): Existing items of construction that are not to be permanently removed and that are not otherwise indicated to be removed, salvaged, or reinstalled.

1.3 MATERIALS OWNERSHIP
A. Unless otherwise indicated, demolition waste becomes property of Contractor.

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

1.5 INFORMATIONAL SUBMITTALS
A. Qualification Data: For refrigerant recovery technician.
C. Predemolition Digital Photographs or Digital Video-recordings: Show existing conditions of adjoining construction, including finish surfaces, that might be misconstrued as damage caused by demolition operations. Submit to Owner’s representative as part of the submittal package required prior to release of the first request for payment.
   1. Prior to mobilization, Owner’s representative and Contractor shall together review existing conditions in the construction and mobilization area. The Contractor in the presence of the Owner shall digitally photograph or video-record existing conditions in sufficient detail to record accurately the physical conditions at the start of construction.
   2. The Contractor shall provide and the Owner and Contractor shall retain identical digital copies of the documentation.
   3. At closeout, the Owner’s acceptance of the Work includes acceptance of the remaining existing conditions as undamaged by Contractor’s forces.
D. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.
E. Warranties: Documentation indicated that existing warranties are still in effect after completion of selective demolition.

1.6 CLOSEOUT SUBMITTALS
A. Inventory: Submit a list of items that have been removed and salvaged.

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

1.8 FIELD CONDITIONS
A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner’s operations will not be disrupted.
1. Coordinate demolition work with Phasing requirements in Division I Section “Summary” and as indicated on Drawings.
2. The Owner and Contractor shall establish “staging areas” for temporary storage of furniture and furnishings removed for alteration areas during construction activities. Work areas should be free of furniture and furnishings during construction activities. The Contractor will not be required to work in furnished areas and will not be responsible for the condition of furniture and furnishings left in place without additional compensation.
B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
1. Before selective demolition, Owner will remove loose furniture, furnishings and equipment.
C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
D. Coordination of Selective Demolition Activities: Coordinate the following with Owner:
1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner’s on-site operations are uninterrupted.
2. Interruption of utility services. Indicate how long utility services will be interrupted.
3. Coordination for shutoff, capping, and continuation of utility services.
4. Use of elevator and stairs.
5. Locations of proposed dust- and noise-control temporary partitions and means of egress.
6. Coordination of Owner’s continuing occupancy of portions of existing building and of Owner’s partial occupancy of completed Work.
7. Means of protection for items to remain and items in path of waste removal from building.
E. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
1. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.
F. Storage or sale of removed items or materials on-site is not permitted.
G. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
1. Maintain fire-protection facilities in service during selective demolition operations.
1.9 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties. Notify warrantor before proceeding. Existing warranties include the following:
   2. Notify warrantor on completion of selective demolition, and obtain documentation verifying that existing system has been inspected and warranty remains in effect. Submit documentation at Project closeout.

1.10 COORDINATION

A. Arrange selective demolition schedule so as not to interfere with Owner`s operations.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Standards: Comply with ANSI/ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped before starting selective demolition operations.

B. Review Project Record Documents of existing construction or other existing condition and hazardous material information provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.

C. Take measures required by OSHA and governing authorities. Perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective building demolition operations.
   1. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

D. Steel Tendons: Locate tensioned steel tendons and include recommendations for detensioning.

E. Survey of Existing Conditions: Record existing conditions by use of preconstruction digital photographs or preconstruction digital video recordings.
   1. Inventory and record the condition of items to be removed and salvaged. Provide photographs or video of conditions that might be misconstrued as damage caused by salvage operations.

3.2 PREPARATION

A. Refrigerant: Before starting demolition, remove refrigerant from mechanical equipment according to 40 CFR 82 and regulations of authorities having jurisdiction.
3.3 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems to Remain: Maintain services/systems which will remain and protect them against damage.

B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.

1. Arrange to shut off indicated utilities with utility companies.
2. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
3. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated to be removed.
   a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
   b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.
   c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
   d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
   e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
   f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
   g. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material and leave in place.

3.4 PROTECTION

A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
4. Cover and protect furniture, furnishings, and equipment that have not been removed.
5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Division 01 Section “Temporary Facilities and Controls.”

B. Temporary Shoring: Design, provide, and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.

1. Strengthen or add new supports when required during progress of selective demolition.

C. Remove temporary barricades and protections where hazards no longer exist.
3.5 SELECTIVE DEMOLITION, GENERAL

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain fire watch and portable fire-suppression devices during flame-cutting operations.
5. Maintain fire watch during and for at least 30 minutes after flame-cutting operations.
7. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
8. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
9. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
10. Dispose of demolished items and materials promptly. Comply with requirements in Division 01 Section “Construction Waste Management and Disposal.”

B. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

C. Existing Surfaces to Receive Finishes:

1. Remove miscellaneous hangers, exposed nails not serving as fasteners, and similar protrusions; remove adhesive residue and tape; fill anchorage holes; and otherwise patch and restore surface to be a uniform substrate suitable for applied finishes.

D. Removed and Salvaged Items:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner’s storage area designated by Owner.
5. Protect items from damage during transport and storage.

E. Removed and Reinstalled Items:

1. Clean and repair items to functional condition adequate for intended reuse.
2. Pack or crate items after cleaning and repairing. Identify contents of containers.
3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.
F. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.6 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS
A. Concrete: Demolish in small sections. Using power-driven saw, cut concrete to a depth of at least 3/4 inch at junctures with construction to remain. Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete. Neatly trim openings to dimensions indicated.
B. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, then remove masonry between saw cuts.
   1. Remove to suit toothing in new masonry at exposed surfaces, new openings, and where indicated.
C. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, then break up and remove.
D. Floor Finishes: After removal of existing floor finishes including backings, remove all residual adhesives and glue. Provide grinding, sanding, or shot-blasting of existing concrete floor slab as required to achieve the proper surface to receive new indicated floor finish. Coordinate slab surface preparations required for each new indicated floor finish with appropriate subcontractor.
E. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI’s “Recommended Work Practices for the Removal of Resilient Floor Coverings.” Do not use methods requiring solvent-based adhesive strippers.

3.7 DISPOSAL OF DEMOLISHED MATERIALS
A. Remove demolition waste materials from Project site and recycle or dispose of them according to Division 01 Section “Construction Waste Management and Disposal.”
   1. Do not allow demolished materials to accumulate on-site.
   2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
   3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
B. Burning: Do not burn demolished materials.

3.8 CLEANING
A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION 024119
SECTION 031000 - CONCRETE FORMING AND ACCESSORIES

PART 1 GENERAL

1.01. SUMMARY

A. Scope of Work
   1. Furnish all labor, equipment, materials, and incidentals necessary to perform and complete concrete forming in accordance with the plans. All formwork shall be of the type specified herein.

B. Section Includes:
   1. Formwork for cast-in-place concrete.
   2. Shoring, bracing, and anchorage.
   3. Form accessories.
   4. Form stripping.

1.02. REFERENCE STANDARDS

A. American Concrete Institute:
   2. ACI 301 - Specifications for Structural Concrete.
   3. ACI 318 - Building Code Requirements for Structural Concrete.
   4. ACI 347 - Guide to Formwork for Concrete.

B. American Forest & Paper Association:

C. ASTM International:
   2. ASTM C171 - Standard Specification for Sheet Materials for Curing Concrete
   3. ASTM E154 - Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover

D. U.S. Army Corps of Engineers
   1. CRD-C 572 - Specifications for Polyvinyl Chloride Waterstops

E. North Carolina Department of Transportation
   1. Standard Specifications for Roads and Structures (latest revision)
1.03. COORDINATION

A. Coordinate Work of this Section with other Sections of Work in forming and placing openings, slots, recesses, sleeves, bolts, anchors, other inserts, and components of other Work.

1.04. SUBMITTALS

A. Section 013300 - Submittal Procedures.

B. Product Data: Submit manufacturer information on form materials, accessories, and installation requirements.

C. Shop Drawings:
   1. Prepared by or under the supervision of a qualified professional ENGINEER detailing fabrication, assembly, and support of formwork.
   2. Indicate:
      a. Formwork, shoring, and reshoring.
      b. Pertinent dimensions, openings, methods of construction, types of connections, materials, joint arrangement and details, ties and shores, location of framing, studding and bracing, and temporary supports.
      c. Means of leakage prevention for concrete exposed to view in finished construction.
      d. Sequence and timing of erection and stripping, assumed compressive strength at time of stripping, height of lift, and height of drop during placement.
      e. Vertical, horizontal, and special loads according to ACI 347, and camber diagrams when applicable.
      f. Notes to formwork erector showing size and location of conduits and piping embedded in concrete according to ACI 318.
      g. Procedure and schedule for removal of shores and installation and removal of reshores.
      h. Proposed construction joints required to construct the structure.

D. Samples: For waterstops and/or vapor retarder.

E. Manufacturer’s Certificate: Certify that products meet or exceed specified requirements.

F. Delegated Design Submittals:
   1. Submit Shop Drawings with design calculations and assumptions for formwork, shoring, and reshoring signed and sealed by a professional ENGINEER licensed to practice in the State of North Carolina.
   2. Indicate loads transferred to structure during process of concreting, shoring, and reshoring.
   3. Include structural calculations to support design.
4. Clearances and types of temporary formwork, shoring, reshoring, and similar formwork supports, insofar as they may affect the finished character of the Work, will be subject to the ENGINEER’s approval, but CONTRACTOR is responsible for adequacy of all formwork, shoring, reshoring, and similar supports.

G. Field Quality-Control Submittals: Provide results of CONTRACTOR-furnished tests and inspections.

1.05. QUALITY ASSURANCE

A. Perform Work according to ACI 301, ACI 318, and ACI 347.

B. For wood products furnished for Work of this Section, comply with AF&PA.

1.06. QUALIFICATIONS

A. Licensed Professional: Professional Engineer experienced in design of concrete formwork and licensed in State of North Carolina.

1.07. DELIVERY, STORAGE, AND HANDLING

A. Section 015500 - Site Access and Storage.

B. Inspection: Accept void forms on Site in manufacturer's original packaging and inspect for damage.

C. Store materials off ground in ventilated and protected manner to prevent deterioration from moisture.

D. Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

PART 2 PRODUCTS

2.01. PERFORMANCE AND DESIGN CRITERIA

A. Design, ENGINEER, and construct formwork, shoring, and bracing according to ACI 318 to conform to design and applicable code requirements to achieve concrete shape, line, and dimension as indicated on Drawings.

2.02. FORM MATERIALS

A. Forms for Exposed Finished Concrete

1. Plywood, metal, metal framed plywood faced, or other acceptable panel type materials, to provide continuous, straight, smooth, exposed surfaces.

2. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system shown on Drawings.
2.03. **PREFABRICATED FORMS**

A. Preformed Steel Forms:
   1. Matched, tightly fitted, and stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished surfaces.

B. Fiber Reinforced Plastic Forms:
   1. Matched, tightly fitted, and stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished concrete surfaces.

C. Pan:
   1. Material: Glass-fiber-reinforced plastic or formed steel.
   2. Configuration: Size and profile as required.

D. Cylindrical Columns, Pedestals, and Supports:
   1. Material: Metal, glass-fiber-reinforced plastic, paper, or fiber tubes that will produce surfaces with gradual or abrupt irregularities not exceeding specified formwork surface class.
   2. Provide units with sufficient wall thickness to resist plastic concrete loads without detrimental deformation.

E. Void Forms:
   1. Structurally sufficient to support weight of wet concrete mix and other superimposed loads until initial set.

F. Form Liners: Smooth, durable, grainless, and non-staining hardboard unless otherwise indicated on Drawings.

2.04. **COATINGS**

A. Provide commercial formulation form coating compounds that will not bond with, stain, nor adversely affect concrete surfaces, and will not impair subsequent treatments of concrete surfaces requiring bond or adhesion or impede the wetting of surfaces to be cured with water or curing compounds.

2.05. **FORMWORK ACCESSORIES**

A. Form Ties:
   1. Type: Removable or snap off with cones, designed to prevent form deflection and to prevent spalling concrete upon removal.
2. Material: Galvanized or glass-fiber reinforced plastic.
3. Length: Adjustable.
4. Furnish ties that will leave holes no larger than 1 inch in concrete surface.
5. Integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

B. Spreaders:
1. Description: Standard, non-corrosive metal-form clamp assembly, of type acting as spreaders and leaving no metal within 1 inch of concrete face.
2. Wire ties, wood spreaders, or through bolts are not permitted.

C. Form Release Agent:
1. Description: Commercially formulated colorless mineral oil that will not stain concrete or absorb moisture or impair natural bonding or color characteristics of coating intended for use on concrete.

D. Corners:
1. Type: Chamfer, unless noted otherwise.
2. Material: Wood, metal, PVC, or rubber
3. Size: 3/4 by 3/4 inches minimum
4. Lengths: Maximum possible.

E. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.

F. Vapor Retarder:
1. Description: Polyethylene sheet that complies with ASTM C171 and meets or exceeds test for water retention, ASTM C156, and is resistant to decay when tested in accordance with ASTM E154.
2. Thickness: 10 mils.

G. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages: Size, strength, and character to maintain formwork in place while placing concrete.

H. Waterstop: PVC complying with Corps of Engineers CRD-C 572
1. Working Temperature Range: Minus 50 to plus 175 degrees F
2. Lengths: Maximum possible
3. Profile: Ribbed
4. Corner Sections: Preformed
5. Jointing: Heat welded
I. Waterstop: Self-expanding rubber
   1. Material: Bentonite-free hydrophilic polymer modified chloroprene rubber.
   2. Working Temperature Range: Minus 50 to plus 175 degrees F
   3. Lengths: Maximum possible
   4. Profile: Ribbed
   5. Corner Sections: Preformed
   7. Manufacturers (or approved equal):
      a. Adeka Ultra Seal Waterstops by Asahi Denka Kogyo K. K. Tokyo, Japan
         1) Unless otherwise noted, at pipe penetrations through concrete walls, use Adeka Ultra Seal MC-2005T for pipes with a diameter of 24 inches or less and MC-2010M for pipes with a diameter greater than 24 inches.
         2) Use Ultra Seal or equal paste type, injectable type and accessories as required for proper installation of MC-2010M.

J. Waterstop: bentonite
   1. Description: Manufactured rectangular or trapezoidal strip in coil form, butyl rubber with sodium bentonite or other hydrophilic polymers, for adhesive bonding to concrete.
   2. Provide warranty information for all bentonite waterproofing systems.

PART 3 EXECUTION

3.01. EXAMINATION
   A. Verify lines, levels, and centers before proceeding with formwork.
   B. Verify that dimensions agree with Project Drawings.
   C. If formwork is placed after reinforcement resulting in insufficient concrete cover over reinforcement, request instructions from ENGINEER before proceeding.

3.02. INSTALLATION
   A. Earth Forms (if allowed by local building code):
      1. Trench earth forms neatly, accurately, and at least 2 inches wider than footing widths indicated on Drawings.
      2. Trim sides and bottom of earth forms.
      3. Construct wood edge strips at top of each side of trench to secure reinforcing and to prevent trench from sloughing.
      4. Form sides of footings where earth sloughs.
5. Tamp earth forms firm and clear them of debris and loose material before depositing concrete.

B. Formwork:

1. Formwork shall be designed by CONTRACTOR in accordance with ACI 347 unless otherwise noted.

2. Provide top form for sloped surfaces steeper than 1.5 horizontal to 1 vertical to hold shape of concrete during placement, unless it can be demonstrated that top forms can be omitted.

3. Construct forms to shape, dimensions, and lines shown to obtain accurate alignment, location, grades, level and plumb work in finished structures. Forms shall be mortar-tight, braced, and of sufficient strength to maintain shape and position under imposed loads from construction operations until such loads can be supported by the concrete structure.

4. Design forms and falsework to include assumed values of live load, dead load, weight of moving equipment operated on formwork, concrete mix, height of concrete drop, vibrator frequency, ambient temperature, foundation pressure, stresses, lateral stability, and other factors pertinent to safety of structure during construction.

5. Provide shores and struts with positive means of adjustment capable of taking up formwork settlement during concrete placing operations, using wedges or jacks or a combination thereof. Support form facing materials by structural members spaced sufficiently close to prevent deflection. Fit forms placed in successive units for continuous surfaces to accurate alignment, free from irregularities and within allowable tolerances.

6. Use selected materials to obtain required finishes.

7. Solidly butt joints and provide back up at joints to prevent leakage of cement paste during concrete placement.

8. Camber forms where necessary for anticipated deflections due to weight and pressures of fresh concrete to produce level finished soffits unless indicated otherwise on Drawings.

9. Positioning:
   a. Carefully verify horizontal and vertical positions of forms.
   b. Correct misaligned or misplaced forms before placing concrete.

10. Complete wedging and bracing before placing concrete.

11. Erect formwork, shoring, and bracing to achieve design requirements according to ACI 301 and ACI 318.
   a. When reshoring is permitted or required, the operations shall be planned in advance and shall be subject to approval. While reshoring is under way, no live load shall be permitted on the new construction.
   b. Do not remove shoring or reshoring until measurement of slab tolerances is complete.
c. In no case during reshoring shall concrete in beam, slabs, column, or any other structural member be subjected to combined dead and construction loads in excess of the loads permitted by the ENGINEER for the developed concrete strength at the time of reshoring. Reshores shall be placed as soon as practicable after stripping operations are complete but in no case later than the end of the working day on which stripping occurs.

d. Plan sequence of removal of shores and reshole to avoid damage to concrete. Locate and provide adequate reshoring to support construction without excessive stress or deflection.

12. Stripping:

a. Arrange and assemble formwork to permit dismantling and stripping without impact, shock, or damage to cast in place concrete surfaces and adjacent materials.

b. Do not damage concrete during stripping.

c. Permit removal of remaining principal shores.

d. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces.

13. Obtain approval of ENGINEER before framing openings in structural members not indicated on Drawings.

14. Install chamfer strips on all external corners and edges unless noted otherwise noted.

15. Install void forms according to manufacturer instructions.

16. Leave forms in place for minimum number of days according to ACI 347.

C. Form Removal:

1. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads, and removal has been approved by ENGINEER.

a. Formwork for columns, walls, sides of beams, and other parts not supporting the weight of the concrete may be removed as soon as the concrete has hardened sufficiently to resist damage from removal operations provided surfaces are cured and protected from cold weather as specified herein.

b. Forms and shoring in the formwork used to support the weight of concrete in beams, slabs and other structural members, shall remain in place until the concrete has reached the minimum strength specified of 75 percent of the specified 28-day design strength. Strength of concrete must be verified by concrete test cylinders molded and cured in the field under the same conditions that the concrete represented by these cylinders are cured and/or maturity meters connected to thermo-couples embedded in the concrete. The concrete technician shall inform the CONTRACTOR when the strength of concrete cured in the field has attained the minimum specified strength required for removal of the forms.

c. Bottom forms of slabs shall not be removed in less time than is indicated in the table below unless otherwise approved by the ENGINEER.
d. When temperature is below 40 degrees F, the shores shall remain in place for an additional time as directed by ENGINEER.

e. Form facing material may be removed four (4) days after placement, only if shores and other vertical supports have been arranged to permit removal of form facing material without loosening or disturbing shores and supports.

2. When repair of surface defects or finishing is required at an early age, forms shall be removed as soon as the concrete has hardened sufficiently to resist damage from removal operations.

3. Loosen forms carefully; do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.

4. Store removed forms in manner that surfaces to be in contact with fresh concrete will not be damaged.

5. Form Release Agent:
   a. Apply according to manufacturer instructions.
   b. Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.
   c. Do not apply form release agent if concrete surfaces are indicated to receive special finishes or applied coverings that may be affected by agent.
   d. Soak inside surfaces of untreated forms with clean water, and keep surfaces coated prior to placement of concrete.

6. Form Cleaning:
   a. Clean forms and adjacent surfaces to receive concrete as erection proceeds to remove foreign matter within forms.
   b. Clean formed cavities of chips, wood, sawdust, dirt, or other debris prior to placing concrete.
   c. Flush with water or use compressed air to remove remaining foreign matter.
   d. Ensure that water and debris drain to exterior through cleanout ports.
   e. Cold Weather:
      1) During cold weather, remove ice and snow from within forms.
      2) Do not use de-icing salts.
      3) Do not use water to clean out forms, unless formwork and concrete construction proceed within heated enclosure; use compressed air or other dry method to remove foreign matter.

7. Reuse and Coating of Forms:
a. Thoroughly clean forms of concrete matrix residue, fins, and laitance and reapply form coating before each reuse. Repair surfaces of forms to be reused in the Work.

b. When forms are extended for successive concrete placement, tighten forms to close joints. Align and secure joints to avoid offsets.
   1) Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

c. For exposed Work, do not reuse split, frayed, delaminated, or otherwise damaged forms.
   1) Do not use patched forms for exposed concrete surfaces unless approved by ENGINEER.

d. Apply form coating to forms according to manufacturer instructions.
   1) Thin form coating compounds only with thinning agent of type, amount, and under conditions of form coating compound manufacturer's directions.
   2) Do not allow excess form coating material to accumulate in forms or to come into contact with in place concrete surfaces against which fresh concrete will be placed.

e. Do not coat forms for concrete indicated to receive "scored finish."

f. Coat steel forms with a non-staining, rust preventative form oil or otherwise protect against rusting.
   1) Rust stained steel formwork is not acceptable.

g. Apply form coatings before placing reinforcing steel.

D. Forms for Smooth Finish Concrete:
   1. Use steel, plywood, or lined-board forms.
   2. Use clean and smooth plywood and form liners, uniform in size, and free from surface and edge damage capable of affecting resulting concrete finish.
   3. Install form lining with close-fitting square joints between separate sheets without springing into place.
   4. Use full-sized sheets of form liners and plywood wherever possible.
   5. Tape joints to prevent protrusions in concrete.
   6. Apply forming and strip wood forms in a manner to protect corners and edges.
   7. Level and continue horizontal joints.
   8. Keep wood forms wet until stripped.

E. Forms for Surfaces to Receive Membrane Waterproofing:
   1. Use plywood or steel forms.
   2. After erection of forms, tape form joints to prevent protrusions in concrete.

F. Framing, Studding, and Bracing:
1. Maximum Spacing of Studs:
   a. Boards: Maximum 16 inches o.c.
   b. Plywood: 12 inches o.c.
2. Size framing, bracing, centering, and supporting members for sufficient strength to maintain shape and position under imposed loads from construction operations.
3. Construct beam soffits of material minimum 2 inches thick.
4. Distribute bracing loads over base area on which bracing is erected.
5. When placed on ground, protect against undermining, settlement, and accidental impact.

G. Form Anchors and Hangers:
1. Do not use anchors and hangers leaving exposed metal at concrete surface.
2. Symmetrically arrange hangers supporting forms from structural-steel members to minimize twisting or rotation of member.
3. Penetration of structural-steel members is not permitted.

H. Inserts, Embedded Parts, and Openings:
1. Install formed openings for items to be embedded in or passing through concrete work.
2. Locate and set in place items required to be cast directly into concrete.
3. Position recessed reglets for brick veneer masonry anchors according to spacing and intervals as indicated on Drawings.
   a. Install reglets to receive top edge of foundation sheet waterproofing, and to receive thru wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, relieving angles, and other conditions.
4. Install accessories straight, level, and plumb, and ensure that items are not disturbed during concrete placement.
   a. Install keyways, reglets, recesses, and the like, for easy removal.
5. Joints:
   a. Clean joint surface of laitance, coatings, loose particles, and foreign matter to expose aggregate.
   b. Prepare for bonding of fresh concrete to new concrete that has hardened:
      1) At joints between foundation systems and walls dampen, but do not saturate, the roughened and cleaned surface of set concrete immediately before placing fresh concrete. In lieu of neat cement grout, bonding grout may be a commercial bonding agent. Apply to cleaned concrete surfaces in accordance with the printed instruction of this bonding material manufacturer.
   c. Install waterstops continuous without displacing reinforcement.
      1) Provide PVC waterstops in all construction joints in concrete walls and in concrete beams and slabs as shown in the Project Drawings. PVC waterstops shall also be provided between concrete beams and slabs at all expansion joints.
to form a continuous diaphragm. Field fabricate joints in waterstops according to manufacturer's written instructions.

2) Install self-expanding strip waterstops in construction joints and at other locations indicated, according to manufacturer's written instructions, adhesive bonding, mechanically fastening, and firmly pressing into place.

6. Openings:
   a. Provide temporary ports or openings in formwork as required to facilitate cleaning and inspection.
   b. Securely brace temporary openings and set tightly to forms to prevent loss of concrete mortar.
   c. Locate openings on bottom of forms to allow flushing water to drain.

7. Close temporary openings with tight-fitting panels, flush with inside face of forms, and neatly fitted such that joints will not be apparent in exposed concrete surfaces.

I. Form Ties:
   1. Provide sufficient strength and quantity to prevent spreading of forms.
   2. Place ties at least 1 inch away from finished surface of concrete.
   3. Leave inner rods in concrete when forms are stripped.
   4. Space form ties equidistant, symmetrical, and aligned vertically and horizontally unless indicated otherwise on Drawings.
   5. After the ends or end fasteners of form ties have been removed, the embedded portion of the ties shall terminate as described elsewhere in this section. When the formed face of the concrete is not to be permanently exposed to view, form ties may be cut off flush with the formed surfaces.

J. Arrange formwork to allow proper erection sequence and to permit form removal without damage to concrete.

K. Construction Joints: Install so strength and appearance of concrete will be least impaired, at locations indicated or as approved by ENGINEER.
   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. Locate joints for beams, slabs, joists, and girders near the middle of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
   3. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
   4. Space vertical joints in walls as indicated. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
   5. Contact surface of the form for sheeting for flush surfaces exposed to view shall overlap the hardened concrete in the previous placement by more than one foot. The
forms shall be held against the hardened concrete to prevent offsets or loss of mortar at the construction joint and to maintain a true surface.

6. Provide keyways at least 1½ inches deep in all construction joints in walls, slabs, and between walls, and foundation systems.

7. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.

8. Install surfaced pouring strip where construction joints intersect on exposed surfaces to provide straight line at joints.

9. Just prior to subsequent concrete placement, remove strip and tighten forms to conceal shrinkage.

10. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

11. Appearance:
   a. Show no overlapping of construction joints.
   b. Construct joints to present same appearance as butted plywood joints.

12. Arrange joints in continuous line straight, true, and sharp.

L. Embedded Items:

1. General
   a. Set and build into work anchorage devices and other embedded items required for other work that is attached to, or supported by, cast in place concrete.
   b. Use setting Drawings, diagrams, instructions, and directions provided by suppliers of items to be attached thereto.

2. Make provisions for pipes, sleeves, anchors, inserts, reglets, anchor slots, nailers, waterstops, and other features.
   a. See structural Drawings for support detail of PVC waterstops and follow manufacturer's instructions for installation of all other type waterstops.
   b. Make provisions to support and protect exposed waterstops during progress of work.
   c. Fabricate field joints in waterstops in accordance with manufacturer's printed instructions.
   d. Install dovetail anchor slots in concrete structures as indicated.

3. Do not embed wood or uncoated aluminum in concrete.

4. Obtain installation and setting information for embedded items furnished under other Sections.

5. Securely anchor embedded items in correct location and alignment prior to placing concrete.

6. Ensure that conduits and pipes, including those made of coated aluminum, meet requirements of ACI 318 regarding size and location limitations.
M. Openings for Items Passing through Concrete:
   1. Frame openings in concrete where indicated on Drawings.
   2. Establish exact locations, sizes, and other conditions required for openings and attachment of Work specified under other Sections.
   3. Coordinate Work to avoid cutting and patching of concrete after placement.
   4. Perform cutting and repairing of concrete required as result of failure to provide required openings.

N. Screeds:
   1. Set screeds and intermediate screed strips to establish levels for tops of and finish on concrete slabs.
      a. Provide and secure units to support screed strips by use of strike off templates or accepted compacting type screeds.
   2. Slope slabs to drain where required or as indicated on Drawings.
   3. Before depositing concrete, remove debris from space to be occupied by concrete and thoroughly wet forms; remove freestanding water.

O. Screed Supports:
   1. For concrete over waterproof membranes and vapor retarder membranes, use cradle-, pad-, or base-type screed supports that will not puncture membrane.
   2. Staking through membrane is not permitted.

P. Cleanouts and Access Panels:
   1. Provide removable cleanout sections or access panels at bottoms of forms where interior area of formwork is inaccessible to permit inspection before concrete placement and effective cleaning of loose dirt, debris, and waste material.
   2. Clean forms and surfaces against which concrete is to be placed.
   3. Remove chips, sawdust, and other debris.
   4. Thoroughly blow out forms with compressed air just before concrete is placed.

3.03. TOLERANCES

A. Construct formwork to maintain tolerances according to ACI 301.
   1. Establish and maintain sufficient control points and bench marks to be used for reference purposes to check tolerances in an undisturbed condition and until final completion and acceptance of the project.

B. Construct formwork to produce completed concrete surfaces within construction tolerances according to ACI 117.
3.04. FIELD QUALITY CONTROL

A. Inspection:
   1. Inspect erected formwork, shoring, and bracing to ensure that Work complies with formwork design and that supports, fastenings, wedges, ties, and items are secure.
   2. Notify ENGINEER after placement of reinforcing steel in forms but prior to placing concrete.
   3. Schedule concrete placement to permit formwork inspection before placing concrete.

END OF SECTION
SECTION 032000 - CONCRETE REINFORCING

PART 1 GENERAL

1.01. SUMMARY

A. Scope of Work
   1. Furnish all labor, equipment, materials, and incidentals necessary to perform and complete concrete forming in accordance with the plans. All reinforcement shall be of the type specified herein.

B. Section Includes:
   1. Reinforcing bars.
   3. Reinforcement accessories.

1.02. REFERENCE STANDARDS

A. American Concrete Institute:
   1. ACI 301 - Specifications for Structural Concrete.
   2. ACI 318 - Building Code Requirements for Structural Concrete.

B. American Welding Society:
   1. AWS D1.4 - Structural Welding Code - Reinforcing Steel.

C. ASTM International:
   1. ASTM A615 - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
   2. ASTM A767 - Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement.
   6. ASTM D3963 - Standard Specification for Fabrication and Jobsite Handling of Epoxy-Coated Steel Reinforcing Bars
D. Concrete Reinforcing Steel Institute:
   2. CRSI 10PLACE - Placing Reinforcing Bars.

1.03. COORDINATION
   A. Coordinate Work of this Section with placement of formwork, formed openings, and other Work.

1.04. SUBMITTALS
   A. Section 013300 - Submittal Procedures.
   B. Shop Drawings:
      1. Indicate fabrication, bar sizes, lengths, material, grade, spacings, locations, splice locations, and quantities of reinforcing steel and welded wire fabric.
      2. Indicate bending and cutting schedules.
      3. Indicate supporting and spacing devices.
      4. Indicate stirrup spacing, bent bar diagrams, bar arrangement, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.
   C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
   D. Submit certified copies of mill test report of reinforcement materials analysis.
   E. Welder Certificates: Certify welders and welding procedures employed on Work, verifying AWS qualification within previous 12 months.
   F. Field Quality-Control Submittals: Indicate results of CONTRACTOR-furnished tests and inspections.
   G. Qualifications Statement
      1. Welders: Qualify procedures and personnel according to AWS D1.4.

1.05. QUALITY ASSURANCE
   A. Perform Work according to ACI 301.
   B. Prepare Shop Drawings according to ACI SP-66.

1.06. QUALIFICATIONS
   A. Welders: AWS qualified within previous 12 months for employed weld types.
1.07. DELIVERY, STORAGE, AND HANDLING

A. Section 015500 - Site Access and Storage.

B. Reinforcing steel shall be cut and shop fabricated and delivered to the Project Site properly tagged, bundled, and ready to place.

C. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.

D. Store materials according to manufacturer instructions.

E. Protection:
   1. Protect materials from mud, excessive rust producing conditions, oil, grease, distortion, or moisture by storing off the ground in clean, dry location remote from construction operations areas.
   2. Provide additional protection according to manufacturer instructions.

1.08. EXISTING CONDITIONS

A. Field Measurements:
   1. Verify field measurements prior to fabrication.
   2. Indicate field measurements on Shop Drawings.

PART 2 PRODUCTS

2.01. REINFORCEMENT

A. Reinforcing Steel:
   1. Comply with ASTM A615.
   2. Yield Strength: 60 ksi

B. Plain Wire:
   2. Finish: Uncoated.

C. Welded Deformed Wire Fabric:
   2. Configuration: Flat sheets.
D. Welded Plain Wire Fabric:
   2. Configuration: Flat sheets.

2.02. FABRICATION

A. Fabricate concrete reinforcement according to CRSI 10-MSP.

B. Form reinforcement bends with minimum diameters according to ACI 318.

C. Fabricate column reinforcement with offset bends at reinforcement splices.
   1. Form spiral column reinforcement from minimum 3/8-inch-diameter continuous
      deformed bar.

D. Form ties and stirrups as indicated on Drawings.
   1. Weld reinforcement according to AWS D1.4.

E. Clean surfaces, weld, and re-protect welded joint according to CRSI 10PLACE.

F. Splicing:
   1. If not indicated on Drawings, locate reinforcement splices at point of minimum stress.
   2. Obtain approval of splice locations from ENGINEER.

2.03. ACCESSORY MATERIALS

A. Tie Wire:
   1. Minimum 16 gage, annealed type, or as otherwise indicated.

B. Chairs, Bolsters, Bar Supports, and Spacers:
   1. Size and Shape: To strengthen and support reinforcement during concrete placement
      conditions.
   2. Furnish load-bearing pad on bottom to prevent vapor retarder puncture.
   3. Manufacture bar supports from stainless steel wire, plastic, or precast concrete
      according to CRSI 10-MSP and as follows:
      a. For concrete surfaces exposed to view where legs of wire bar supports contact
         forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-
         steel bar supports.
      b. For epoxy-coated reinforcement, use epoxy-coated or other dielectric-polymer-
         coated wire bar supports.
c. For slabs on grade, use supports with sand plates or horizontal runners where base material will not support chair legs or 6,000 psi solid concrete blocks meeting CRSI requirements.

C. Special Chairs, Bolsters, Bar Supports, and Spacers Adjacent to Weather-Exposed Concrete Surfaces:
   2. Size and Shape: To meet Project conditions.

D. Reinforcing Splicing Devices:
   1. Type: Exothermic welding type; full tension and compression.

E. Epoxy Coating Patching Material: Type as recommended by coating manufacturer.

PART 3 EXECUTION

3.01. INSTALLATION

A. General: Comply with Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars," for details and methods of reinforcement placement and supports, and as herein specified.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other materials which reduce or destroy bond with concrete.

C. Place, support, and secure reinforcement against displacement from construction loads, the placement of concrete or other anticipated loads.

D. Do not deviate from required position beyond specified tolerance.
   1. Bars may be moved one bar diameter as necessary to avoid interference with other reinforcing steel, conduits, or embedded items. If the bars are moved more than one bar diameter, the resulting arrangement of bars shall be subject to approval.

E. Locate and support reinforcing by metal chairs, runners, bolsters, spacers, and hangers, as required.

F. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging.

G. Lap adjoining pieces at least one full mesh but not less than 6 inches and lace splices with wire.

H. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire. Wire mesh shall be so placed as to positively secure its position 1/3 of the slab thickness below the top of the slab for slabs on grade.
I. Securely maintain the steel reinforcement accurately in place until the concrete is placed. Any and all disturbances of reinforcing from any reason whatsoever shall be fully corrected prior to placing of concrete, and all damaged bar supports and spaces shall be repaired or removed and replaced. All bars shall be extended beyond stress points the development length of the bar or be provided with an equivalent development length with a hook.

J. When required or approved, welding of reinforcing steel shall conform to AWS D1.4. No welding shall be done at the bend in a bar.

K. Do not weld crossing reinforcement bars for assembly except as permitted by ENGINEER.

L. Do not displace or damage vapor retarder.

M. Accommodate placement of formed openings.
   1. Box out all slots, chases, recesses, or openings as shown on the drawings and specifications and as required by the work of other trades. Box out all temporary openings such as slots, pipe spaces, etc., and build forms to seal up when and as required.
   2. Inserts, anchors, ties, hangers, etc. shall be built into concrete as required to secure the work of the various subcontractors. Collars, sleeves, thimbles, anchors, sockets, etc., shall be furnished to the General CONTRACTOR by the other subcontractors for installation in the formwork. Sleeves shall not displace the reinforcing steel from its designated location by more than one bar diameter unless approved by the ENGINEER.

N. Spacing:
   1. Space reinforcement bars with minimum clear spacing according to ACI 318.
   2. If bars are indicated in multiple layers, place upper bars directly above lower bars.

O. Unless otherwise shown on the plans and details, the following accessories shall be provided for supports for all reinforcement:
   1. Reinforced slabs-on-grade shall have plain precast concrete blocks sufficient to support bars within prescribed tolerances, or individual high chairs with runners to rest on soil.
   2. Slab bars shall have continuous slab bolsters for bottom bars spaced a maximum distance of 48 inches on center, and for individual high chairs spaced 48 inches with a no.6 continuous support bar for top bars. Top bar supports shall be spaced a maximum distance apart of 48 inches and no greater than 18 inches from the overhanging ends of bars.
   3. Beam bottom bars shall have beam bolsters spaced a maximum distance of 72 inches. Top beam bars may be supported from beam stirrups where permitted provided beam stirrups are fabricated sufficiently accurate to permit top bars to be placed within the tolerances permitted. Individual high chairs are required where ties or other supports are not provided.

P. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations.
Q. Maintain minimum concrete cover around reinforcement according to ACI 318 or as indicated on the Drawings, whichever is greater.

R. Splice reinforcing according to manufacturer's instructions.
   1. All splices shall be approved, and shall provide sufficient lap to transfer the stress between the bars by the required development length of the bars. The character and design of each splice shall conform to the requirements of the ACI 318. Bars shall not be bent after being embedded in hardened concrete, unless otherwise noted on the drawings. Bars with kinks or bends not shown on the drawings shall not be placed. The heating of reinforcement for bending or straightening will be permitted only if the entire operation is approved by the ENGINEER.

S. Repair cut and damaged epoxy coatings with epoxy repair coating according to ASTM D3963. Use epoxy-coated steel wire ties to fasten epoxy-coated steel reinforcement.

3.02. TOLERANCES

A. Bars used for concrete reinforcement shall meet the following requirements for fabrication tolerance.
   1. Sheared length: Plus 1 inch
   2. Overall Dimension of Stirrups: Plus ½ inch
   3. All other Bends: Plus 1 inch

B. Bars shall be placed to the following tolerances:
   1. Concrete Cover to Formed Surfaces: Plus 1/4 inch.
   2. Concrete Cover to Top Bars in Slabs: Plus 1/4 inch.
   3. Concrete Cover to Top Bars in Beams: Plus 1/2 inch.
   6. Lengthwise in Member: Plus 2 inches.
   7. Wire Fabric: Plus 1/2 inch from center of slab or from location indicated in Drawings.

C. Foundation Walls: Install reinforcement within tolerances according to ACI 530/530.1.

3.03. FIELD QUALITY CONTROL

A. Notify the ENGINEER of the pouring schedule in advance and in ample time prior to placement of concrete to inspect the reinforcement. Inspection of reinforcement will be made only after each section to be poured is complete.

END OF SECTION
SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 SUMMARY
A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:
   1. Footings.
   2. Foundation walls.
   3. Slabs-on-grade.
   5. Beams.
   7. Slabs on metal deck.

1.3 DEFINITIONS
A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.

1.4 ACTION SUBMITTALS
A. Product Data: For each type of product indicated.
B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
   1. Indicate amounts of mixing water to be withheld for later addition at Project site.
C. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. 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.
D. Formwork Shop Drawings: Prepared by or under the supervision of a qualified professional engineer detailing fabrication, assembly, and support of formwork.
   1. Shoring and Reshoring: Indicate proposed schedule and sequence of stripping formwork, shoring removal, and reshoring installation and removal.
E. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.
   1. Location of construction joints is subject to approval of the Architect.
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. Waterstops.
   7. Curing compounds.
   8. Floor and slab treatments.
  10. Adhesives.
  11. Vapor retarders.
  12. Semirigid joint filler.

D. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements:
   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.

H. Quality Control at Epoxy Terrazzo Substrates: Contractor shall establish and provide written quality control concrete slab finishing procedures reviewed by and acceptable to the (096623) epoxy terrazzo flooring manufacturer for slab areas to receive epoxy terrazzo flooring to maintain the 1/8-inch in 10'-0" tolerance specified. Reduce high spots by approved mechanical means such as shot blast or special grinder. Fill low slab areas with cementitious or epoxy leveling compound acceptable to epoxy terrazzo flooring manufacturer and compatible with epoxy resin to attain level substrate for epoxy terrazzo work. Before concrete slab installation at epoxy terrazzo flooring areas, the General Contractor and installer shall review all screed elevations and spacing, extent of slab pour to help assure quality, and special conditions such as interface to stairs, elevator entrance thresholds and edge of slabs to minimize miscellaneous cracks.

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/C 94M requirements for production facilities and equipment.
   1. Manufacturer certified according to NRMCA's “Certification of Ready Mixed Concrete Production Facilities.”

C. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, 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 I, 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.

D. 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.


F. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
   1. ACI 301, “Specifications for Structural Concrete.”

G. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

H. 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. Special concrete finish subcontractor.
      f. Architect/EOR.
   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, construction contraction and isolation joints, and joint-filler strips, vapor-retarder installation, steel reinforcement installation, floor and slab flatness and levelness measurement, concrete repair procedures, and concrete protection.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.
B. Waterstops: Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

PART 2 - PRODUCTS

2.1 FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete: Form-facing panels that will 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.

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.


D. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

E. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
   1. Furnish units that will leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.
   2. Furnish ties that, when removed, will 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.

2.2 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615/A 615M, Grade, deformed.

B. Low-Alloy-Steel Reinforcing Bars: ASTM A 706/A 706M, deformed.

C. Plain-Steel Wire: ASTM A 82/A 82M, as drawn.

D. Plain-Steel Welded Wire Reinforcement: ASTM A 185/A 185M, plain, fabricated from as-drawn steel wire into flat sheets.

2.3 REINFORCEMENT ACCESSORIES

A. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60, plain-steel bars, cut true to length with ends square and free of burrs.
B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire or plastic and as follows:
   1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.

2.4 CONCRETE MATERIALS
A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:
   1. Portland Cement: ASTM C 150, Type I, Type II or Type I/II. Supplement with the following:
      a. Fly Ash: ASTM C 618, Class F.
      b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.
B. Silica Fume: ASTM C 1240, amorphous silica.
   1. Maximum Coarse-Aggregate Size: 1 inch nominal.
      a. 3/4 inch nominal for elevated slabs.
   2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
D. Light-Weight Aggregates: ASTM C 330. “Solite” or “Stalite” expanded shale aggregate produced by rotary kiln method acceptable to the Structural Engineer or approved equal.
E. Water: ASTM C 94/C 94M and potable.

2.5 ADMIXTURES
B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
   1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
   2. Retarding Admixture: ASTM C 494/C 494M, Type B.
   3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
   4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
   5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
   6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

2.6 FIBER REINFORCEMENT
A. Synthetic Macro-Fiber: Polyolefin macro-fibers engineered and designed for use in concrete, complying with ASTM C 1116/C 1116M, Type III, 1 to 2-1/4 inches long.
   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. 3M; Scotchcast Polyolefin Fibers.
      b. Euclid Chemical Company (The), an RPM company; Tuf-Strand SF.
2.7 VAPOR BARRIERS

A. Sheet Vapor Barrier: ASTM E 1745, Class A, with a permeance of less than 0.01 perms after mandatory conditioning (ASTM E1745, Section 7.1). Include manufacturer's recommended mastic, pressure-sensitive tape, and accessory materials.
   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. Fortifiber Building Systems Group; Moistop Ultra 15.
      c. Stego Industries, LLC; Stego Wrap 15 mil Class A

B. Granular Fill: Granular, densely-graded “crusher run” material with a balanced fine content, such as NCDOT ABC Stone, GAB, OR 21A or 21B. The base course shall be compacted and shall be finished to a flat, smooth, low-friction surface.

2.8 LIQUID FLOOR TREATMENTS

A. 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).

B. Penetrating Liquid Floor Treatment: Clear, chemically reactive, waterborne solution of inorganic silicate or siliconate materials and proprietary components; odorless; that penetrates, hardens, and densifies concrete surfaces.

2.9 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

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. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.

F. Terrazzo Floor Areas: Do not use curing agents in areas to receive terrazzo flooring.

2.10 RELATED MATERIALS


B. Bonding Agent: ASTM C 1059/C 1059M, Type II, non-redispersible, acrylic emulsion or styrene butadiene.
C. 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.

D. Dovetail Anchor Slots: Hot-dip galvanized-steel sheet, not less than 0.034 inch thick, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.

2.11 REPAIR MATERIALS

A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.
   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.
   4. Compressive Strength: Not less than 4100 psi at 28 days when tested according to ASTM C 109/C 109M.

B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch and that can be filled in over a scarified surface to match adjacent floor elevations.
   1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
   2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
   3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by topping manufacturer.
   4. Compressive Strength: Not less than 5000 psi at 28 days when tested according to ASTM C 109/C 109M.

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.

B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
   1. Fly Ash: 25 percent.
   2. Ground Granulated Blast-Furnace Slag: 25 percent.

C. Admixtures: Use admixtures according to manufacturer's written instructions.
   1. Use high-range water-reducing admixture in concrete, as required, for placement and workability.
   2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
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 water-cementitious materials ratio below 0.50.

2.13 CONCRETE MIXTURES FOR BUILDING ELEMENTS

A. Footings: Proportion normal-weight concrete mixture as follows:
   1. Minimum Compressive Strength: As indicated.
   2. Slump Limit: 4 inches, 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.
   3. Maximum Water/Cement Ratio: 0.50

B. Slabs-on-Grade: Proportion normal-weight concrete mixture as follows:
   1. Minimum Compressive Strength: As indicated.
   2. Slump Limit: 5 inches, plus or minus 1 inch.
   3. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.
   4. Maximum Water/Cement Ratio: 0.45

C. Suspended Slabs on Steel Deck: Proportion light-weight concrete mixture as follows:
   1. Minimum Compressive Strength: As indicated.
   2. Slump Limit: 5 inches, plus or minus 1 inch.
   3. Maximum Water/Cement Ratio: 0.45
   4. Synthetic Macro-Fiber: Uniformly disperse in concrete mixture at manufacturer's recommended rate, but not less than 4 lb/cu. yd.
   5. Air content: 4%-7% to comply with UL for fire rated floors.

D. Elevated formed slabs: Proportion normal-weight concrete mixture as follows:
   1. Minimum Compressive Strength: As indicated.
   2. Slump Limit: 4 inches, or 8 inches for concrete with verified slump of 2 to 4 inches before adding high-range water-reducing admixture or plasticizing admixture.
   3. Maximum Water/Cement Ratio: 0.45

E. Formed walls: Proportion normal-weight concrete mixture as follows:
   1. Minimum Compressive Strength: As indicated.
   2. Slump Limit: 4 inches, or 8 inches for concrete with verified slump of 2 to 4 inches before adding high-range water-reducing admixture or plasticizing admixture.
   3. Maximum Water/Cement Ratio: 0.45

F. 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% with a tolerance of plus 1 or minus 1.5 percent, for exterior concrete only, unless otherwise indicated.

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/C 94M 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/C 94M. 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

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

C. Construct forms tight enough to prevent loss of concrete mortar.

D. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
   1. Install keyways, reglets, recesses, and the like, for easy removal.
   2. Do not use rust-stained steel form-facing material.

E. 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.

F. 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.

G. Chamfer exterior corners and edges of permanently exposed concrete.

H. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.

I. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

J. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
K. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. 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’s “Code of Standard Practice for Steel Buildings and Bridges.”

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.

3.3 REMOVING AND REUSING FORMS

A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F 24 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations and curing and protection operations need to be maintained.

1. Leave formwork for beam soffits, joists, slabs, and other structural elements that supports weight of concrete in place until concrete has achieved at least 70 percent of its 28-day design compressive strength.

2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.

B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.

C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

3.4 VAPOR BARRIERS

A. Sheet Vapor Barriers: Place, protect, and repair sheet vapor barrier according to ASTM E 1643 and manufacturer's written instructions.

1. Lap joints 6 inches and seal with manufacturer's recommended tape. Seal to all penetrations and vertical surfaces.

3.5 STEEL REINFORCEMENT

A. General: Comply with CRSI's “Manual of Standard Practice” for placing 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 would 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/D 1.4M, 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.

3.6 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. 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. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.

C. 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 as long as practicable. Where more than one length is required, lace or clip sections together.

D. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.

E. Terrazzo Coordination: Locate construction joints at terrazzo floor areas to align with joint and divider locations indicated on terrazzo floor pattern drawing, as approved.

3.7 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.

B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.

C. 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.
D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
   1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
   2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
   3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
   1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
   3. Screed slab surfaces with a straightedge and strike off to correct elevations.
   4. Slope surfaces uniformly to drains where required.
   5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

F. 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.

G. 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. 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 or to be covered with a coating or covering material applied directly to concrete.

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 one part portland cement to one and one-half parts fine sand with a 1:1 mixture of bonding admixture and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap and keep surface damp by fog spray for at least 36 hours.

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, restraightening, 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 bullfloated 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 indicated and to receive concrete floor toppings and 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 restraightening until surface is left with a uniform, smooth, granular texture.

1. Apply float finish to surfaces indicated, to surfaces to receive trowel finish and to surfaces 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 indicated and 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. Specified overall values of flatness, F(F) 35; and of levelness, F(L) 25; with minimum local values of flatness, F(F) 24; and of levelness, F(L) 17 (F(L) not required at elevated slab).
   b. At areas receiving a terrazzo floor finish, specified overall values of flatness, F(F) 35; and of levelness, F(L) 35; with minimum local values of flatness, F(F) 24; and of levelness, F(L) 24 (F(L) not required at elevated slab).

E. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces indicated and to surfaces where ceramic or quarry tile is to be installed by either thickset or thin-set 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 ITEMS

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. 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.

C. Equipment Bases and Foundations:
   1. Coordinate sizes and locations of concrete bases with actual equipment provided.
   2. Minimum Compressive Strength: 3500 psi at 28 days.
   3. 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.
   4. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base, and anchor into structural concrete substrate.
   5. Prior to pouring concrete, place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
   6. 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 the remainder of the curing period.

D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.

E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
   1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
      a. Water.
      b. Continuous water-fog spray.
      c. Absorbent cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorbent covers.
   2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
      a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
      b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
      c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies will not interfere with bonding of floor covering used on Project.
   3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
      a. 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.
   4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a 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. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.
5. Terrazzo Floor Areas: At areas to receive terrazzo flooring, cure concrete for a minimum of 28 days. Do not use curing agents in areas to receive terrazzo flooring.

3.12 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 six month(s). Do not fill joints until construction traffic has permanently ceased.
B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.
C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.13 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 one part portland cement to two and one-half parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.
C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
   1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension 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 will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
   3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by 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 (0.25 mm) 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.

3.14 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage a special inspector and qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Inspections:
   1. Steel reinforcement placement.
   2. Steel reinforcement welding.
   3. Headed bolts and studs.
   4. Verification of use of required design mixture.
   5. Concrete placement, including conveying and depositing.
   6. Curing procedures and maintenance of curing temperature.
   7. Verification of concrete strength before removal of shores and forms from beams and slabs.

C. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
   1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.
2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.

3. Air Content: ASTM C 231, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.

4. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.

5. Unit Weight: ASTM C 567, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.

6. Compression Test Specimens: ASTM C 31/C 31M.
   a. Cast and laboratory cure one set of five standard cylinder specimens for each composite sample.

7. Compressive-Strength Tests: ASTM C 39/C 39M; test one laboratory-cured specimen at 7 days and one set of three specimens at 28 days and hold one specimen for test at 56 days.
   a. A compressive-strength test shall be the average compressive strength from a set of three specimens obtained from same composite sample and tested at age indicated.

8. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.

9. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.

10. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.

11. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that temperature, batch to placement time, slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Architect.

12. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

13. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

D. Measure floor and slab flatness and levelness according to ASTM E 1155 within 24 hours of finishing.
END OF SECTION 033000
SECTION 033900 - CONCRETE CURING

PART 1 GENERAL

1.01. SUMMARY

A. Scope of Work:
   1. Furnish all labor, equipment, materials, and incidentals necessary to perform and complete concrete curing in accordance with the plans. All materials, testing, and procedures shall be of the type specified herein.

B. Section Includes: Initial and final curing of horizontal and vertical concrete surfaces.

1.02. REFERENCE STANDARDS

A. American Association of State Highway and Transportation Officials:
   1. AASHTO M 182 - Standard Specification for Burlap Cloth Made from Jute or Kenaf and Cotton Mats.

B. American Concrete Institute:
   1. ACI 301 - Specifications for Structural Concrete.
   4. ACI 308.1 - Specification for Curing Concrete.

C. ASTM International:

1.03. SUBMITTALS

A. Section 013300 - Submittal Procedures.

B. Product Data: Submit manufacturer's information on curing compounds, mats, paper, and film, including compatibilities and limitations.

C. Manufacturer's Certificate: Certify that curing compounds meet or exceed specified requirements.

D. Manufacturer Instructions: Submit detailed instructions on installation requirements, including storage and handling procedures.
E. Qualifications Statement:
   1. Submit qualifications for manufacturer.

F. During hot or cold weather concreting, submit the proposed method of maintaining proper temperature and moisture during the curing period. In general, control concrete curing as recommended in ACI 305R and ACI 306R.

1.04. QUALITY ASSURANCE
   A. Perform Work according to ACI 301.

1.05. QUALIFICATIONS
   A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years' documented experience.

1.06. DELIVERY, STORAGE, AND HANDLING
   A. Section 015500 - Site Access and Storage.

   B. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.

   C. Store materials according to manufacturer instructions.

   D. Protection:
      1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
      2. Provide additional protection according to manufacturer instructions.

PART 2 PRODUCTS

2.01. MATERIALS
   A. Membrane-Curing Compound:
      1. Comply with ASTM C309, Type 1 or 1D, Class A or B.
      2. Manufacturers:
         b. Select one of the following 30% solids compounds or approved equal for other surfaces:
            1) "Masterkure" by Master Builders
            2) "Super Rez-Seal" by Euclid Chemical Co (Type 1, A and B)
3) "Kure-N-Seal 30" by Sonneborn Building Products (Type 1, A and B)
4) "Dress & Seal 30" by L & M Construction Chemicals Co (type 1D)

B. Absorptive Mats:
   1. Description:
      a. Comply with ASTM C171 or AASHTO M 182, Class 2
      c. Minimum Weight: 9 oz./sq. yd.
      d. Bonded to prevent separation during handling and placing.
      e. Free of sizing or any substance that is injurious to cement or can cause discoloration.

C. Waterproof Paper:
   1. Description: Curing paper treated to prevent separation during handling and placing.
   2. Comply with ASTM C171.

D. PE Film:

E. Water: Potable; not detrimental to concrete.

PART 3  EXECUTION

3.01. EXAMINATION
   A. Verify that substrate surfaces are ready to be cured.

3.02. APPLICATION
   A. All concrete surfaces shall be cured for a minimum of 14 days.

   B. Cure formed concrete surfaces, including undersides of beams, supported slabs, and other similar surfaces by moist curing with forms in place for full curing period.
      1. If forms are removed before the end of the curing period, continue curing by methods specified below, as applicable.

   C. Cure unformed surfaces, such as slabs, floor topping, and other flat surfaces by any of the approved curing methods.

   D. Hot Weather Curing - Comply with ACI 305R.
      1. During hot weather concreting keep forms moist and covered with plastic during the curing period.
2. If forms are removed before the end of the curing period, apply a curing compound, keep walls moist, and cover with plastic for the remainder of the curing period.

E. Cold Weather Curing - Comply with ACI 306R.

F. Horizontal Surfaces:

1. Comply with ACI 308.1, using ponding, moist curing, moisture retaining cover curing, a membrane-curing compound, or by combinations thereof, as herein specified.
   a. Ponding: Maintain 100 percent coverage of water over floor slab areas continuously for four days.
   b. Spraying: Spray water over floor slab areas and maintain wet for seven days.
   c. Absorptive Mat:
      1) Saturate burlap-PE and place burlap-side down over floor slab areas.
      2) Lap ends and sides at least 3” and seal by waterproof tape or adhesive.
      3) Maintain in place for seven days.
      4) Immediately repair any holes or tears during curing period using cover material and waterproof tape.
      5) Curing for all horizontal surfaces during period when the outside air temperature will exceed 60 degrees F shall be provided by covering the entire surface with burlap. The burlap shall be lapped 1/2 width in order to provide a double thickness of burlap.
      6) Do not permit surfaces to dry at any period during the required curing period.
   d. Membrane-Curing Compound: Apply curing compound in one coat.
      1) Curing for all horizontal slab surfaces, except those to receive a bonded finish material, during periods when the outside air temperature does not exceed 60 degrees F shall be provided by applying a membrane-forming curing compound to concrete surfaces as soon as the final troweling or floating operation has been completed.
      2) Apply one coat of specified curing compound to concrete at a rate in compliance with manufacturer’s instructions.
      3) Apply uniformly in continuous operation by power spray or roller.
      4) Reccoat areas subjected to heavy rainfall within 3 hours after initial application.
      5) Maintain continuity of coating and repair damage during curing period.
      6) Do not use membrane curing compounds on concrete surfaces which are to receive liquid floor hardener, waterproofing, dampproofing, membrane roofing, flooring (such as ceramic or quarry tile, glue down carpet), painting, or other coatings and finish materials, unless written verification from the manufacturer states that his product is compatible with the curing compound.
      7) During hot weather concreting if a curing compound is used, the slab shall still be moist cured for 12 hours immediately following initial set.
2. PE Film:
   a. Spread over floor slab areas.
   b. Lap edges and sides.
   c. Seal with pressure-sensitive tape.
   d. Maintain in place for seven days.

G. Vertical Surfaces:
   1. Comply with ACI 308.1, using spraying or a membrane-curing compound.
      a. Spraying: Spray water over surfaces and maintain wet for seven days or until forms are removed.
      b. Membrane-Curing Compound: If forms are removed before the curing period is complete, apply membrane-curing compound in one coat in accordance with the manufacturer’s directions as soon as the water film has disappeared.

3.03. PROTECTION

   A. Do not permit traffic over unprotected floor surfaces.

   B. During the curing period, protect concrete from damaging mechanical disturbances, including load stresses, shocks, excessive vibration and from change caused by subsequent construction operations.

   C. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 305 for hot-weather protection during curing.

END OF SECTION
SECTION 034100 - PRECAST STRUCTURAL CONCRETE

PART 1 GENERAL

1.01. SUMMARY

A. Scope of Work:
   1. Furnish all labor, equipment, materials, and incidentals necessary for the fabrication and installation of precast structural concrete in accordance with the plans. All materials, testing, and procedures shall be of the type specified herein.

B. Section Includes:
   1. Columns and bearing saddles.
   2. Beams.
   4. Floor tees.
   5. Channel slabs.
   7. Connection and supporting devices.
   8. Lintels.

1.02. REFERENCE STANDARDS

A. American Concrete Institute:
   1. ACI 301 - Specifications for Structural Concrete.
   2. ACI 318 - Building Code Requirements for Structural Concrete.

B. American Welding Society:
   2. AWS D1.1 - Structural Welding Code - Steel.
   3. AWS D1.4 - Structural Welding Code - Reinforcing Steel.

C. ASTM International:
5. ASTM A416 - Standard Specification for Steel Strand, Uncoated Seven-Wire for Prestressed Concrete.
6. ASTM A615 - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
8. ASTM C31 - Standard Practice for Making and Curing Concrete Test Specimens in the Field.
14. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.

D. Precast/Prestressed Concrete Institute:
1. PCI MNL-116 - Manual for Quality Control for Plants and Production of Structural Precast Concrete Products.
3. PCI MNL-123 - Design and Typical Details of Connections for Precast and Prestressed Concrete.

1.03. COORDINATION

A. Coordinate Work of this Section with framing components not pre-tensioned but associated with Work of this Section.

B. Coordinate cutting of required openings 10 inches and smaller.

1.04. SUBMITTALS

A. Section 01 30 00 – Submittals/Electronic Submittals.
B. Product Data: Submit standard component configurations, design loads, deflections, cambers, and bearing requirements.

C. Concrete Mix Design: Thirty days minimum prior to concrete placement, submit a mix design for each strength and type of concrete. Include a complete list of materials including type; brand; source and amount of cement, pozzolan, and admixtures; and applicable reference specifications.

D. Records: Submit mandatory batch ticket information for each load of ready-mixed concrete.

E. Shop Drawings: Indicate layout, unit locations, fabrication details, material properties of steel and concrete used, unit identification marks, bracing/shoring required, reinforcement, connection details, support items, lifting and erection inserts, dimensions and surface finishes of each member, location and size of openings, headers for openings, joints between members, joints between members and other construction, erection sequence and handling requirements, relationship to adjacent materials, areas to receive toppings, topping thickness.

F. Samples: Submit two 2-inch-thick samples, 12 inches by 12 inches in size, illustrating surface finish treatment.

G. Fabricator's Certificate: Certify that products meet or exceed specified requirements.

H. Welder Certificates: Certify welders and welding procedures employed on Work, verifying AWS qualification within previous 12 months.

I. Delegated Design Submittals: Submit signed and sealed Shop Drawings with design calculations and assumptions for loadings and stresses of fabricated and designed framing and connections.

J. Fabricator Instructions: Submit special procedures, perimeter conditions requiring special attention, and quality control procedures established in accordance with PCI MNL-116 by the precast manufacturer.

K. Source Quality-Control Submittals: Indicate results of factory tests and inspections showing that the mix has been successfully tested to produce concrete with the properties specified and will be suitable for the job conditions.

L. Qualifications Statements:
   1. Submit qualifications for fabricator, erector, and licensed professional.
   2. Welders: Qualify procedures and personnel according to AWS D1.1, AWS B2.1, and AWS D1.4.

1.05. QUALITY ASSURANCE

A. Comply with PCI MNL-116, PCI MNL-123, and PCI MNL-120.
1. Design precast members (including connections) for the design load conditions and spans indicated, and for additional loads imposed by openings and supports of the work of other trades. Design precast members for handling without cracking.

1.06. QUALIFICATIONS

A. Fabricator: Company specializing in fabricating products specified in this Section with minimum three years’ documented experience and certified by the Prestressed Concrete Institute, Plant Certification Program, prior to the start of production.

1. In lieu of such certification, the manufacturer shall, at his expense, meet the following requirements:
   a. Retain independent testing or consulting firm approved by the ENGINEER and/or OWNER.
   b. The basis of inspection shall be the Prestressed Concrete Institute Manual for Quality Control for Plants and Production of Precast and Prestressed Concrete Products, MNL-116.
   c. This firm shall inspect the precast plant at two-week intervals during production and issue a report, certified by a registered ENGINEER verifying that materials, methods, products, and quality control meet all the requirements of the specifications, drawings, and PCI MNL-116. If the report indicates to the contrary, the ENGINEER, at the precaster's expense, will inspect and may reject any or all products produced during the period of non-compliance with the above requirements.

B. Erector: Company specializing in performing Work of this Section with minimum three years' documented experience.

C. Welders: AWS qualified within previous 12 months for employed weld types.


1.07. DELIVERY, STORAGE, AND HANDLING

A. Section 015500 - Site Access and Storage.

B. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.

C. Store materials according to manufacturer instructions.
   1. Store precast members off the ground.
   2. Separate stacked precast members by battens across the full width of each bearing point.
D. Protection:
   1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
   2. Provide additional protection according to manufacturer instructions.
   3. Protect members to prevent staining, chipping, or spalling of concrete.
   4. Protect from weather, marring, damage, and overload.

E. Handling:
   1. Handle precast members in position consistent with their shape and design.
   2. Lift and support only from designated lift and support points indicated on the shop drawings.
   3. Lifting or Handling Devices: Capable of supporting member in positions anticipated during manufacture, storage, transportation, and erection.
   4. Mark each member with date of production and final position in structure.

PART 2 PRODUCTS

2.01. PERFORMANCE AND DESIGN CRITERIA
   A. Size components to withstand design loads in accordance with local building codes.
   B. Maximum Allowable Deflection: 1/360 of span.
   C. Seismic Design: Design and detail elements and connections to resist seismic force in accordance with local building codes requirements and ACI 318.
   D. Design members exposed to weather to allow movement of components without damage, failure of joint seals, undue stress on fasteners, or other detrimental effects when subject to seasonal or cyclic day/night temperature ranges.
   E. Design system to accommodate construction tolerances, deflection of other building structural members, and clearances of intended openings.
   F. Calculate structural properties of framing members according to ACI 318.
   G. The minimum compressive strength of concrete at 28 days shall be 5,000 psi unless otherwise indicated.

2.02. MATERIALS
   A. Cement:
      1. Comply with ASTM C150, Type I, II, or ASTM C595 Type IP (MS) or IS (MS).
      2. Type: Portland.
4. Fly Ash and Pozzolan
   a. ASTM C618, Type N, F, or C, except that the maximum allowable loss on ignition shall be 6 percent for Type N and F

5. Ground Iron Blast-Furnace Slag
   a. ASTM C989, Grade 100 or 120

B. Aggregate, Sand, Water, Admixtures:
   1. As appropriate to design requirements and PCI MNL-116.
   2. Admixtures: as determined by precast fabricator.
   3. Water: fresh, clean, and potable.
   4. Aggregates Selection
      a. ASTM C33, Size 67 except as modified herein. Obtain aggregates for exposed concrete surfaces from one source. Aggregates shall not contain any substance which may be deleteriously reactive with the alkalies in the cement.
   5. Aggregates for Lightweight Concrete
      a. ASTM C330.

C. Reinforcement:
   1. Tensioning Steel Tendons:
      a. Comply with ASTM A416, Grade 250K.
      b. Strength: Commensurate with member design.
   2. Deformed Reinforcement:
      a. Description: Steel bars.
      b. Comply with ASTM A615, Grade 60.
   3. Welded Steel Wire Fabric:
      a. Type: Plain.
      b. Comply with ASTM A1064.
      c. Configuration: Flat sheets.
      d. Finish: Galvanized.
   4. Coating: Epoxy coat to resist corrosion.

2.03. FABRICATION

A. Comply with PCI MNL-116 and ACI 318.

B. Maintain plant records and quality-control program during production of precast members, and make records available upon request of ENGINEER.
1. Mixing operations shall produce batch-to-batch uniformity of strength, consistency, and appearance.

C. Ensure that reinforcing steel, anchors, inserts, plates, angles, and other cast items are embedded and located as indicated on Shop Drawings.
   1. Reinforcement may be preassembled before placement in forms. Provide exposed connecting bars, or other approved connection methods, between precast and cast-in-place construction. Remove any excess mortar that adheres to the exposed connection.

D. Tension Reinforcement Tendons: As required to achieve design load criteria.

E. Fabricate required openings larger than 8 inches.

F. Embed accessories provided by other Sections at indicated locations.

G. Exposed Ends at Stressing Tendons: Fill recess with nonshrink grout and trowel flush.

H. Welding:
   1. Steel Fabrications: Comply with AWS D1.1.
   2. Reinforcing Steel: Comply with AWS D1.4.
   3. Do not tack-weld reinforcing.

I. Tolerances:

2.04. FINISHES

A. Exposed-to-View Finished Surfaces of Precast Concrete Members: Uniform in color and appearance.

B. Curing:
   1. Cure members under identical conditions to develop required concrete quality.
   2. Commence curing immediately following the initial set and completion of surface finishing. When accelerated curing is used, apply heat at controlled rate and uniformly along the casting beds. Monitor temperatures at various points in a product line in different cast.
   3. Minimize appearance blemishes including nonuniformity, staining, and surface cracking.

C. Finishes:
   1. Unexposed Formed Surfaces: Provide a standard grade surface finish.
   2. Exposed Formed Surfaces: Provide a standard grade broomed surface finish. The combined area of acceptable defective areas shall not exceed 0.2 percent of the exposed view surface area, and the patches shall be indistinguishable from the surrounding surfaces when dry.
3. Unformed Surfaces: Provide a floated finish.

2.05. **ACCESSORIES**

A. Connecting and Supporting Devices:
   2. Plates, Angles, Inserts, Items Cast into Concrete, and Items Connected to Steel Framing Members: Comply with PCI MNL-123.
      a. Inserts: Also comply with ASTM A47, Grade 32510 or 35018, or ASTM A27 Grade U-60-30
   4. Do not paint surfaces in contact with concrete or surfaces requiring field welding.

B. Grout:
   1. Type:
      a. Nonshrink in accordance with ASTM C1107.
      b. Minimum Compressive Strength: 10,000 psi at 28 days.

C. Bearing Pads:
   1. Material: Elastomeric for exterior applications complying with AASHTO HB14. Hardboard for interior applications complying with ANSI A135.4, class as specified by the precast Manufacturer.
   2. Thickness: 1/8 inch
   3. Finish: Smooth both sides.

D. Bolts, Nuts, and Washers:
   1. Provide ASTM A123 or ASTM A153 galvanized.

E. Primer Paint: Zinc-rich alkyd.

F. Repair damage to galvanized coatings using ASTM A780 zinc rich paint for galvanized surfaces damaged by handling, transporting, cutting, welding, bolting, or acid washing. Do not heat surfaces to which repair paint has been applied.

2.06. **SOURCE QUALITY CONTROL**

A. Testing:
2. Concrete:

B. OWNER Inspection:
   1. Make completed precast units available for inspection at fabricator’s factory prior to packaging for shipment.
   2. Notify OWNER at least 14 days before inspection is allowed.
   3. Neither the exercise nor waiver of inspection at the plant will affect the Owner’s right to enforce contractual provisions after units are transported or erected.

C. OWNER Witnessing:
   1. Allow witnessing of factory inspections and test at fabricator's test facility.
   2. Notify OWNER at least seven days before inspections and tests are scheduled.

D. Certificate of Compliance:
   1. If fabricator is approved by authorities having jurisdiction, submit certificate of compliance indicating Work performed at fabricator's facility conforms to Contract Documents.
   2. Specified shop tests are not required for Work performed by approved fabricator.

PART 3 EXECUTION

3.01. EXAMINATION
   A. Verify that Site conditions are ready to receive Work.
   B. Verify that field measurements are as indicated on Shop Drawings.
   C. Prior to erection, and again after installation, check precast members for damage, such as cracking, spalling, and honeycombing. As directed by the ENGINEER, repair or remove and replace precast members that do not meet the surface finish requirements specified.

3.02. PREPARATION
   A. Prepare support equipment for erection procedure, temporary bracing, and induced loads during erection.

3.03. ERECTION
   A. Erect members after the concrete has attained the specified compressive strength, unless otherwise approved by the precast manufacturer.
   B. Erect members in accordance with the approved shop drawings without damage to structural capacity, shape, or finish; replace or repair damaged members.
C. Provide anchorage for fastening work in place. Conceal fasteners where practicable. Make threaded connections up tight and nick threads to prevent loosening.

D. Align and maintain uniform horizontal and vertical joints as erection progresses.

E. Temporary Bracing and Support:
   1. Brace precast members, unless design calculations submitted with the shop drawings indicate bracing is not required.
   2. Maintain in place until final support is provided.
   3. Protect members from staining.
   4. Provide temporary lateral support to prevent bowing, twisting, or warping of members.
   5. Brace forms to prevent deformation. Forms shall produce a smooth, dense surface. Chamfer exposed edges of columns and beams 3/4 inch, unless otherwise indicated.

F. Follow the manufacturer’s recommendations for maximum construction loads.

G. Adjust differential camber between precast members to tolerance before final attachment.

H. Bearing surfaces shall be flat, free of irregularities, and properly sized. Size bearing surfaces to provide for the indicated clearances between the precast member and adjacent precast members or adjoining field placed surfaces. Correct bearing surface irregularities with nonshrink grout.

I. Install bearing pads where indicated or required. Do not use hardboard bearing pads in exterior locations.

J. Place precast members at right angles to the bearing surface, unless indicated otherwise, and draw-up tight without forcing or distortion, with sides plumb.

K. Level differential elevation of adjoining horizontal members with grout to maximum slope of 1:12.

L. Set vertical units dry, without grout, and attain joint dimensions with lead or plastic spacers.

M. Grout:
   1. Underside of column and beam bearing plates.
   2. Joints between members at roof and floor locations.
   3. Clean and fill keyways between precast members, and other indicated areas.
   4. Remove excess grout before hardening.

N. Welding:
   1. Comply with AWS D1.1 and AWS D1.4.
   2. Protect the concrete and other reinforcing from heat during welding.
   3. Do not tack-weld reinforcing.
4. Grind smooth visible welds in the finished installation.

O. Openings:

1. Holes or cuts requiring reinforcing to be cut, which are not indicated on approved shop drawing, shall only be made with the approval of the ENGINEER and the precast manufacturer. Drill holes less than 12 inches in diameter with a diamond tipped core drill.

P. Surface Finish:

1. Repairs located in a bearing area must be approved by the ENGINEER. Precast members containing hairline cracks which are visible and are less the 0.02 inches in width, may be accepted, except that cracks larger than 0.005 inches in width for surfaces exposed to the weather shall be repaired. Precast members which contain cracks greater than 0.02 inches in width shall be approved by the ENGINEER, prior to being repaired. Any precast member that is structurally impaired or contains honeycombed section deep enough to expose reinforcing shall be rejected.

3.04. TOLERANCES

A. Erect members level and plumb within allowable tolerances. Align member ends.

B. Comply with PCI MNL-116.

C. Noncompliance:

1. If members cannot be adjusted to comply with design or tolerance criteria, cease Work and advise ENGINEER.

2. Execute modifications as directed by ENGINEER.

3.05. CLEANING

A. Clean weld marks, dirt, or blemishes from surfaces of exposed members.

3.06. PROTECTION

A. Protect members from damage caused by field welding or erection operations.

B. Use noncombustible shields during welding operations to protect adjacent Work.

END OF SECTION
SECTION 034500 - ARCHITECTURAL PRECAST CONCRETE (APC) - PLANT CAST (1)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 PERFORMANCE REQUIREMENTS
   A. Structural Performance: Engineer, fabricate, and install architectural precast concrete units to withstand design loads within limits and under conditions indicated.
   B. Engineering Responsibility: Engage a fabricator who utilizes a qualified professional engineer to prepare design calculations, Shop Drawings, and other structural data for architectural precast concrete units.

1.3 SUBMITTALS
   A. Product data and instructions for manufactured materials and products. Include mix designs, certifications, and laboratory test reports as required. Include water absorption test reports for units with exterior exposure.
   B. Shop Drawings: Submit shop drawings prepared by or under the supervision of a qualified professional engineer detailing fabrication and installation of APC units. Indicate locations, plans, elevations, dimensions, shapes, and cross sections of each unit. Indicate joints, reveals, and extent and location of each surface finish. Indicate details at building corners.
      1. Provide full-size lay-out of inscription showing text, typestyle and graphic elements for date stone application indicated.
   C. Design Calculations: Provide complete design calculations prepared by a registered engineer licensed in the State of North Carolina.
   D. Samples in manufacturer's standard size, to illustrate quality, color, and texture of surface finish matches Architect’s control sample.
      1. Provide minimum 12-inch square sample incorporating two or three engraved characters. Provide 7-inch height Helvetica Medium font unless directed otherwise.
   E. Design mixes for each concrete mix.
   F. Material test reports from a qualified independent testing agency evidencing compliance with requirements of the following based on comprehensive testing of current materials:
      1. Concrete materials.
      2. Reinforcing materials.
      3. Admixtures.
      4. Water-absorption test reports.
   G. Material certificates in lieu of agency test reports, when permitted by Architect, signed by fabricator certifying that each material item complies with requirements.

1.4 QUALITY ASSURANCE
   A. Installer Qualifications: Engage an experienced Installer who has completed architectural precast concrete work similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.
   B. Fabricator Qualifications: A firm that complies with the following requirements and is experienced in manufacturing precast architectural concrete units similar to those indicated for this Project and with a record of successful in-service performance.
1. Assumes responsibility for engineering precast architectural concrete units to comply with performance requirements. This responsibility includes preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.

2. Participates in PCI's Plant Certification program and is designated a PCI-certified plant for Group A, Category A1--Architectural Cladding and Load Bearing Units or in APA's Plant Certification Program for Production of Architectural Precast Concrete Products and is designated an APA-certified plant. www.pci.org www.archprecast.org

3. Is registered with and approved by authorities having jurisdiction.

C. PCI Design Standard: Comply with recommendations of PCI’s MNL-120 “PCI Design Handbook--Precast and Prestressed Concrete” applicable to types of architectural precast concrete units indicated.

D. PCI Quality-Control Standard: Comply with requirements of PCI’s MNL-117 “Manual for Quality Control for Plants and Production of Architectural Precast Concrete Products,” including manufacturing procedures and testing requirements, quality-control recommendations, and dimensional tolerances for types of units required.

E. Sample Panels: After sample approval and before fabricating precast structural concrete units with architectural finish and thin brick facing, produce a minimum of two sample panels approximately 16 sq. ft. in area for review by Architect. Incorporate full-scale details of architectural features, finishes, textures, and transitions in sample panels.
   1. Locate panels where indicated or, if not indicated, as directed by Architect.
   2. Damage part of an exposed-face surface for each finish, color, and texture, and demonstrate adequacy of repair techniques proposed for repair of surface blemishes.
   3. After approval of repair technique, maintain one sample panel at fabricator's plant and one at Project site in an undisturbed condition as a standard for judging the completed Work.
   4. Demolish and remove sample panels when directed.

F. Mockups: After sample panel approval but before production of precast concrete units with architectural finish and thin brick facing, construct full-sized mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and to set quality standards for materials and execution.
   1. Build mockup as indicated on Drawings including sealants and precast concrete units with an architectural finish complete with anchors, connections, flashings, and joint fillers.
   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.

1.5 COORDINATION

A. Furnish loose connection hardware and anchorage items to be embedded in or attached to other construction before starting that Work. Provide locations, setting diagrams, templates, instructions, and directions, as required, for installation.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Support units during shipment on non-staining shock-absorbing material in same position as during storage.
B. Store units with adequate bracing and protect units to prevent contact with soil, to prevent staining, and to prevent cracking, distortion, warping or other physical damage.
   1. Store units with dunnage across full width of each bearing point unless otherwise indicated.
   2. Place adequate dunnage of even thickness between each unit.
   3. Place stored units so identification marks are clearly visible, and units can be inspected.

C. Handle and transport units in a manner that avoids excessive stresses that cause cracking or damage.

D. Lift and support units only at designated points indicated on Shop Drawings.

1.7 SEQUENCING
A. Supply anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, templates, instructions, and directions, as required, for installation.

PART 2 - PRODUCTS

2.1 FABRICATORS
A. Available Fabricators: Subject to compliance with requirements, fabricators offering products that may be incorporated in the Work include, but are not limited to, the following:
   1. Gate Precast Company.
   4. Tindall Corporation.

2.2 MOLD MATERIALS
A. Forms: Provide forms and, where required, form-facing materials of metal, plastic, wood, or another acceptable material that is nonreactive with concrete and will produce required finish surfaces.

2.3 REINFORCING MATERIALS
A. Reinforcing Bars: ASTM A 615, Grade 60, deformed.
B. Galvanized Reinforcing Bars: ASTM A 767, Class II, 2 oz./sq. ft. zinc, hot-dip galvanized.

2.4 CONCRETE MATERIALS
A. Portland Cement: ASTM C 150, Type I or Type III. Use “white” Portland cement.
B. Normal-Weight Aggregates: ASTM C 33, with coarse aggregates meeting Class 5S and MNL-117 requirements.
   1. Use aggregate from same source as those used in Architect’s control sample.
C. Coloring Agent: ASTM C 979, synthetic mineral oxide pigments or colored water-reducing admixtures, color stable, nonfading, resistant to lime and other alkalis.
D. Water: Potable; free from deleterious material that may affect concrete color stability, setting, or strength.
E. Air-Entraining Admixture: ASTM C 260, certified by manufacturer as compatible with other required admixtures.
F. Water-Reducing, Retarding, or Accelerating Admixtures: ASTM C 494, type as selected by Fabricator and containing not more than 0.1 percent chloride ions.
2.5 STEEL CONNECTION MATERIALS
A. Carbon-Steel Shapes and Plates: ASTM A 36.
B. Carbon-Steel-Headed Studs: ASTM A 108, AISI 1018 through AISI 1020, cold finished, AWS D1.1/D1.1M, Type A or B, with arc shields and with minimum mechanical properties of PCI MNL 117, Table 3.2.3.
C. Deformed-Steel Wire or Bar Anchors: ASTM A 496 or ASTM A 706/A 706M.
D. Carbon-Steel Bolts and Studs: ASTM A 307, Grade A; carbon-steel, hex-head bolts and studs; carbon-steel nuts, ASTM A 563; and flat, unhardened steel washers, ASTM F 844.
E. Zinc-Coated Finish: For exterior steel items, steel in exterior walls, and items indicated for galvanizing, apply zinc coating by hot-dip process according to ASTM A 123/A 123M or ASTM A 153/A 153M.
1. For steel shapes, plates, and tubing to be galvanized, limit silicon content of steel to less than 0.03 percent or to between 0.15 and 0.25 percent or limit sum of silicon and 2.5 times phosphorous content to 0.09 percent.
2. Galvanizing Repair Paint: High-zinc-dust-content paint with dry film containing not less than 94 percent zinc dust by weight, and complying with DOD-P-21035A or SSPC-Paint 20.
F. Shop-Primed Finish Prepare surfaces of non-galvanized steel items, except those surfaces to be embedded in concrete, according to requirements in SSPC-SP 3 and shop-apply lead- and chromate-free, rust-inhibitive primer, complying with performance requirements in MPI 79 according to SSPC-PA 1.
G. Welding Electrodes: Comply with AWS standards.

2.6 MORTAR MATERIALS AND MIXES
A. Provide mortar materials and mixes that comply with Division 04 Section "Unit Masonry."

2.7 CONCRETE MIXES
A. Prepare design mixes for each type of concrete required.
B. Design mixes may be prepared by a qualified independent testing agency or by qualified architectural precast manufacturing plant personnel at architectural precast fabricator’s option.
C. Limit water-soluble chloride ions to the maximum percentage by weight of cement permitted by ACI 318.
D. Normal-Weight Concrete Face and Back-Up Mixes: Proportion mixes by either laboratory trial batch or field test data methods according to ACI 211.1, using materials to be used on the Project, to provide normal-weight concrete with the following properties:
2. Maximum Water-Cement Ratio at Point of Placement: 0.40.
E. Add air-entraining admixture at manufacturer’s prescribed rate to result in normal-weight concrete at point of placement having an air content complying with MNL-117 requirements.
F. Water Absorption: Maximum 6 percent by weight, tested according to PCI MNL 117.
G. When included in design mixes, add other admixtures to concrete mixes according to manufacturer’s directions.
2.8 MOLDS
A. Accurately construct molds, mortar-tight, of sufficient strength to withstand pressures due to concrete-placing operations, temperature changes.
B. Maintain molds to provide completed architectural precast concrete units of shapes, lines, and dimensions indicated, within fabrication tolerances specified.
C. Provide engraved characters for signage applications in accordance with approved shop drawings, by means established by fabricator to produce clean, sharp, concise letters. Molded or post-fabrication machining of engraved lettering is acceptable, subject to review of sample.

2.9 FABRICATION
A. Cast-in Anchors, Inserts, Plates, Angles, and Other Anchorage Hardware: Fabricate anchorage hardware with sufficient anchorage and embedment to comply with design requirements. Accurately position for attachment of loose hardware, and secure in place during precasting operations. Locate anchorage hardware where it does not affect position of main reinforcement or concrete placement.
   1. Weld-headed studs and deformed bar anchors used for anchorage according to AWS D1.1 and AWS C5.4, “Recommended Practices for Stud Welding.”
B. Furnish loose hardware items including steel plates, clip angles, seat angles, anchors, dowels, cramps, hangers, and other hardware shapes for securing architectural precast concrete units to supporting and adjacent construction.
   1. All precast shapes shall be anchored to the supporting construction through the use of plates, clip angles, dowels, or other mechanical anchorage. Precast shall not be set in a mortar bed as the sole means of anchorage.
   2. Cast-in reglets, slots, holes, and other accessories in architectural precast concrete units as indicated on the Contract Drawings.
C. Mix concrete according to MNL-117 and requirements of this Section. Following concrete batching, no additional water may be added.
D. Place concrete in a continuous operation to prevent seams or planes of weakness from developing in precast units. Comply with requirements of MNL-117 for measuring, mixing, transporting, and placing concrete. Fabricate units by the “Wet Pour” process; the “Dry Tamp” fabrication method will not be accepted.
E. Thoroughly consolidate placed concrete by internal and external vibration without dislocating or damaging reinforcement and built-in items. Use equipment and procedures complying with MNL-117.
   2. Comply with ACI 305R procedures for hot-weather concrete placement.
F. Cure concrete according to the requirements of MNL-117 by moisture retention without heat or by accelerated heat curing, using low-pressure live steam or radiant heat and moisture.
G. Fabricate architectural precast concrete units straight and true to size and shape with exposed edges and corners precise and true. Provide uniformly chamfered edge and corner treatment.
H. Date Stone: Fabricate date stone to dimensions and details indicated. Provide engraved text of font and size indicated in accordance with approved shop drawings.
I. Discard architectural precast concrete units that are warped, cracked, broken, spalled, stained, or otherwise defective unless repairs are permitted by Architect and meet
requirements.

2.10 FABRICATION TOLERANCES
   A. Generally, comply with MNL-117 recommendations.

2.11 ACCESSORIES
   A. Joint Sealants: Provide joint sealants as indicated in Division 07 Section “Joint Sealants.”
   B. Reglets: Specified in Division 07 Section "Flashing, Sheet Metal and Roofing Accessories."
   C. Precast Accessories: Provide clips, hangers, high-density plastic or steel shims, and other
      accessories required to install structural precast concrete units.

2.12 FINISHES
   A. Panel faces shall be free of joint marks, grain, and other obvious defects. Corners, including
      false joints shall be uniform, straight, and sharp. Finish exposed-face surfaces of
      architectural precast concrete units to match approved sample panels mockups and as
      follows:
      1. Design Reference Sample: Off-white color comparable to Seaboard Concrete
         Products “Bermuda Beige” #7224.
      2. Acid-Etched Finish: Use acid and hot-water solution, equipment, application
         techniques, and cleaning procedures to expose aggregate and surrounding matrix
         surfaces.
      3. Cast stone units specified in Division 4 Section “Unit Masonry” shall match color
         and finish established for architectural precast concrete.
   B. Finish unexposed surfaces of architectural precast concrete units by float finish.

PART 3 - EXECUTION

3.1 INSTALLATION
   A. Install clips, hangers, bearing pads, and other accessories required for connecting
      architectural precast concrete units to supporting members and backup materials.
   B. Install architectural precast concrete units level, plumb, square, and true, without exceeding
      the recommended erection and location tolerances of MNL-117. Provide temporary supports
      and bracing as required to maintain position, stability, and alignment as units are being
      permanently connected.
      1. Maintain horizontal and vertical joint alignment and uniform joint width.
      2. Remove projecting hoisting devices and cement-grout fill recessed hoisting devices.
   C. Connect architectural precast concrete units in position by bolting, welding, grouting, or as
      otherwise indicated on Shop Drawings. Remove temporary shims, wedges, and spacers as
      soon as practical after connecting and grouting are completed.

3.2 SETTING ARCHITECTURAL PRECAST CONCRETE IN MORTAR
   A. Install precast concrete units to comply with requirements in Division 04 Section "Unit
      Masonry."
   B. Set precast concrete 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. Coordinate installation of precast concrete with installation of flashing specified in
         other Sections.
C. Wet joint surfaces thoroughly before applying mortar or setting in mortar.

D. Set units in full bed of mortar with full head joints unless otherwise indicated.
   1. Set units with joints 3/8 to 1/2 inch (10 to 13 mm) wide unless otherwise indicated.
   2. Build anchors and ties into mortar joints as units are set.
   3. Fill dowel holes and anchor slots with mortar.
   4. Fill collar joints solid as units are set.
   5. Build concealed flashing into mortar joints as units are set.
   6. Keep head joints in copings and between other units with exposed horizontal surfaces open to receive sealant.
   7. Keep joints at shelf angles open to receive sealant.

E. Rake out joints for pointing with mortar to depths of not less than 3/4 inch. Rake joints to uniform depths with square bottoms and clean sides. Scrub faces of units to remove excess mortar as joints are raked.

F. Point mortar joints by placing and compacting mortar in layers not greater than 3/8 inch (10 mm). Compact each layer thoroughly and allow it to become thumbprint hard before applying next layer.

G. Tool exposed joints slightly concave when thumbprint hard. Use a smooth plastic jointer larger than joint thickness.

H. Point joints with sealant to comply with applicable requirements in Division 07 Section "Joint Sealants."
   1. Prime precast concrete surfaces to receive sealant and install compressible backer rod in joints before applying sealant unless otherwise indicated.

I. Provide sealant joints at head joints of copings; at joints between APC and other masonry; at expansion, control, and pressure-relieving joints; and at locations indicated.
   1. Keep joints free of mortar and other rigid materials.
   2. Build in compressible foam-plastic joint fillers where indicated.
   3. Form joint of width indicated, but not less than 3/8 inch (10 mm).
   4. Prime precast concrete surfaces to receive sealant and install compressible backer rod in joints before applying sealant unless otherwise indicated.
   5. Prepare and apply sealant of type and at locations indicated to comply with applicable requirements in Division 07 Section "Joint Sealants."

3.3 REPAIRS
A. Repair exposed exterior surfaces of architectural precast concrete units to match color, texture, and uniformity of surrounding concrete when permitted by Architect. Warranty repairs for a period of three years after Architect’s acceptance of repaired surfaces.

B. Remove and replace damaged architectural precast concrete units when repairs do not meet requirements.

3.4 CLEANING
A. Clean exposed surfaces of APC units after erection to remove weld marks, other markings, dirt, and stains.
   1. Wash and rinse according to architectural precast concrete fabricator’s recommendations. Protect other work from staining or damage due to cleaning operations.
   2. Do not use cleaning materials or processes that could change the appearance of exposed APC finishes.
END OF SECTION 034500
SECTION 042000 - UNIT MASONRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 DEFINITIONS
A. CMU(s): Concrete masonry unit(s).
B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.3 PERFORMANCE REQUIREMENTS
A. Provide structural unit masonry that develops indicated net-area compressive strengths at 28 days.
   1. Determine net-area compressive strength of masonry from average net-area compressive strengths of masonry units and mortar types (unit-strength method) according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.

1.4 PRECONSTRUCTION TESTING
A. Preconstruction Testing Service: Owner will engage a qualified independent testing agency to perform preconstruction testing indicated below. Retesting of materials that fail to comply with specified requirements shall be done at Contractor’s expense.
   1. Clay Masonry Unit Test: For each type of unit required, according to ASTM C 67 for compressive strength.
   2. Concrete Masonry Unit Test: For each type of unit required, according to ASTM C 140 for compressive strength.

1.5 SUBMITTALS
A. Product Data: For each type of product indicated.
   1. Submit product data for masonry cleaner products recommended by unit masonry manufacturer for proposed unit masonry.
   2. Submit product data for SPF cavity-wall insulation and XEPS cavity-wall board insulation and accessory butyl joint tape.
B. Shop Drawings: For the following:
   1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
   2. Architectural Concrete Stone Veneer: For a substitute product meeting ASTM C 90 or ASTM C 1364 to be considered, submit shop drawings of all elevations indicating locations of all control, expansion, and other movement joints. Show sizes, profiles, and locations of each stone trim unit required.
   3. Reinforcing Steel: Detail bending and placement of unit masonry reinforcing bars. Comply with ACI 315, “Details and Detailing of Concrete Reinforcement.”[<>]
   4. Fabricated Flashing: Detail corner units, end-dam units, and other special applications.
C. Samples for Initial Selection:
   1. Colored mortar.
   2. Weep holes/vents.
D. Samples for Verification: Face brick, colored mortar, cast stone, pre-faced CMU’s and accessories will be verified in mock-up panel.
E. List of Materials Used in Constructing Mockups: 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.

F. Qualification Data: For testing agency.

G. Material Certificates: For each type and size of the following:
1. Masonry units.
   a. Include material test reports substantiating compliance with requirements.
   b. For brick, include size-variation data verifying that actual range of sizes falls within specified tolerances.
   c. For exposed brick, include test report for efflorescence according to ASTM C 67.
   d. For masonry units used in structural masonry, include data and calculations establishing average net-area compressive strength of units.
   e. For concrete masonry units, include data verifying compliance with ASTM C 33 for normal weight aggregates, and and ASTM C 331 for lightweight aggregates, and ASTM C 618 for fly ash.
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.
7. Anchors, ties, and metal accessories.

H. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.
1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C 109 for compressive strength, ASTM C 1506 for water retention, and ASTM C 91 for air content.
2. Include test reports, according to ASTM C 1019, for grout mixes required to comply with compressive strength requirement.

I. 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.

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

1.6 QUALITY ASSURANCE

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

B. The work of this section shall be bid and performed by a firm that employs full-time "CMP-Certified Masonry Professional" or "CME - Certified Masonry Executive" personnel, certified by "North Carolina Masonry Contractors Association" as described in the most current version of the NCMCA’s "Guide to Masonry Contractor Certification." (North
MOORE COUNTY COURTHOUSE AND RENOVATION
CARTHAGE, NORTH CAROLINA
Architect's Project No.: 582405

Carolina Masonry Contractors Association, PO Box 3463, Hickory, NC 28603-3463, (828) 324-1564, information@ncmca.com

1. The masonry subcontractor shall at all times when work is in progress, provide an individual from its own staff designated by the North Carolina Masonry Contractors Association Masonry Contractor Certification Program as a “CMP-Certified Masonry Professional” or “CME-Certified Mason Executive” (as described in the most current version of the NCMCA’s “Guide to Masonry Contractor Certification”) on-site to supervise work in progress. CMP/CME personnel shall be onsite at all times during masonry installation.

2. Contractor will furnish resume(s) of CMP/CME personnel that will supervise the project.

C. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.

D. Aggregate for Concrete Masonry Units: If bottom ash is used as aggregate in the CMU, the source for the bottom ash shall be a power station that has experience as a supplier of quality material as verified by independent certified laboratory testing and no defects in the marketplace.

E. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.

F. Masonry Standard: Comply with ACI 530.1/ASCE 6/TMS 602 unless modified by requirements in the Contract Documents.

G. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Build mockups for typical exterior wall in sizes approximately 16 feet long by 8 feet high by full thickness, including face and backup wythes and accessories. Provide all face brick. Include vertical sealant joint two feet from one edge of panel. Include full width base-of-wall flashing with weep holes 24 o.c. located 8 inches from bottom of panel. Include 24-inch square masonry opening with steel lintel, lintel flashing and end dams. Omit one veneer brick unit to expose end dam fabrication and installation. Include support framing to building structure sealant indicated in Division 7 Section “Joint Sealants.”

2. Demonstrate method to be utilized to keep cavity free of mortar droppings.

3. Clean one-half of exposed faces of mockups with masonry cleaner as indicated.

4. Protect accepted mockups from the elements with weather-resistant membrane.

5. Approval of mockups is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; and aesthetic qualities of workmanship.

   a. Approval of mockups is also for other material and construction qualities specifically approved by Architect in writing.

   b. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless such deviations are specifically approved by Architect in writing.

H. Integrated Exterior Mockups: Attend preinstallation conference and provide masonry work for integrated exterior mockup as indicated on Drawings and specified in Division 01 section “Quality Requirements.”

I. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section “Project Management and Coordination.”
1.7 DELIVERY, STORAGE, AND HANDLING
A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.
B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
D. In lieu of separate cementitious materials and aggregate, Contractor may deliver pre-blended dry mortar mix in moisture-resistant containers designed for use with dispensing silos.
   1. Store pre-blended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in a metal dispensing silo with weatherproof cover.
E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.8 PROJECT CONDITIONS
A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day’s work. Cover partially completed masonry when construction is not in progress. Cover tops of foundation walls containing insulation to protect from exposure to sun. Protect tops of foundation walls from construction traffic damage.
   1. Extend cover a minimum of 24 inches down both sides of walls and hold cover securely in place.
   2. Where one wythe of multi-wythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches down face next to unconstructed wythe and hold cover in place.
   3. Waterproofing sheet covering may be omitted at solid (fully grouted) CMU walls. (Walls with exposed open cells and cavity walls must be covered.)
B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least three days after building masonry walls or columns.
C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
   1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
   2. Protect sills, ledges, and projections from mortar droppings.
   3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
   4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.
D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.
   1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and higher and will remain so until masonry has dried, but not less than seven days after completing cleaning.

1.9 UNIT COST ALLOWANCE

A. Furnish “field” utility size face brick under indicated unit cost allowance specified in Division 1 Section “Allowances.” Bidders and material suppliers are responsible for determining cost to produce special shape (“lip brick”) face brick units.

1. Face Brick Types 1, and 2: Five Hundred Dollars ($500) per thousand.

B. Contract Sum will be adjusted to reflect cost of brick selected in accordance with General Conditions. Contractor shall submit material receipts to verify cost and quantity used, and shall initiate Change Order process. The Contractor is reminded that unit cost allowance includes delivery to the site and all required taxes, less applicable trade discounts in accordance with the General Conditions.

PART 2 - PRODUCTS

2.1 MASONRY UNITS, GENERAL

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

B. Fire-Resistance Ratings: Where indicated, provide units that comply with requirements for fire-resistance ratings indicated as determined by testing according to ASTM E 119, by equivalent masonry thickness, or by other means, as acceptable to authorities having jurisdiction.

2.2 CONCRETE MASONRY UNITS

A. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.

1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.

2. Provide bullnose units for exposed outside corners unless otherwise indicated.

3. Provide square edge outside corners for all concealed conditions.

4. Provide solid bullnose cap units at top of exposed free-standing walls as indicated on Drawings.

B. CMUs: ASTM C 90.

1. Density Classification: Lightweight, unless otherwise indicated.

2. Aggregates:

a. Lightweight Aggregates: Lightweight aggregate used shall strictly comply with ASTM C 331, ASTM C 151, and ASTM C 641. Drying shrinkage of aggregate shall not exceed 0.10 percent (%) at 100 days.

b. Normal Weight Aggregates: Normal weight aggregate used shall strictly comply with ASTM C 33.

c. Waste concrete, scoria, and aglite shall not be permitted.


a. Width: Manufactured to dimensions 3/8 inch less than nominal dimensions.


C. Decorative CMUs: ASTM C 90.

1. Density Classification: Normal weight.

2. Size (Width): Manufactured to dimensions specified in “CMUs” Paragraph.
3. Pattern and Texture:
4. Colors: As selected by Architect from manufacturer's full range.
5. Special Aggregate: Provide units made with aggregate matching aggregate in Architect’s sample.
6. Acrylic Field Coat: For ground-face units provide clear acrylic topcoat of minimum 20 percent solids content equal to “Trendcoat” or “Trendcoat WB.”

2.3 CONCRETE AND MASONRY LINTELS
A. General: Provide one of the following:
B. Concrete Lintels: Precast or formed-in-place concrete lintels complying with requirements in Division 03 Section “Cast-in-Place Concrete” and with reinforcing bars indicated. Precast U-lintels fabricated in accordance with performance standards of PCI MNL-116 with 3500 psi concrete for standard lintels and 6000 psi concrete for prestressed lintels as manufactured by Cast-Crete are acceptable in lieu of rectangular section lintels.
C. Masonry Lintels: Prefabricated or Built-in-place masonry lintels made from bond beam CMUs with reinforcing bars placed as indicated and filled with coarse grout. Cure precast lintels before handling and installing. Temporarily support built-in-place lintels until cured.

2.4 BRICK
A. General: Provide shapes indicated and as follows, with exposed surfaces matching finish and color of exposed faces of adjacent units:
   1. For ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces, provide units without cores or frogs and with exposed surfaces finished.
   2. Provide special shapes for applications where stretcher units cannot accommodate special conditions, including those at corners, movement joints, bond beams, sashes, and lintels.
   3. Provide special shapes for applications requiring brick of size, form, color, and texture on exposed surfaces that cannot be produced by sawing.
   4. Provide special shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view.
B. Face Brick: Facing brick complying with ASTM C 216.
   1. Grade: SW.
   2. Type: FBS or FBX.
   3. Efflorescence: Provide brick that has been tested according to ASTM C 67 and is rated “not effloresced.”
   4. Size (Actual Dimensions): 3-5/8 inches (92 mm) wide by 2-1/4 inches (57 mm) high by 7-5/8 inches (194 mm) long.
   5. Application: Use where brick is exposed unless otherwise indicated.
   6. Color and Texture:
      b. Brick Color 2: Medium Gray, Velour (as indicated for Alternate No. 2).
C. Building (Common) Brick: ASTM C 62, Grade MW or SW.
   1. Size: Match size of face brick.
   2. Application: Use where brick is indicated for concealed locations. Face brick may be substituted for building brick.
2.5 CAST STONE MASONRY UNITS (CSMU)
A. General: Cast stone masonry veneer units duplicating the appearance of modular stone masonry.
B. Sizes and Shapes:
C. Custom Shapes and Sizes: As indicated. Provide factory-fabricated shapes.
   1. Bullnose running trim unit, 3-5/8" high by 7-5/8" deep by 23-5/8" long in smooth texture, for water-table applications indicated. Slope ledge surface not less than 1/8 inch per foot to drain away from building. Provide special shape outside corner units unless indicated otherwise.
D. Products and Textures:

2.6 MORTAR AND GROUT MATERIALS
A. Masonry Cement: ASTM C 91.
B. Colored Cement Product: Packaged blend made from masonry cement and mortar pigments, all complying with specified requirements, and containing no other ingredients.
   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. Argos USA; Magnolia Masonry Cement.
      b. Holcim (US) Inc; Rainbow Mortamix Custom Color Masonry Cement.
      c. Lehigh Hanson; flamingo Masonry Cement.
      d. Roanoke Cement; a division of Titan America; Colored Masonry Cement.
      e. York Building Products, a Stewart Company; Workrite Colored Masonry Cement.
   2. Formulate blend as required to match Architect’s sample, including white or colored aggregates.
   3. Pigments shall not exceed 10 percent of portland cement by weight.
   4. Pigments shall not exceed 5 percent of masonry cement by weight.
C. Aggregate for Mortar: ASTM C 144.
   1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
   2. For joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.
   3. White-Mortar Aggregates: Natural white sand or crushed white stone.
   4. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.
E. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C 494, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.
F. Water-Repellent Admixture: Liquid water-repellent mortar admixture intended for use with decorative CMUs containing integral water repellent by same manufacturer.
   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. ACM Chemistries; RainBloc for Mortar.
      b. BASF Aktiengesellschaft; Rheopel Mortar Admixture.
      c. Grace Construction Products; Dry-Block Mortar Admixture.
G. Water: Potable.
2.7 REINFORCEMENT

A. Uncoated Steel Reinforcing Bars: ASTM A 615 or ASTM A 996, Grade 60 (Grade 420).

B. Masonry Joint Reinforcement, General: ASTM A 951/A 951M.
   1. Interior Walls: Mill-galvanized, carbon steel.
   2. Exterior Walls: Hot-dip galvanized, carbon steel.
   5. Wire Size for Veneer Ties: 0.148-inch diameter.
   6. Spacing of Cross Rods, Tabs, and Cross Ties: Not more than 16 inches o.c.
   7. Provide in lengths of not less than 10 feet, with prefabricated corner and tee units.

C. Masonry Joint Reinforcement for Single-Wythe Masonry: Ladder type with single pair side rods.

D. Masonry Joint Reinforcement for Multi-wythe Masonry:
   1. Composite Walls: Ladder type with 1 side rod at each face shell of hollow masonry units more than 4 inches wide, plus 1 side rod at each wythe of masonry 4 inches wide or less.
   2. Cavity Walls: Adjustable (two-piece) type, either ladder or truss design, with one side rod at each face shell of backing wythe and with separate adjustable ties with pintle-and-eye connections having a maximum adjustment of 1-1/4 inches. Size ties to extend at least halfway through facing wythe but with at least 5/8-inch cover on outside face.
   3. Cavity Wall Alternate: In lieu of joint reinforcement with integral adjustable veneer anchors, Contractor may provide ladder joint reinforcement and individual screw-attached adjustable masonry-veneer anchors. (Refer to “Ties and Anchors” article of this section.)
   4. Truss-type reinforcement consisting of four (4) side-rods welded to a continuous diagonally formed cross rod designed to bed rods at face shells of CMU, to suit CMU thicknesses and wall thickness. Use only for subgrade and composite walls; not for cavity wall construction.

E. Masonry Joint Reinforcement for Veneers Anchored with Seismic Masonry-Veneer Anchors: Single 0.187-inch-diameter, hot-dip galvanized, carbon-steel continuous wire.

2.8 TIES AND ANCHORS

A. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated.
   2. Steel Sheet, Galvanized after Fabrication: ASTM A 1008, Commercial Steel, with ASTM A 153, Class B coating.

B. Wire Ties, General: Unless otherwise indicated, size wire ties to extend at least halfway through veneer but with at least 5/8-inch cover on outside face. Outer ends of wires are bent 90 degrees and extend 2 inches parallel to face of veneer.

C. Individual Wire Ties: Rectangular units with closed ends and not less than 4 inches wide.
   1. Z-shaped ties with ends bent 90 degrees to provide hooks not less than 2 inches long may be used for masonry constructed from solid units.
   2. Where wythes do not align, use adjustable ties with pintle-and-eye connections having a maximum adjustment of 1-1/4 inches.

D. Adjustable Anchors for Connecting to Structural Steel Framing: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.
   1. Anchor Section for Welding to Steel Frame: Crimped 1/4-inch-diameter, hot-dip galvanized steel wire.
   2. Tie Section: Triangular-shaped wire tie, sized to extend within 1 inch of masonry face, made from 0.187-inch-diameter, hot-dip galvanized steel wire.

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.

F. Adjustable Masonry-Veneer Anchors:
   1. General: Provide anchors that allow vertical adjustment but resist tension and compression forces perpendicular to plane of wall, for attachment over sheathing to metal studs, and as follows:
      a. Structural Performance Characteristics: Capable of withstanding a 100-lbf load in both tension and compression without deforming or developing play in excess of 0.05 inch.
      b. Size: Size anchor section and ties to accommodate indicated insulation thickness without interference with adjustability.
   2. Screw-Attached, Masonry-Veneer Anchors: Units consisting of a wire tie and a metal anchor section designed to be installed prior to cavity insulation or with no cavity insulation as indicated.
      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) Heckmann Building Products Inc.; 213 + 282.
         2) Hohmann & Barnard, Inc.; HB-200 series or BL-407 System.
         3) Wire-Bond; RJ-711 or 2407 System.
         4) Construction Tie Products; CTP-16.
      b. Anchor Section, Bent Plate Type: Rib-stiffened, sheet metal plate with screw hole(s) on vertical leg for attachment to backup; with projecting leg having slotted hole(s) for inserting companion triangular wire tie and allowing for vertical adjustment. Size projecting tabs to suit indicated insulation thickness, where insulation is shown.
      c. Fabricate sheet metal anchor sections and other sheet metal parts from engineered thickness steel sheet, galvanized after fabrication.
      d. Wire Ties: Triangular-, rectangular-, or T-shaped wire ties fabricated from 0.187-inch-diameter, hot-dip galvanized steel wire.
   3. Seismic Masonry-Veneer Anchor Clips: Clips or ties designed to engage a continuous wire embedded in the veneer mortar joint. Provide units designed specifically to work with respective veneer anchors.
      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) Hohmann & Barnard, Inc.; DA 213S.
         2) Hohmann & Barnard, Inc.; Seismicclip for wire ties.
         3) Wire-Bond; Wire-Bond Clip.
         4) Construction Tie Products; CTP WT-Tie.
4. Polymer-Coated, Steel Drill Screws for Steel Studs: ASTM C 954 except manufactured with hex washer head and neoprene or EPDM washer, No. 10 diameter by length required to penetrate steel stud flange with not less than three exposed threads, and with organic polymer coating with salt-spray resistance to red rust of more than 800 hours per ASTM B 117.
   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) ITW Buildex; Teks Maxiseal with Climaseal finish.
      2) Textron Inc.; Elco Drill-Flex with Stalgard finish.

5. Stainless-Steel Drill Screws for Steel Studs: Proprietary fastener consisting of carbon-steel drill point and 300 Series stainless-steel shank, complying with ASTM C 954 except manufactured with hex washer head and neoprene or EPDM washer, No. 10 diameter by length required to penetrate steel stud flange with not less than three exposed threads.
   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) Dur-O-Wal, Division of Hohmann & Barnard, Inc.; Stainless Steel SX Fastener.
      2) ITW Buildex; Scots long life Teks.

2.9 MISCELLANEOUS ANCHORS
A. Unit Type Inserts in Concrete: Cast-iron or malleable-iron wedge-type inserts.
B. Dovetail Slots in Concrete: Furnish dovetail slots with filler strips, of slot size indicated, fabricated from 0.034-inch, galvanized steel sheet.
C. Anchor Bolts: 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, Class C; of dimensions indicated.
D. Postinstalled Anchors: Torque-controlled expansion anchors.
   1. Load Capacity: 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 E 488, conducted by a qualified independent testing agency.
   2. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5 unless otherwise indicated.

2.10 EMBEDDED FLASHING MATERIALS
A. Metal Flashing: Provide metal flashing complying with Division 07 Section “Flashing, Sheet Metal and Roofing Accessories” and as follows:
   1. Stainless Steel: ASTM A 240, Type 304 minimum 0.016 inch thick.
   2. Copper: ASTM B 370, Temper H00, cold-rolled copper sheet, 16-oz./sq. ft. weight or 0.0216 inch thick or ASTM B 370, Temper H01, high-yield copper sheet, 12-oz./sq. ft. weight or 0.0162 inch thick.
   3. Fabricate continuous flashings in sections 96 inches long minimum, but not exceeding 12 feet. Provide splice plates at joints of formed, smooth metal flashing.
   4. Fabricate through-wall flashing with snap-lock receiver on exterior face where indicated to receive counterflashing.
5. Fabricate through-wall flashing with drip edge at exterior face of wall. Fabricate by extending flashing 1/4 inch out from wall, with outer edge bent down 30 degrees and hemmed. Fabricate separate sheet copper drip for use with flexible flashing, extended at least 3 inches into wall, also with outer edge bent down 30 degrees and hemmed.

6. Ribbed Metal Flashing (under Mortar-Set Stone or APC Copings): Fabricate metal flashing embedded in masonry from stainless steel with sawtooth ribs at 3-inch (76-mm) intervals along length of flashing to provide an integral mortar bond. Flashing pieces shall interlock without need for solder except in corners and special conditions. Provide manufacturer’s welded corners and end dams where recommended by manufacturer.
   a. Provide sawtooth flashing for building wall parapet copings. Flashing not required for free-standing site wall applications, which are not part of the building envelope.
   b. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
      1) Cheney Flashing Company; Cheney 3-Way Flashing (Sawtooth).
      3) Hohmann & Barnard, Inc.; “MTL-STF” Metal Sawtooth Flashing

B. Flexible Flashing: Use one of the following unless otherwise indicated:
   1. Copper-Laminated Flashing: 5-oz./sq. ft. copper sheet bonded between 2 layers of glass-fiber cloth. Provide non-asphalt lamination product. Use only where flashing is fully concealed in masonry and in conjunction with metal drip edge.
      a. Use polyether based moisture-curing sealer products recommended by flashing manufacturer. Traditional mastic is not acceptable.
      b. Accessories: Provide preformed corners, end dams, other special shapes, and seaming materials produced by flashing manufacturer.
         1) Termination Bars: Manufacturer’s recommended one inch wide termination bars, fabricated of 0.125-inch PVC or 0.075-inch stainless steel.
      c. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
         1) Advanced Building Products Inc.; “Copper Sealite 2000.”
         2) Hohmann & Barnard, Inc.; “Copper-Fabric NA.”
         3) STS Coatings; “Wall Guardian Copper TWF.”
         4) York Manufacturing, Inc; “Multi-Flash 500.”

C. Application: Unless otherwise indicated, use the following:
   1. Where flashing is indicated to receive counterflashing, use metal flashing.
   2. Where flashing is indicated to be turned down at or beyond the wall face, use metal flashing.
   3. Where flashing is partly exposed and is indicated to terminate at the wall face, use metal flashing with a drip edge or flexible flashing with a metal sealant stop.
   4. Where flashing is fully concealed, use flexible flashing.

D. Solder and Sealants for Sheet Metal Flashings: As specified in Division 07 Section “Flashing, Sheet Metal and Roofing Accessories.”

E. Adhesives, Primers, and Seam Tapes for Flashings: Provide polyether-based, 100% solids, moisture-curing elastomeric products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates, and that are compatible with asphalt-free
flashing materials and air barrier materials. Traditional mastic is not acceptable.

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; “MasterSeal NP 150.”
   b. STS Coatings; “GreatSeal LT-100 Liquid Tape.”
   c. York Manufacturing; “UniverSeal US-100 Liquid Tape.”

2.11 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.

1. Size for Veneer Masonry: 3-inch wide by 3/8-inch thickness at nominal 4-inch masonry veneer unless indicated otherwise.

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. Provide nominal 2.5-inch “standard” and “tee” configurations to suit application unless indicated otherwise.

C. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).

D. Weep/Vent Products: Use one of the following unless otherwise indicated:

1. Cellular Plastic Weep/Vent: One-piece, flexible extrusion made from UV-resistant polypropylene copolymer, full height and width of head joint and depth 1/8 inch less than depth of outer wythe, in color selected from manufacturer’s standard.
   a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
      1) Advanced Building Products Inc.; Mortar Maze weep vent.
      2) Blok-Lok Limited; Cell-Vent.
      3) Dur-O-Wal Division of Hohmann & Barnard, Inc.; Cell Vents.
      4) Heckmann Building Products Inc.; No. 85 Cell Vent.
      5) Hohmann & Barnard, Inc.; Quadro-Vent.
      6) Wire-Bond; Cell Vent.

2. Bed-Joint Weep System: Corrugated plastic drainage system incorporating continuous drainage strip within cavity portion of wall with integral weep hole extensions at 9-1/2 inches on center located above flashing in the bed joint of the veneer masonry. Provide Masonry Technology Incorporated “Cavity Weep” CV 5010, Heckmann Building Products “Core/Cavity Vent Weep System” #367, or alternate comparable performance bed-joint drainage system acceptable to Architect. Provide bed-joint weeps for masonry units over 32 inches long and in applications indicated.

E. Cavity Drainage Material (Mortar Dropping Collection Device): Free-draining mesh, made from polymer strands that will not degrade within the wall cavity.

1. Provide a configuration of strips, 0.4-inch thickness for use with cavity-wall insulation and 10 inches tall, with dovetail shaped notches not less than 6 inches deep designed to prevent mesh from being clogged with mortar droppings.
   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) Advanced Building Products, Inc.; "Mortar Break DT."
2) Heckmann Building Products; "WallDefender."
3) Hohmann & Barnard, Inc.; "Mortar Trap."
4) Mortar Net Solutions; “MortarNet.”
5) Wire-Bond; "Cavity Net DT (3611D)."

2. At cavity walls with 2-3/4-inch cavity, provide companion drainage product by one of the manufacturers above; nominal 1/2-inch thickness by 20-inches wide, to be field inserted into cavity in a “U” configuration. Basis-of-Design is “Mortar Catch 352” by Advanced Building Products, Inc.

F. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells and hold reinforcing bars in center of cells. Units are formed from 0.148-inch steel wire, hot-dip galvanized after fabrication. Provide units designed for number of bars indicated.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
   b. Hohmann & Barnard, Inc.; #RB or #RB-Twin Rebar Positioner.
   c. Wire-Bond; O-Ring or Double O-Ring Rebar Positioner.

G. Protection Board: ASTM D 6506, semi-rigid sheets of fiberglass or mineral-reinforced-asphaltic core, pressure laminated between two asphalt-saturated fibrous liners and as follows:

1. Thickness: 1/8 inch, nominal.
2. Adhesive: Rubber-based solvent type recommended by waterproofing manufacturer for type of protection course.

2.12 COLD-APPLIED, EMULSIFIED-ASPHALT DAMPPROOFING

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. APOC, Inc; a division of Gardner Industries.
2. BASF Corporation; Construction Systems.
4. ChemMasters, Inc.
5. Euclid Chemical Company (The); an RPM company.

B. Fibered Brush and Spray Coats: ASTM D 1227, Type II, Class 1.
C. Brush and Spray Coats: ASTM D 1227, Type III, Class 1.
D. Miscellaneous Dampproofing Materials:

2. Emulsified-Asphalt Primer: ASTM D 1227, Type III, Class I, except diluted with water as recommended by manufacturer.
3. Asphalt-Coated Glass Fabric: ASTM D 1668, Type I.
4. Patching Compound: Epoxy or latex-modified repair mortar, or manufacturer’s fibered mastic of type recommended by dampproofing manufacturer.
2.13 CAVITY-WALL INSULATION

A. Refer to Division 07 Sections “Sprayed Polyurethane Foam Air Barrier” and “Thermal Insulation” for cavity insulation.

2.14 MASONRY CLEANERS

A. Proprietary Acidic Cleaner: Manufacturer’s standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.

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

2.15 MORTAR AND GROUT MIXES

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated.

1. Do not use calcium chloride in mortar or grout.
2. Use masonry cement mortar unless otherwise indicated.
3. For exterior masonry, use masonry cement mortar.
4. For reinforced masonry, use masonry cement mortar.
5. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.

B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.

C. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification. Provide the following types of mortar for applications stated unless another type is indicated or needed to provide required compressive strength of masonry.

1. For masonry below grade or in contact with earth, use Type S.
2. For reinforced masonry, use Type S.
3. For non-security reinforced masonry and where indicated, use Type S.
4. For concrete masonry unit walls and partitions designated as “secure perimeter,” “interior security wall,” or partitions tagged on Drawings with “S” (secure), use Type M, 2500 psi mortar.
5. For mortar parge coats, use Type S.
6. For exterior, above-grade, load-bearing and non-load-bearing walls and parapet walls; for interior load-bearing walls; for interior non-load-bearing partitions; and for other applications where another type is not indicated, use Type N.
7. For interior non-load-bearing partitions, Type O may be used instead of Type N.
8. Comply with requirements for mortar for fire-resistance rated assemblies.

D. Pigmented Mortar: Use colored cement product.

1. Application: Use pigmented mortar for exposed mortar joints with the following units:
   a. Decorative CMUs.
b. Face brick.
c. Cast stone trim units.

E. Grout for Unit Masonry: Comply with ASTM C 476 and notes on Structural Drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
   1. 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.

3.2 INSTALLATION, GENERAL

A. Thickness: Build cavity and composite walls and other masonry construction to full thickness shown. Build single-wythe walls to actual widths of masonry units, using units of widths indicated.

B. Build chases and recesses to accommodate items specified in this and other Sections.

C. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to opening.

D. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

E. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.
   1. Mix units from several pallets or cubes as they are placed.

F. Matching Existing Masonry: Match coursing, bonding, color, and texture of existing masonry.

G. Wetting of Brick: Wet brick before laying if initial rate of absorption exceeds 30 g/30 sq. in. (30 g/194 sq. cm) per minute when tested per ASTM C 67. Allow units to absorb water so they are damp but not wet at time of laying.

H. Ground-Face Masonry Unit Work: Provide specified decorative ground finish CMU for applications indicated, with undamaged faces, edges and ends of exposed surfaces. Do not include in exposed work chipped or cracked units permitted within manufacturing tolerances of ASTM C90 for 5% of shipped units. Cull defective units from the pallets and include the cost for 5% wastage in the overhead of this subcontract. Place units plumb, parallel, in bond pattern indicated, and with properly tooled joints of uniform 3/8-inch thickness. Keep exposed surfaces clean and free from blemishes or defects.

I. Protection Board: Provide protection board at face of masonry that will be in contact with backfill soils. Trim protection board just below finish grade. Install prior to Division 32 backfill in accordance with manufacturer instructions.

J. When erecting masonry partitions, chases, and pilasters adjacent to steel columns, keep spaces between columns and masonry free of mortar droppings.

K. Sleeves: Install sleeves in walls to allow for the passage of piping and conduits.
3.3 TOLERANCES

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

B. Lines and Levels:
   1. For bed joints and top surfaces of bearing walls do not vary from level by more than 1/4 inch in 10 feet, or 1/2 inch maximum.
   2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
   3. For vertical lines and surfaces do not vary from plumb by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch maximum.
   4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
   5. For lines and surfaces do not vary from straight by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch maximum.
   6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet, or 1/2 inch maximum.
   7. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch except due to warpage of masonry units within tolerances specified for warpage of units.

C. Joints:
   1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch.
   2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.
   3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch or minus 1/4 inch.
   4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch. Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch (3 mm).
   5. For exposed bed joints and head joints of stacked bond, do not vary from a straight line by more than 1/16 inch from one masonry unit to the next.

3.4 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.
C. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 2 inches (50 mm). 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 brick if required before laying fresh masonry.

E. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

F. Fill space between steel frames and masonry solidly with mortar, unless otherwise indicated. Mix mortar (or grout) to a 4-inch maximum slump consistency and hand trowel into place in accordance with Steel Door Institute (SDI-100).

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. Fill cores in hollow CMUs with grout 24 inches under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.

I. Grout all hollow masonry and cavities solid below grade except where protected by waterproofing.

J. 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. At fire-rated partitions, treat joint between top of partition and underside of structure above to comply with Division 07 Section “Fire-Resistive Joint Systems.”
   3. Provide security terminations at security partitions as indicated on Drawings.

3.5 MORTAR BEDDING AND JOINTING

A. Lay hollow masonry 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. Provide polyethylene bond-breaker between clay masonry and other masonry types. Rake back joint for sealant.

D. 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. Allow cleaned surfaces to dry before setting.
   3. Wet joint surfaces thoroughly before applying mortar.
   4. Provide sealant joints at coping, window sills, and other horizontal surfaces, at expansion, control, and pressure-relieving joints, and at locations indicated.
a. Keep joints free of mortar and other rigid materials.
b. Build in compressible foam-plastic joint fillers where indicated.
c. Form joint of width indicated, but not less than 3/8 inch but not more than 1/2 inch.
d. Prime cast stone surfaces to receive sealant and install compressible backer rod in joints before applying sealant unless otherwise indicated.
e. Prepare and apply sealant of type and at locations indicated to comply with applicable requirements in Division 07 Section "Joint Sealants."

E. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.
F. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.

3.6 COMPOSITE MASONRY

A. Bond wythes of composite masonry together using one of the following methods unless indicated otherwise:
      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.

B. Bond wythes of composite masonry together using bonding system indicated.
C. Collar Joints: Solidly fill collar joints by parging face of first wythe that is laid and shoving units of other wythe into place.
D. 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.
E. 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.

3.7 BELOW-GRADE FOUNDATION WALLS

A. Bond wythes of below-finish-grade foundation masonry together using one of the following methods unless indicated otherwise:
   1. Masonry Joint Reinforcement: In horizontal mortar joints.
      a. Where bed joints of both wythes align, use continuous truss-type or ladder-type reinforcement consisting of four (4) side-rods welded to a continuous diagonally formed cross rod (truss) or individual cross rods (ladder). Install at 8 inches on center vertically maximum below finish grade.
      b. Where bed joints of wythes do not align, bond as indicated in drawings.
B. Tie wythes of below-finish-grade foundation masonry to concrete foundations with rigid anchors at no more than 8 inches on center vertically maximum.
C. Where insulation between or behind wythes is indicated, coordinate work with insulation installer.
D. Collar Joints: Solidly fill collar joints, and joints between wythes and rigid insulation, with grout.
E. Intersecting and Abutting Walls: Provide continuity with masonry joint reinforcement by using prefabricated T-shaped units.

3.8 CAVITY WALLS
A. Bond wythes of cavity walls together using one of the following methods:
1. Individual Metal Ties: Provide ties as shown installed in horizontal joints, but not less than one metal tie for 1.77 sq. ft. of wall area spaced not to exceed 36 inches (914 mm) 16 inches (406 mm) o.c. horizontally and 16 inches (406 mm) o.c. vertically. Stagger ties in alternate courses. Provide additional ties within 12 inches (305 mm) of openings and space not more than 36 inches (915 mm) apart around perimeter of openings. At intersecting and abutting walls, provide ties at no more than 24 inches o.c. vertically.
   a. Where bed joints of wythes do not align, use adjustable (two-piece) type ties.
   b. Where one wythe is of clay masonry and the other of concrete masonry, use adjustable (two-piece) type veneer ties to allow for differential movement regardless of whether bed joints align.

B. Keep cavities clean of mortar droppings and other materials during construction. Bevel beds away from cavity, to minimize mortar protrusions into cavity. Do not attempt to trowel or remove mortar fins protruding into cavity.

C. Parge cavity face of backup wythe in a single coat approximately 3/8 inch (10 mm) thick. Trowel face of parge coat smooth.

D. Cavity-wall insulation is included in Division 07 Sections "Sprayed Polyurethane Foam Air Barrier" and "Thermal Insulation." Coordinate masonry and insulation air barrier construction.

3.9 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. Provide continuity at wall intersections by using prefabricated T-shaped units.

D. Provide continuity at corners by using prefabricated L-shaped units.

3.10 ANCHORING MASONRY TO STRUCTURAL STEEL AND CONCRETE
A. Anchor masonry to structural steel and concrete where masonry abuts or faces structural steel or concrete to comply with the following:
   1. Provide anchors on each face of columns and beams where abutting or facing masonry.
   2. Provide an open space not less than 1 inch (25 mm) wide between masonry and structural steel or concrete unless otherwise indicated. Keep open space free of mortar and other rigid materials.
   3. Anchor masonry with anchors embedded in masonry joints and attached to structure.
4. Space anchors as indicated, but not more than 24 inches o.c. vertically and 36 inches o.c. horizontally.

3.11 ANCHORING MASONRY VENEERS

A. Anchor masonry veneers to wall framing and concrete and masonry backup with masonry-veneer anchors to comply with the following requirements:
1. Insert adjustable masonry veneer anchors in horizontal masonry reinforcing incorporating separate ties with eyes that engage adjustable veneer anchors. Space anchors as indicated, but not more than 16 inches o.c. vertically and horizontally with not less than 1 anchor for each 1.78 sq. ft. (0.13 sq. m) of wall area.
2. Fasten screw-attached anchors through sheathing to wall framing and to concrete and masonry backup with metal fasteners of type indicated. Use two fasteners unless anchor design only uses one fastener. Provide screw-attached or barrel-shank anchor type. Coordinate installation of veneer anchor components with spray-applied polyurethane foam insulation and air/vapor barrier as indicated.
3. Embed tie sections in veneer masonry joints.
4. Locate anchor sections to allow maximum vertical differential movement of ties up and down.
5. Space anchors as indicated, but not more than 16 inches o.c. vertically and 24 inches o.c. horizontally, with not less than 1 anchor for each 2.67 sq. ft. of wall area. Install additional anchors within 12 inches of openings and at intervals, not exceeding 8 inches, around perimeter.

3.12 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. Provide control and expansion joints as indicated on Drawings, and as follows:
   a. At changes in wall height.
   b. At changes in wall thickness.
   c. At change in support (eg: transition from foundation support to floor slab support).
   d. Adjacent to corners of walls within a distance equal to no more than half the maximum control joint spacing.
   e. Wall intersections.
   f. Do not place control joints closer than 16 inches to edge of wall openings (doors, windows, louvers, ducts).
   g. Distance between joints shall not exceed a length to height ratio of 1.5:1.
   h. Distance between joints shall not exceed 25 feet where no openings occur between joints.
   i. Distance between joints shall not exceed 20 feet where openings occur between joints.

B. Form control joints in concrete masonry as follows:
1. Install temporary foam-plastic filler in head joints and remove filler when unit masonry is complete for application of sealant.

C. Form expansion joints in brick as follows:
1. Build in compressible joint fillers where indicated.
2. Form open joint full depth of brick wythe and of width indicated, but not less than 1/2 inch for installation of sealant and backer rod specified in Division 07 Section “Joint Sealants.”
D. Provide horizontal, pressure-relieving joints by either leaving an air space or inserting a compressible filler of width required for installing sealant and backer rod specified in Division 07 Section “Joint Sealants,” of width required for expansion, but not less than 1/4 inch.

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

3.13 LINTELS
A. Install steel lintels where indicated.
B. Provide concrete or masonry lintels where indicated and in accordance with structural notes for opening sizes.
C. Provide minimum bearing of 8 inches at each jamb unless otherwise indicated.

3.14 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. Coordinate flashing with installation of insulation, air/vapor barriers, and transition membranes. Install cavity vents at shelf angles, ledges, and other obstructions to upward flow of air in cavities, and where indicated.
B. Install flashing as follows:

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. Repair damaged flashing as recommended by flashing manufacturer.
2. At multi-wythe masonry walls, including cavity walls, extend flashing through outer wythe, turned up a nominal 16 inches and mechanically fasten to back-up wythe with termination bar fastened at 16 inches on center and capped with sealant. Coordinate flashing installation and air barrier continuity and terminations at masonry openings.
3. At masonry-veneer walls, extend flexible flashing through veneer in conjunction with drip edge, across air space behind veneer, and up face of sheathing at least 16 inches. Secure flashing with termination bar fastened at 16 inches on center and capped with sealant. Coordinate with installation of cavity insulation.
4. At lintels, shelf angles, window sills, and other discontinuous flashing, extend flashing a minimum of 6 inches into masonry at each end and turn up not less than 2 inches to form end dams. Construct end dam terminations to be entirely embedded within veneer masonry head joints; do not extend end dam construction to be exposed at outside face of wall. Only the formed metal drip edge extends beyond exterior face of wall.
5. Interlock end joints of ribbed sheet metal flashing by overlapping ribs not less than 1-1/2 inches or as recommended by flashing manufacturer, and seal lap with elastomeric sealant complying with requirements in Division 07 Section “Joint Sealants” for application indicated.
6. Install metal drip edges beneath flexible flashing at exterior face of wall. Set metal edges in thin slurry of mortar or beads of compatible sealant as recommended by the flexible flashing manufacturer. Stop flexible flashing 1/2 inch back from outside face of wall and adhere flexible flashing to top of metal drip edge. In all cases provide exposed hemmed edge for formed sheet metal drip edge pieces. At exterior masonry corners, notch metal drip piece and form exterior corner to eliminate exposed cut metal edges.
7. Install metal flashing termination beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch back from outside face of wall and adhere flexible flashing to top of metal flashing termination.

8. Where counterflashing is indicated, in lieu of drip edge, install metal reglet furnished by counterflashing supplier in same manner as drip edges.

9. Use a compatible sealant or trowel-on mastic to hold flexible flashings in place during construction operations.

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 24 inches o.c. unless otherwise indicated.
   3. Install bed-joint weep system continuous over flashing in bed joints indicated and per manufacturer directions.

E. Place cavity drainage material in cavities to comply with configuration requirements for cavity drainage material in “Miscellaneous Masonry Accessories” Article.

3.15 REINFORCED UNIT MASONRY INSTALLATION

A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.
   1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
   2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other loads that may be placed on them during construction.

B. Placing Reinforcement: Comply with requirements in ACI 530.1/ASCE 6/TMS 602.

C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.
   1. Comply with requirements in ACI 530.1/ASCE 6/TMS 602 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
   2. Limit height of vertical grout pours to not more than 60 inches (1520 mm).

3.16 FIELD QUALITY CONTROL

A. Inspectors: Owner will engage qualified independent inspectors to perform inspections and prepare reports. Allow inspectors access to scaffolding and work areas, as needed to perform inspections.
   1. Place grout only after inspectors have verified compliance of grout spaces and grades, sizes, and locations of reinforcement.

B. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections indicated below and prepare test reports:
   1. Payment for these services will be made by Owner.
   2. Retest materials failing to comply with specified requirements at Contractor’s expense.

C. Testing Frequency: Tests and Evaluations for masonry units listed in this Article will be performed during construction for each 5000 sq. ft. of wall area or portion thereof. Other testing will be performed at frequencies required in paragraphs below.
D. Mortar properties will be tested per ASTM C 780. Perform testing for first three days of construction and whenever mortar mix is altered or mixing techniques differ from accepted material test reports.

E. Sample and test grout compressive strength per ASTM C 1019. Perform testing for first three days of construction and whenever grout mix is altered or mixing techniques differ from accepted material test reports.

F. Concrete Masonry Unit Tests: For primary bearing concrete masonry units utilized in project, units will be tested according to ASTM C 140. Primary bearing unit size(s) are 8-inch for project, and additional size units if so required by Architect.

3.17 BITUMINOUS DAMMPROOFING

A. Protection of Other Work: Mask or otherwise protect adjoining exposed surfaces from being stained, spotted, or coated with dampproofing. Prevent dampproofing materials from entering and clogging weep holes and drains.

B. Clean substrates of projections and substances detrimental to work; fill voids, seal joints, and apply bond breakers if any, as recommended by prime material manufacturer.

C. Apply patching compound for filling and patching tie holes, honeycombs, reveals, and other imperfections.

D. Comply with manufacturer’s written recommendations unless more stringent requirements are indicated or required by Project conditions to ensure satisfactory performance of dampproofing.

E. Apply primer where recommended by manufacturer.

F. Apply 1 brush or spray coat of dampproofing at not less than 1.25 gal./100 sq. ft.

3.18 REPAIRING, POINTING, AND CLEANING

A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.

B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.

C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:

1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect’s approval of sample cleaning before proceeding with cleaning of masonry.
3. Protect adjacent stone and non-masonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
6. Clean masonry with a proprietary acidic cleaner applied according to manufacturer’s written instructions.
7. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable to type of stain on exposed surfaces.
8. Clean stone trim to comply with stone supplier’s written instructions.

3.19 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 (100 mm) 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 31 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 Owner’s property.

END OF SECTION 042000
SECTION 047200 - CAST STONE MASONRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 ACTION SUBMITTALS
   A. Product Data: For each type of product.
      1. For cast-stone units, include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
   B. Shop Drawings: Show fabrication and installation details for cast-stone units. Include dimensions, details of reinforcement and anchorages if any, and indication of finished faces.
      1. Include building elevations showing layout of units and locations of joints and anchors.
   C. Delegated Design Submittal: For architectural cast stone 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. Show governing panel types, connections and anchors, types of reinforcement, including special reinforcement, and concrete cover on reinforcement. Indicate location, type, magnitude, and direction of loads imposed on the building structural frame from architectural cast stone.
   D. Samples for Initial Selection: For cast stone units and colored mortar.
   E. Samples for Verification: Cast stone units and mortar will be verified in mock-up panel.

1.3 INFORMATIONAL SUBMITTALS
   A. Qualification Data: For fabricator and testing agency.
      1. Include copies of material test reports for completed projects, indicating compliance of cast stone with ASTM C 1364.
   B. Material Test Reports: For each mix required to produce cast stone, based on testing according to ASTM C 1364, including test for resistance to freezing and thawing.
      1. Provide test reports based on testing within previous two years.

1.4 QUALITY ASSURANCE
   A. Fabricator Qualifications: A qualified fabricator that assumes responsibility for engineering architectural cast stone units to comply with performance requirements. This responsibility includes preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.
   B. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.
   C. Mockup: Provide cast stone work for mockup specified in Division 04 section “Unit Masonry.”
   D. Integrated Exterior Mockups: Attend preinstallation conference and provide cast stone masonry work for integrated exterior mockup as indicated on Drawings and specified in Division 1 Section “Quality Requirements.”
   E. Preinstallation Conference: Attend preinstallation conference and incorporate cast stone work as part of masonry preinstallation conference per Division 04 section “Unit Masonry.”
1.5 DELIVERY, STORAGE, AND HANDLING
   A. Coordinate delivery of cast stone with unit masonry work to avoid delaying the Work and to minimize the need for on-site storage.
   B. Pack, handle, and ship cast-stone units in suitable packs or pallets.
      1. Lift with wide-belt slings; do not use wire rope or ropes that might cause staining. Move cast-stone units if required, using dollies with wood supports.
      2. Store cast-stone units on wood skids or pallets with non-staining, waterproof covers, securely tied. Arrange to distribute weight evenly and to prevent damage to units. Ventilate under covers to prevent condensation.
   C. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
   D. Store mortar aggregates where grading and other required characteristics can be maintained, and contamination can be avoided.

1.6 PROJECT CONDITIONS
   A. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Comply with cold-weather construction requirements in TMS 602/ACI 530.1/ASCE 6.
      1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and above and will remain so until cast stone has dried, but no fewer than seven days after completing cleaning.

PART 2 - PRODUCTS

2.1 MANUFACTURERS
   A. Cast Stone Fabricators: Subject to compliance with requirements, provide cast-stone products by one of the following:
      1. Arban Precast, Ltd.
      2. Cast Stone Systems, Inc.
      5. Southern Castings, Inc.
      6. Stafford Castings, Inc.
   B. Source Limitations for Cast Stone: Obtain cast-stone units from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS
   A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 “Quality Requirements,” to design architectural cast stone units, including reinforcement and anchorage system capable of transferring structural loads to the structural element of the exterior wall assembly or to the building’s structural steel frame.
   B. Comply with the requirements of the Cast Stone Institute Technical Manual, except in the event of discrepancy with the Contract Documents, in which case the Contract Documents shall govern.
2.3 CAST-STONE MATERIALS

A. General: Comply with ASTM C 1364.

B. Portland Cement: ASTM C 150, Type I or Type III, containing not more than 0.60 percent total alkali when tested according to ASTM C 114. Provide natural color or white cement as required to produce cast-stone color indicated.

C. Coarse Aggregates: Granite, quartz, or limestone complying with ASTM C 33; gradation and colors as needed to produce required cast-stone textures and colors.

D. Fine Aggregates: Natural sand or crushed stone complying with ASTM C 33, gradation and colors as needed to produce required cast-stone textures and colors.

E. 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 alkaLi.

F. Admixtures: Use only admixtures specified or approved in writing by Architect.
   1. Do not use admixtures that contain more than 0.1 percent water-soluble chloride ions by mass of cementitious materials. Do not use admixtures containing calcium chloride.
   2. Use only admixtures that are certified by manufacturer to be compatible with cement and other admixtures used.
   3. Air-Entraining Admixture: ASTM C 260. Add to mixes for units exposed to the exterior at manufacturer's prescribed rate to result in an air content of 4 to 6 percent, except do not add to zero-slump concrete mixes.

G. Reinforcement: Deformed steel bars complying with ASTM A 615, Grade 60. Use galvanized or epoxy-coated reinforcement when covered with less than 1-1/2 inches of cast-stone material.

H. Embedded Anchors and Other Inserts: Fabricated from stainless steel complying with ASTM A 240, ASTM A 276, or ASTM A 666, Type 304.

2.4 CAST-STONE UNITS

A. Cast-Stone Units: Comply with ASTM C 1364.
   1. Units shall be manufactured using the wet-cast method.
   2. Units shall be resistant to freezing and thawing as determined by laboratory testing according to ASTM C 666, Procedure A, as modified by ASTM C 1364.

B. Fabricate units with sharp arris and accurately reproduced details, with indicated texture on all exposed surfaces unless otherwise indicated.
   1. Slope exposed horizontal surfaces 1:12 to drain unless otherwise indicated.
   2. Provide raised fillets at backs of sills and at ends indicated to be built into jambs.
   3. Provide drips on projecting elements unless otherwise indicated.

C. 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.

D. Cure Units as Follows:
1. Cure units in enclosed, moist curing room at 95 to 100 percent relative humidity and temperature of 100 deg F for 12 hours or 70 deg F for 16 hours.
2. Keep units damp and continue curing to comply with one of the following:
   a. No fewer than five days at mean daily temperature of 70 deg F or above.
   b. No fewer than six days at mean daily temperature of 60 deg F or above.
   c. No fewer than seven days at mean daily temperature of 50 deg F or above.
   d. No fewer than eight days at mean daily temperature of 45 deg F or above.

E. Acid etch units after curing to remove cement film from surfaces to be exposed to view.

F. Color: As selected by Architect from manufacturer’s full range.

2.5 MORTAR MATERIALS
A. Provide mortar materials that comply with Section 042000 "Unit Masonry."
B. Masonry Cement: ASTM C91.
C. Colored Cement Product: Packaged blend made from masonry cement and mortar pigments, all complying with specified requirements, and containing no other ingredients.
   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. Argos USA; Magnolia Masonry Cement.
      b. Holcim (US) Inc; Rainbow Mortamix Custom Color Masonry Cement.
      c. Lehigh Hanson; flamingo Colored Cement.
      d. Roanoke Cement; a division of Titan America; Colored Masonry Cement.
      e. York Building Products, a Stewart Company; Workrite Colored Masonry Cement.
   2. Formulate blend as required to produce color indicated or, if not indicated, as selected from manufacturer's standard colors.
   3. Pigments shall not exceed 10 percent of portland cement by weight.
   4. Pigments shall not exceed 5 percent of masonry cement by weight.

D. Aggregate for Mortar: ASTM C144.
   1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
   2. For joints less than 1/4-inch-thick, use aggregate graded with 100 percent passing the No. 16 sieve.
   3. White-Mortar Aggregates: Natural white sand or crushed white stone.
   4. Colored Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.

E. Water: Potable.

2.6 ACCESSORIES
A. Anchors: Type and size indicated, fabricated from Type 304 stainless steel complying with ASTM A240, ASTM A276, or ASTM A666.
B. Dowels: 1/2-inch-diameter round bars, fabricated from Type 304 stainless steel complying with ASTM A240, ASTM A276, or ASTM A666.
C. 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 cast-stone manufacturer and expressly approved by cleaner manufacturer for use on cast stone and adjacent masonry materials.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. Diedrich Technologies, Inc.
   b. EaCo Chem, Inc.
   c. Prosoco, Inc.

2.7 MORTAR MIXES

A. Comply with requirements in Division 04 Section "Unit Masonry" for mortar mixes.

B. Do not use admixtures including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.

1. Do not use calcium chloride in mortar or grout.
2. Use masonry cement mortar unless otherwise indicated.


1. For setting mortar, use Type S.
2. For pointing mortar, use Type N.

D. Pigmented Mortar: Use colored cement product or select and proportion pigments with other ingredients to produce color required. Do not add pigments to colored cement products.

1. Pigments shall not exceed 5 percent of mortar cement by weight.
2. Mix to match Architect's sample.
3. Application: Use pigmented mortar for exposed mortar joints.

2.8 SOURCE QUALITY CONTROL

A. Engage a qualified independent testing agency to sample and test cast-stone units according to ASTM C 1364.

1. Include one test for resistance to freezing and thawing.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates 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 SETTING CAST STONE IN MORTAR

A. Install cast-stone units to comply with requirements in Division 04 Section "Unit Masonry."

B. 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. Install anchors, supports, fasteners, and other attachments indicated or necessary to secure units in place.
2. Coordinate installation of cast stone with installation of flashing specified in other Sections.
C. Wet joint surfaces thoroughly before applying mortar or setting in mortar.
D. Set units in full bed of mortar with full head joints unless otherwise indicated.
   1. Set units with joints 1/4 to 3/8 inch wide unless otherwise indicated.
   2. Build anchors and ties into mortar joints as units are set.
   3. Fill dowel holes and anchor slots with mortar.
   4. Fill collar joints solid as units are set.
   5. Build concealed flashing into mortar joints as units are set.
   6. Keep head joints in copings and between other units with exposed horizontal surfaces open to receive sealant.
   7. Keep joints at shelf angles open to receive sealant.
E. Rake out joints for pointing with mortar to depths of not less than 3/4 inch. Rake joints to uniform depths with square bottoms and clean sides. Scrub faces of units to remove excess mortar as joints are raked.
F. Point mortar joints by placing and compacting mortar in layers not greater than 3/8 inch. Compact each layer thoroughly and allow it to become thumbprint hard before applying next layer.
G. Tool exposed joints slightly concave when thumbprint hard. Use a smooth plastic jointer larger than joint thickness.
H. Provide sealant joints at copings and other horizontal surfaces; at expansion, control, and pressure-relieving joints; and at locations indicated.
   1. Keep joints free of mortar and other rigid materials.
   2. Build in compressible foam-plastic joint fillers where indicated.
   3. Form joint of width indicated, but not less than 3/8 inch.
   4. Prime cast-stone surfaces to receive sealant and install compressible backer rod in joints before applying sealant unless otherwise indicated.
   5. Prepare and apply sealant of type and at locations indicated to comply with applicable requirements in Division 07 Section "Joint Sealants."

3.3 SETTING ANCHORED CAST STONE WITH SEALANT-FILLED JOINTS

A. Set cast stone as indicated on approved Shop 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. Keep cavities open where unfilled space is indicated between back of cast-stone units and backup wall; do not fill cavities with mortar or grout.
C. Fill anchor holes with sealant.
   1. Where dowel holes occur at pressure-relieving joints, provide compressible material at ends of dowels.
D. 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.
E. 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.

F. Prime cast-stone surfaces to receive sealant and install compressible backer rod in joints before applying sealant unless otherwise indicated.

G. Prepare and apply sealant of type and at locations indicated to comply with applicable requirements in Division 07 Section "Joint Sealants."

3.4 INSTALLATION TOLERANCES

A. Variation from Plumb: Do not exceed 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.

B. Variation from Level: Do not exceed 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.

C. Variation in Joint Width: Do not vary joint thickness more than 1/8 inch in 36 inches or one-fourth of nominal joint width, whichever is less.

D. Variation in Plane between Adjacent Surfaces (Lipping): Do not vary from flush alignment with adjacent units or adjacent surfaces indicated to be flush with units by more than 1/16 inch, except where variation is due to warpage of units within tolerances specified.

3.5 ADJUSTING AND CLEANING

A. Remove and replace stained and otherwise damaged units and units not matching approved Samples. Cast stone may be repaired if methods and results are approved by Architect.

B. Replace units in a manner that results in cast stone matching approved Samples, complying with other requirements, and showing no evidence of replacement.

C. In-Progress Cleaning: Clean cast stone as work progresses.
   1. Remove mortar fins and smears before tooling joints.
   2. Remove excess sealant immediately, including spills, smears, and spatter.

D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed cast stone as follows:
   1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
   2. Test cleaning methods on sample; leave one sample uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of cast stone.
   3. Protect adjacent surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
   4. Wet surfaces with water before applying cleaners; remove cleaners promptly by rinsing thoroughly with clear water.
   5. Clean cast stone with proprietary acidic cleaner applied according to manufacturer's written instructions.

END OF SECTION
SECTION 051200 - STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

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

1.2 SUMMARY
A. Section Includes:
   1. Structural steel.
   2. Grout.

B. Related Requirements:
   1. Section 051213 "Architecturally Exposed Structural Steel Framing" for additional requirements for architecturally exposed structural steel.
   2. Section 055000 "Metal Fabrications" miscellaneous steel fabrications and other steel items not defined as structural steel.

1.3 DEFINITIONS
A. Structural Steel: Elements of the structural frame indicated on Drawings and as described in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

B. Lateral-Force-Resisting System: Elements of structural-steel frame designated as "LFRS" or along grid lines designated as "LFRS" on Drawings, including columns, beams, and braces and their connections.

C. Demand Critical Welds: Those welds, the failure of which would result in significant degradation of the strength and stiffness of the Seismic-Load-Resisting System and which are indicated as "Demand Critical" or "Seismic Critical" on Drawings.

1.4 COORDINATION
A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

1.5 PREINSTALLATION MEETINGS
A. Preinstallation Conference: Conduct conference at the Project site.
   1. 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 inspecting the work.
c. Steel erector.

d. Architect/EOR.

1.6 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Show fabrication of structural-steel components.
   1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
   2. Include embedment Drawings.
   3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
   4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical, high-strength bolted connections.
   5. Identify members and connections of the Seismic-Load-Resisting System.
   6. Indicate locations and dimensions of protected zones.
   7. Identify demand critical welds.

C. Delegated-Design Submittal: For structural-steel connections indicated to comply with design loads, include analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.7 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer and fabricator.

B. Welding certificates.

C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

D. Mill test reports for structural steel, including chemical and physical properties.

E. Product Test Reports: For the following:
   1. Bolts, nuts, and washers including mechanical properties and chemical analysis.
   2. Direct-tension indicators.
   3. Tension-control, high-strength, bolt-nut-washer assemblies.
   4. Shop primers.
   5. Non-shrink grout.

F. Source quality-control reports.

G. Field quality-control and special inspection reports.

1.8 QUALITY ASSURANCE

A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category STD, or is accredited by the IAS Fabricator Inspection Program for Structural Steel (AC 172).

B. Installer Qualifications: A qualified installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector.
C. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
   1. Welders and welding operators performing work on bottom-flange, demand-critical welds shall pass the supplemental welder qualification testing, as required by AWS D1.8/D1.8M. FCAW-S and FCAW-G shall be considered separate processes for welding personnel qualification.

D. Comply with applicable provisions of the following specifications and documents:
   1. AISC 303.
   2. AISC 341 and AISC 341s1.
   3. AISC 360.
   4. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

1.9 DELIVERY, STORAGE, AND HANDLING

A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.
   1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.
   1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.
   2. Clean and relubricate bolts and nuts that become dry or rusty before use.
   3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F 1852 fasteners and for retesting fasteners after lubrication.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Connections: Provide details of simple shear connections required by the Contract Documents to be selected or completed by structural-steel fabricator, including comprehensive engineering analysis by a qualified professional engineer, to withstand loads indicated and comply with other information and restrictions indicated.
   1. Select and complete connections using schematic details indicated and AISC 360.
   2. Use Allowable Stress Design; data are given at service-load level.

B. Moment Connections: Type FR, fully restrained.

C. Construction: Combined system of braced frame and shear walls.

D. Recycled Content: Provide products with a minimum post-consumer recycled content of 75%.

2.2 STRUCTURAL-STEEL MATERIALS

A. W-Shapes: ASTM A 992/A 992M, Grade 50.

B. Channels, Angles-Shapes: ASTM A 36/A 36M.
C. Plate and Bar: ASTM A 36/A 36M.
D. Cold-Formed Hollow Structural Sections: ASTM A 500/A 500M, Grade C, structural tubing.
E. Steel Pipe: ASTM A 53/A 53M, Type E or Type S, Grade B.
   1. Weight Class: as indicated.
F. Welding Electrodes: Comply with AWS requirements.

2.3 BOLTS, CONNECTORS, AND ANCHORS

A. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade C, heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers; all with plain finish.
   1. Direct-Tension Indicators: ASTM F 959, Type 325, compressible-washer type with plain finish.
B. High-Strength Bolts, Nuts, and Washers: ASTM A 490, Type 1, heavy-hex steel structural bolts or tension-control, bolt-nut-washer assemblies with splined ends; ASTM A 563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers with plain finish.
   1. Direct-Tension Indicators: ASTM F 959, Type 490, compressible-washer type with plain finish.
C. Zinc-Coated High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade DH heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers.
   1. Finish: Hot-dip zinc coating.
   2. Direct-Tension Indicators: ASTM F 959, Type 325, compressible-washer type with mechanically deposited zinc coating finish.
D. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F 1852, Type 1, round head assemblies consisting of steel structural bolts with splined ends, heavy-hex carbon-steel nuts, and hardened carbon-steel washers.
   1. Finish: Plain.
E. Shear Connectors: ASTM A 108, Grades 1015 through 1020, headed-stud type, cold-finished carbon steel; AWS D1.1/D1.1M, Type B.
F. Unheaded Anchor Rods: ASTM F 1554, Grade 36
   4. Washers: ASTM F 436, Type 1, hardened carbon steel.
   5. Finish: Plain.
G. Headed Anchor Rods: ASTM F 1554, Grade 55, include supplement S1, straight.
   3. Washers: ASTM F 436, Type 1, hardened carbon steel.
H. Threaded Rods: ASTM A 36/A 36M.
   2. Washers: ASTM F 436, Type 1, hardened carbon steel.
   3. Finish: Plain.
I. Clevises: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1035.
J. Eye Bolts and Nuts: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1030.

2.4 PRIMER
A. Low-Emitting Materials: Paints and coatings shall comply with the testing and product requirements of the California Department of Public Health's (formerly, the California Department of Health Services') "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
B. Primer: Comply with Division 9.
C. Primer: Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer complying with MPI#79 and compatible with topcoat.
D. Galvanizing Repair Paint: ASTM A 780/A 780M.

2.5 GROUT
A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107/C 1107M, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

2.6 FABRICATION
   1. Camber structural-steel members where indicated.
   2. Fabricate beams with rolling camber up.
   3. Identify high-strength structural steel according to ASTM A 6/A 6M and maintain markings until structural steel has been erected.
   4. Mark and match-mark materials for field assembly.
   5. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.
B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.
   1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1/D1.1M.
C. Bolt Holes: Cut, drill or punch standard bolt holes perpendicular to metal surfaces.
D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.
E. Cleaning: Clean and prepare steel surfaces that are to remain unpainted according to SSPC-SP 2, "Hand Tool Cleaning."
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2.6  STRUCTURAL STEEL FRAMING

F. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.

G. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel members.
   1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
   2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
   3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

2.7  SHOP CONNECTIONS

A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
   1. Joint Type: as indicated.

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. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in AISC 303 for mill material.

2.8  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.
   4. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
   5. Galvanized surfaces.

B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:
   1. For Concealed Steel:
      a. SSPC-SP 2, "Hand Tool Cleaning."
      b. SSPC-SP 3, "Power Tool Cleaning."
   2. For Exposed Steel:
      a. SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."

C. Priming: Immediately after surface preparation, apply primer according to 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.
   1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
   2. Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.

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D. Painting: Prepare steel and apply a one-coat, nonasphaltic primer complying with SSPC-PS Guide 7.00, "Painting System Guide 7.00: Guide for Selecting One-Coat Shop Painting Systems," to provide a dry film thickness of not less than 1.5 mils (0.038 mm).

2.9 GALVANIZING

A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A 123/A 123M.
   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. Galvanize lintels and shelf angles attached to structural-steel frame and located in exterior walls.

2.10 SOURCE QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform shop tests and inspections.
   1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.

B. Bolted Connections: Inspect and test shop-bolted connections according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

C. Welded Connections: Visually inspect shop-welded connections according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
   1. Liquid Penetrant Inspection: ASTM E 165.
   2. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
   4. Radiographic Inspection: ASTM E 94.

D. 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 PREPARATION

A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.
   1. Do not remove temporary shoring supporting composite deck construction until cast-in-place concrete has attained its design compressive strength.
3.3 **ERECTION**

A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.

   1. Set plates for structural members on wedges, shims, or setting nuts as required.
   2. Weld plate washers to top of baseplate where indicated.
   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 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 shrinkage-resistant grouts.

C. Maintain erection tolerances of structural steel within AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

D. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that are in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
   1. Level and plumb individual members of structure.
   2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.

E. Splice members only where indicated.

F. Do not use thermal cutting during erection.

G. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.

3.4 **FIELD CONNECTIONS**

A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
   1. Joint Type: Snug tightened, unless noted otherwise.

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 AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
   2. Remove backing bars or runoff tabs, back gouge, and grind steel smooth.
3.5 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified 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.

C. Bolted Connections: Inspect and test bolted connections according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

D. Welded Connections: Visually inspect field welds according to AWS D1.1/D1.1M.
   1. In addition to visual inspection, test and inspect field welds according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
      a. Liquid Penetrant Inspection: ASTM E 165.
      b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
      c. Ultrasonic Inspection: ASTM E 164.
      d. Radiographic Inspection: ASTM E 94.

E. In addition to visual inspection, test and inspect field-welded shear connectors according to requirements in AWS D1.1/D1.1M for stud welding and as follows:
   1. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
   2. Conduct tests according to requirements in AWS D1.1/D1.1M on additional shear connectors if weld fracture occurs on shear connectors already tested.

3.6 REPAIRS AND PROTECTION

A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing and repair galvanizing to comply with ASTM A 780/A 780M.

B. Touchup Painting: Immediately after erection, clean exposed areas where primer is damaged or missing and paint with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
   1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.

C. Touchup Painting: Cleaning and touchup painting are specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

D. Touchup Priming: Cleaning and touchup priming are specified in Section 099600 "High-Performance Coatings."

END OF SECTION 051200
SECTION 051213 - ARCHITECTURALLY EXPOSED STRUCTURAL STEEL FRAMING

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

1.2 SUMMARY
   A. Section includes architecturally exposed structural-steel (AESS).
      1. Requirements in Division 5 Section "Structural Steel Framing" also apply to AESS.
   B. Related Requirements:
      1. Division 5 Section "Structural Steel Framing" for additional requirements applicable to AESS.
      2. Division 9 for surface preparation and priming requirements.

1.3 DEFINITIONS
   A. AESS: Structural steel designated as "architecturally exposed structural steel" or "AESS" in the Contract Documents.
   B. Category 1 AESS: AESS that is within 96 inches vertically and 36 inches horizontally of a walking surface and that is visible to a person standing on that walking surface or is designated as "Category 1 architecturally exposed structural steel" or "AESS-1" in the Contract Documents.
   C. Category 2 AESS: AESS that is within 20 feet vertically and horizontally of a walking surface and that is visible to a person standing on that walking surface or is designated as "Category 2 architecturally exposed structural steel" or "AESS-2" in the Contract Documents.
   D. Category 3 AESS: AESS that is not defined as Category 1 or Category 2 or that is designated as "Category 3 architecturally exposed structural steel" or "AESS-3" in the Contract Documents.

1.4 COORDINATION
   A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

1.5 PREINSTALLATION MEETINGS
   A. Preinstallation Conference: Conduct conference at Project site.

1.6 ACTION SUBMITTALS
   A. Shop Drawings: Show fabrication of AESS components. Shop Drawings for structural steel may be used for AESS provided items of AESS are specifically identified and requirements below are met for AESS.
      1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
      2. Include embedment Drawings.
      3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed
and supplemental fillet welds where backing bars are to remain. Indicate grinding, finish, and profile of welds.

4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical, high-strength bolted connections. Indicate orientation of bolt heads.

5. Indicate exposed surfaces and edges and surface preparation being used.

6. Indicate special tolerances and erection requirements.

B. Samples: Submit Samples of AESS to set quality standards for exposed welds for Category 1 AESS.

1. Two steel plates, 3/8 by 8 by 4 inches, with long edges joined by a groove weld and with weld ground smooth.

2. Steel plate, 3/8 by 8 by 8 inches, with one end of a short length of rectangular steel tube, 4 by 6 by 3/8 inches, welded to plate with a continuous fillet weld and with weld ground smooth and blended.

1.7 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer and fabricator.

B. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

1.8 QUALITY ASSURANCE

A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category STD, or is accredited by the IAS Fabricator Inspection Program for Structural Steel (AC 172).

B. Installer Qualifications: A qualified installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector.


1.9 DELIVERY, STORAGE, AND HANDLING

A. Use special care in handling to prevent twisting, warping, nicking, and other damage. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.

1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

1.10 FIELD CONDITIONS

A. Field Measurements: Where AESS is indicated to fit against other construction, verify actual dimensions by field measurements before fabrication.
PART 2 - PRODUCTS

2.1 BOLTS, CONNECTORS, AND ANCHORS
   A. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F 1852, Type 1, round-head assemblies, consisting of steel structural bolts with splined ends, heavy-hex carbon-steel nuts, and hardened carbon-steel washers.
      1. Finish: Plain.

2.2 FILLER

2.3 PRIMER
   A. Low-Emitting Materials: Paints and coatings shall comply with the testing and product requirements of the California Department of Public Health's (formerly, the California Department of Health Services') "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
   B. Primer: Comply with Division 9.
   C. Primer: SSPC-Paint 25, zinc oxide, alkyd, linseed oil primer.
   D. Primer: SSPC-Paint 25 BCS, zinc oxide, alkyd, linseed oil primer.
   E. Primer: SSPC-Paint 23, latex primer.
   F. Primer: Fabricator's standard lead- and chromate-free, non-asphaltic, rust-inhibiting primer complying with MPI#79 and compatible with topcoat.
   G. Etching Cleaner for Galvanized Metal: MPI#25.
   H. Galvanizing Repair Paint: ASTM A 780.

2.4 FABRICATION
   A. Shop fabricate and assemble AESS to the maximum extent possible. Locate field joints at concealed locations if possible. Detail assemblies to minimize handling and to expedite erection.
   B. In addition to special care used to handle and fabricate AESS, comply with the following:
      1. Fabricate with exposed surfaces smooth, square, and free of surface blemishes including pitting, rust, scale, and roughness.
      2. Grind sheared, punched, and flame-cut edges of Category 1 and Category 2 AESS to remove burrs and provide smooth surfaces and edges.
      3. Fabricate Category 1 AESS with exposed surfaces free of mill marks, including rolled trade names and stamped or raised identification.
      4. Fabricate Category 1 and Category 2 AESS with exposed surfaces free of seams to maximum extent possible.
      5. Remove blemishes by filling or grinding or by welding and grinding, before cleaning, treating, and shop priming.
      6. Fabricate with piece marks fully hidden in the completed structure or made with media that permits full removal after erection.
7. Fabricate Category 1 AESS to the tolerances specified in AISC 303 for steel that is designated AESS.
8. Fabricate Category 2 and Category 3 AESS to the tolerances specified in AISC 303 for steel that is not designated AESS.
9. Seal-weld open ends of hollow structural sections with 3/8-inch closure plates for Category 1 AESS.

Coping, Blocking, and Joint Gaps: Maintain uniform gaps of 1/8 inch with a tolerance of 1/32 inch for Category 1 AESS.

2.5 SHOP CONNECTIONS

A. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work, and comply with the following:
1. Assemble and weld built-up sections by methods that will maintain true alignment of axis without exceeding specified tolerances.
2. Use weld sizes, fabrication sequence, and equipment for AESS that limit distortions to allowable tolerances.
3. Provide continuous, sealed welds at angle to gusset-plate connections and similar locations where AESS is exposed to weather.
4. Provide continuous welds of uniform size and profile where Category 1 AESS is welded.
5. Grind butt and groove welds flush to adjacent surfaces within tolerance of plus 1/16 inch, minus zero inch for Category 1 and Category 2 AESS.
6. Make butt and groove welds flush to adjacent surfaces within tolerance of plus 1/16 inch, minus zero inch for Category 1 and Category 2 AESS. Do not grind unless required for clearances or for fitting other components, or unless directed to correct unacceptable work.
7. Remove backing bars or runoff tabs; back-gouge and grind steel smooth for Category 1 and Category 2 AESS.
8. At locations where welding on the far side of an exposed connection of Category 1 and Category 2 AESS occurs, grind distortions and marking of the steel to a smooth profile aligned with adjacent material.
9. Make fillet welds for Category 1 and Category 2 AESS oversize and grind to uniform profile with smooth face and transition.
10. Make fillet welds for Category 1 and Category 2 AESS of uniform size and profile with exposed face smooth and slightly concave. Do not grind unless directed to correct unacceptable work.

2.6 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 to be high-strength bolted with slip-critical connections.
4. Surfaces to receive sprayed fire-resistive materials.
5. Galvanized surfaces.

B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:
   1. SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."

C. Preparing Galvanized Steel for Shop Priming: After galvanizing, thoroughly clean steel of grease, dirt, oil, flux, and other foreign matter, and treat with etching cleaner.

D. Priming: Immediately after surface preparation, apply primer according to 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.
   1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
   2. Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify, with steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.
   1. Prepare a certified survey of bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.

B. Examine AESS for twists, kinks, warping, gouges, and other imperfections before erecting.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Provide temporary shores, guys, braces, and other supports during erection to keep AESS secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.
   1. If possible, locate welded tabs for attaching temporary bracing and safety cabling where they will be concealed from view in the completed Work.
   2. Do not remove temporary shoring supporting composite deck construction until cast-in-place concrete has attained its design compressive strength.

3.3 ERECTION

A. Set AESS accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.
   1. Erect Category 1 AESS to the tolerances specified in AISC 303 for steel that is designated AESS.
   2. Erect Category 2 and Category 3 AESS to the tolerances specified in AISC 303 for steel that is not designated AESS.

B. Do not use thermal cutting during erection.
3.4 FIELD CONNECTIONS

A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
   1. Joint Type: Snug tightened, unless noted otherwise.
   2. Orient bolt heads in same direction for each connection and to maximum extent possible in same direction for similar connections.

   1. Remove backing bars or runoff tabs; back-gouge and grind steel smooth for Category 1 and Category 2 AESS.
   2. Remove erection bolts in Category 1 and Category 2 AESS, fill holes, and grind smooth.
   3. Fill weld access holes in Category 1 and Category 2 AESS and grind smooth.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to inspect AESS as specified in Division 5 Section "Structural Steel Framing." The testing agency is not responsible for enforcing requirements relating to aesthetic effect.

B. Architect will observe AESS in place to determine acceptability relating to aesthetic effect.

3.6 REPAIRS AND PROTECTION

A. Remove welded tabs that were used for attaching temporary bracing and safety cabling and that are exposed to view in the completed Work. Grind steel smooth.

B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

C. 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.
   1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.

D. Touchup Painting: Priming, cleaning and touchup painting are specified in Division 9 Section "Painting."

END OF SECTION 051213
SECTION 052100 - STEEL JOIST FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   2. KCS-type K-series steel joists.
   4. LH- and DLH-series long-span steel joists.
   5. Joist accessories.

1.3 DEFINITIONS

A. SJI's "Specifications": Steel Joist Institute's "Standard Specifications, Load Tables and Weight Tables for Steel Joists and Joist Girders."

B. Special Joists: Steel joists or joist girders requiring modification by manufacturer to support non-uniform, unequal, or special loading conditions that invalidate load tables in SJI's "Specifications."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of joist, accessory, and product.

B. Shop Drawings:
   1. Include layout, designation, number, type, location, and spacing of joists.
   2. Include joining and anchorage details, bracing, bridging, and joist accessories; splice and connection locations and details; and attachments to other construction.
   3. Indicate locations and details of bearing plates to be embedded in other construction.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For manufacturer.

B. Welding certificates.
C. Manufacturer certificates.

D. Mill Certificates: For each type of bolt.

E. Comprehensive engineering analysis of special joists signed and sealed by the qualified professional engineer responsible for its preparation.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: A manufacturer certified by SJI to manufacture joists complying with applicable standard specifications and load tables in SJI's "Specifications."

1. Manufacturer's responsibilities include providing professional engineering services for designing special joists to comply with performance requirements.

B. Welding Qualifications: Qualify field-welding procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

C. Recycled Content: Provide products with a minimum post-consumer recycled content of 60%.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle joists as recommended in SJI's "Specifications."

B. Protect joists from corrosion, deformation, and other damage during delivery, storage, and handling.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide special joists and connections capable of withstanding design loads indicated.

1. Use ASD; data are given at service-load level.
2. Design special joists to withstand design loads with live-load deflections no greater than the following:

2.2 K-SERIES STEEL JOISTS


B. Steel Joist Substitutes: Manufacture according to "Standard Specifications for Open Web Steel Joists, K-Series" in SJI's "Specifications," with steel-angle or -channel members.

C. Provide holes in chord members for connecting and securing other construction to joists.

D. Top-Chord Extensions: Extend top chords of joists with SJI's Type S top-chord extensions where indicated, complying with SJI's "Specifications."

E. Extended Ends: Extend bearing ends of joists with SJI's Type R extended ends where indicated, complying with SJI's "Specifications."

F. Do not camber joists.

G. Equip bearing ends of joists with manufacturer's standard beveled ends or sloped shoes if joist slope exceeds 1/4 inch per 12 inches.

2.3 LONG-SPAN STEEL JOISTS

A. Manufacture steel joists according to "Standard Specifications for Longspan Steel Joists, LH-Series and Deep Longspan Steel Joists, DLH-Series" in SJI's "Specifications," with steel-angle top- and bottom-chord members; of joist type and end and top-chord arrangements as follows:

   2. End Arrangement: Underslung.
   3. Top-Chord Arrangement: as indicated.

B. Provide holes in chord members for connecting and securing other construction to joists.

C. Do not camber long-span joists.

D. Equip bearing ends of joists with manufacturer's standard beveled ends or sloped shoes if joist slope exceeds 1/4 inch per 12 inches.

2.4 PRIMERS

A. Low-Emitting Materials: Paints and coatings 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. Primer: SSPC-Paint 15, or manufacturer's standard shop primer complying with performance requirements in SSPC-Paint 15.

C. Primer: Provide shop primer that complies with Division 9.
2.5 JOIST ACCESSORIES

A. Bridging: Provide bridging anchors and number of rows of bridging of material, size, and type required by SJI's "Specifications" for type of joist, chord size, spacing, and span. Furnish additional erection bridging if required for stability.

B. Bridging: Schematically indicated. Detail and fabricate according to SJI's "Specifications." Furnish additional erection bridging if required for stability.

C. Steel bearing plates with integral anchorages are specified in Section 055000 "Metal Fabrications."

D. Welding Electrodes: Comply with AWS standards.

E. Furnish miscellaneous accessories including splice plates and bolts required by joist manufacturer to complete joist assembly.

2.6 CLEANING AND SHOP PAINTING

A. Clean and remove loose scale, heavy rust, and other foreign materials from fabricated joists and accessories by hand-tool cleaning, SSPC-SP 2 or power-tool cleaning, SSPC-SP 3.

B. Apply one coat of shop primer to joists and joist accessories to be primed to provide a continuous, dry paint film not less than 1 mil thick.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine supporting substrates, embedded bearing plates, and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance.

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

3.2 INSTALLATION

A. Do not install joists until supporting construction is in place and secured.

B. Install joists and accessories plumb, square, and true to line; securely fasten to supporting construction according to SJI's "Specifications," joist manufacturer's written recommendations, and requirements in this Section.

1. Before installation, splice joists delivered to Project site in more than one piece.
2. Space, adjust, and align joists accurately in location before permanently fastening.
3. Install temporary bracing and erection bridging, connections, and anchors to ensure that joists are stabilized during construction.

4. Delay rigidly connecting bottom-chord extensions to columns or supports until dead loads are applied.

C. Field weld joists to supporting steel bearing plates and framework. Coordinate welding sequence and procedure with placement of joists. Comply with AWS requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.

D. Bolt joists to supporting steel framework using carbon-steel bolts.


F. Install and connect bridging concurrently with joist erection, before construction loads are applied. Anchor ends of bridging lines at top and bottom chords if terminating at walls or beams.

3.3 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to inspect field welds and bolted connections and to perform field tests and inspections and prepare test and inspection reports.

B. Visually inspect field welds according to AWS D1.1/D1.1M.

1. In addition to visual inspection, test field welds according to AWS D1.1/D1.1M and the following procedures, as applicable:

C. Visually inspect bolted connections.

D. Correct deficiencies in Work that test and inspection reports have indicated are not in compliance with specified requirements.

E. Perform additional testing to determine compliance of corrected Work with specified requirements.

3.4 PROTECTION

A. Touchup Painting: After installation, promptly clean, prepare, and prime or reprime field connections, rust spots, and abraded surfaces of prime-painted joists and abutting structural steel and accessories.

1. Clean and prepare surfaces by hand-tool cleaning according to SSPC-SP 2, or power-tool cleaning according to SSPC-SP 3.
2. Apply a compatible primer of same type as primer used on adjacent surfaces.

B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that joists and accessories are without damage or deterioration at time of Substantial Completion.

END OF SECTION 052100
SECTION 053100 - STEEL DECKING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Roof deck.
   2. Composite floor deck.

B. Related Requirements:
   1. Section 033000 “Cast-in-Place Concrete” for normal-weight and lightweight structural concrete fill over steel deck.
   2. Section 051200 “Structural Steel Framing” for shop- and field-welded shear connectors.
   3. Section 055000 “Metal Fabrications” for framing deck openings with miscellaneous steel shapes.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of deck, accessory, and product indicated.

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.

1.4 INFORMATIONAL SUBMITTALS

A. Welding certificates.

B. Product Certificates: For each type of steel deck.

C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that each of the following complies with requirements:
   1. Power-actuated mechanical fasteners.
   2. Acoustical roof deck.

D. Evaluation Reports: For steel deck.
E. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.

B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.3, "Structural Welding Code - Sheet Steel."


D. Recycled Content: Provide products with a minimum post-consumer recycled content of 75%.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.

B. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.

1. Protect and ventilate acoustical cellular roof deck with factory-installed insulation to maintain insulation free of moisture.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."

B. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

C. Low-Emitting Materials: Paints and coatings 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."
2.2 ROOF DECK

A. Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 31, and with the following:

1. Galvanized-Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 33, G60 zinc coating.
2. Galvanized and Shop-Primed Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 33, G60 zinc coating; cleaned, pretreated, and primed with manufacturer's standard baked-on, rust-inhibitive primer.
3. Deck Profile: As indicated.
5. Profile Depth: As indicated.
6. Design Uncoated-Steel Thickness: As indicated.
7. Design Uncoated-Steel Thicknesses; Deck Unit/Bottom Plate: As indicated.
8. Span Condition: Triple span or more.
9. 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 Specifications and Commentary for Composite Steel Floor Deck,” in SDI Publication No. 31, with the minimum section properties indicated, and with the following:

1. Galvanized-Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 50, G60 zinc coating.
2. Galvanized and Shop-Primed Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 50, G60 Zinc coating; with unpainted top surface and cleaned and pretreated bottom surface primed with manufacturer’s standard baked-on, rust-inhibitive primer.
3. Profile Depth: As indicated.
4. Design Uncoated-Steel Thickness: As indicated.
5. Span Condition: Triple span or more.

2.4 ACCESSORIES

A. General: 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 50,000 psi, of same material and finish as deck; of profile indicated or required for application.

G. 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.

H. Recessed Sump Pans: Single-piece steel sheet, 0.0747 inch thick, of same material and finish as deck, with 3-inch wide flanges and recessed pans of 1-1/2-inch minimum depth. For drains, cut holes in the field.


J. Repair Paint: Manufacturer's standard rust-inhibitive primer of same color as primer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine supporting frame and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance.

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

3.2 INSTALLATION, GENERAL

A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 31, 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.

   1. Align cellular deck panels over full length of cell runs and align cells at ends of abutting panels.

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 according to deck manufacturer's written instructions.

3.3 ROOF-DECK INSTALLATION

A. Fasten roof-deck panels to steel supporting members as indicated.

B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports as indicated.

C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches, with end joints as follows:
   1. End Joints: Lapped 2 inches minimum.

D. Roof Sump Pans and Sump Plates: Install over openings provided in roof deck and weld flanges to top of deck. Space welds not more than 12 inches apart with at least one weld at each corner.

E. Miscellaneous Roof-Deck Accessories: Install ridge and valley plates, finish strips, end closures, and reinforcing channels according to deck manufacturer's written instructions. Weld 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 according to manufacturer's written instructions to ensure complete closure.

3.4 FLOOR-DECK INSTALLATION

A. Fasten floor-deck panels to steel supporting members as indicated.

B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports as indicated.

C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches, with end joints as follows:
   1. End Joints: Lapped 2 inches minimum.

D. Pour Stops and Girder Fillers: Weld steel sheet pour stops and girder fillers to supporting structure according to SDI recommendations unless otherwise indicated.
E. Floor-Deck Closures: Weld steel sheet column closures, cell closures, and Z-closures to deck, according to SDI recommendations, to provide tight-fitting closures at open ends of ribs and sides of decks, unless otherwise indicated.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

B. Field welds will be subject to inspection.

C. Testing agency will report inspection results promptly and in writing to Contractor and Architect.

D. Remove and replace work that does not comply with specified requirements.

E. Additional inspecting, at Contractor's expense, will be performed to determine compliance of corrected work with specified requirements.

3.6 PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

B. Repair Painting: Wire brush and clean rust spots, welds, and abraded areas on both surfaces of prime-painted deck immediately after installation, and apply repair paint.

1. Apply repair paint, of same color as adjacent shop-primed deck, to bottom surfaces of deck exposed to view.

2. Wire brushing, cleaning, and repair painting of bottom deck surfaces are included in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

C. Repair Painting: Wire brushing, cleaning, and repair painting of rust spots, welds, and abraded areas of both deck surfaces are included in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

D. Provide final protection and maintain conditions to ensure that steel deck is without damage or deterioration at time of Substantial Completion.

END OF SECTION 053100
SECTION 054000 - COLD-FORMED METAL FRAMING – STRUCTURAL (CFSF-S)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 SUMMARY
A. Section Includes:
   1. Exterior non-load-bearing wall framing.
   2. Interior non-load-bearing wall framing indicated as CFSF-S

1.3 PREINSTALLATION MEETINGS
A. Preinstallation Conference: Conduct conference at Project site.
   1. 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 inspecting the work.
      c. CFSF installer.
      d. Architect/EOR.

1.4 ACTION SUBMITTALS
A. Product Data: For each type of cold-formed steel framing product and accessory.
B. Shop Drawings:
   1. Include layout, spacings, sizes, thicknesses, and types of cold-formed steel framing;
      fabrication; and fastening and anchorage details, including mechanical fasteners.
   2. Indicate reinforcing channels, opening framing, supplemental framing, strapping, 
      bracing, bridging, splices, accessories, connection details, and attachment to adjoining
      work.
   3. Calculations prepared by an engineer licensed in the state of North Carolina.
C. Delegated-Design Submittal: For cold-formed steel framing.

1.5 INFORMATIONAL SUBMITTALS
A. Qualification Data: For testing agency.
B. Welding certificates.
C. Product Test Reports: For each listed product, for tests performed by manufacturer and 
   witnessed by a qualified testing agency.
   1. Steel sheet.
   2. Power-actuated anchors.
   3. Mechanical fasteners.
   4. Vertical deflection clips.
5. Horizontal drift deflection clips
6. Miscellaneous structural clips and accessories.

D. Evaluation Reports: For non-standard cold-formed steel framing, from ICC-ES.

1.6 QUALITY ASSURANCE
A. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.
B. Product Tests: Mill certificates or data from a qualified independent testing agency indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.
C. Welding Qualifications: Qualify procedures and personnel according to the following:
D. Comply with AISI’s “North American Specification for the Design of Cold-Formed Steel Structural Members” and its “Standard for Cold-Formed Steel Framing – General Provisions.”

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

PART 2 - PRODUCTS

2.1 MANUFACTURERS

1. AllSteel Products, Inc.
2. Clark Steel Framing.
3. Consolidated Fabricators Corp.; Building Products Division.
4. Craco Metals Manufacturing, LLC.
5. Custom Stud, Inc.
6. Formetal Co. Inc. (The).
7. MarinoWare; a division of Ware Industries.
8. SCAFCO Corporation.
10. Steel Construction Systems.
11. United Metal Products, Inc.

2.2 PERFORMANCE REQUIREMENTS
A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 “Quality Requirements,” to design cold-formed steel framing.
B. Structural Performance: Provide cold-formed steel framing capable of withstanding design loads within limits and under conditions indicated.
   1. Design Loads: As indicated.
   2. Deflection Limits: Design framing systems to withstand design loads without deflections greater than the following:
a. Exterior Non-Load-Bearing Framing: Horizontal deflection of 1/360 of the wall height. Maximum horizontal deflection of 1/600 of the wall height where supporting brick or limestone veneer or similar veneers that are prone to damage under small deflections.

b. Interior Non-Load Bearing Framing indicated as CFSF-S: Horizontal deflection of 1/360 under a horizontal load of 5 lbf/sq. ft.

3. Design framing systems to provide for movement of framing members located outside the insulated building envelope without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 120 deg F.

4. Design framing system to maintain clearances at openings, to allow for construction tolerances, and to accommodate live load deflection of primary building structure as follows:
   a. Upward and downward movement of 1 inch.

5. Design exterior non-load-bearing wall framing to accommodate horizontal deflection without regard for contribution of sheathing materials.

C. Cold-Formed Steel Framing Design Standards: Unless more stringent requirements are indicated, framing shall comply with AISI S100, AISI S200, and the following:
   2. Wall Studs: AISI S211.
   3. Headers: AISI S212.

D. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
   1. Indicate design designations from UL's “Fire Resistance Directory” or from the listings of another qualified testing agency.

E. Recycled Content: Provide products with a minimum post-consumer recycled content of 25%.

2.3 COLD-FORMED STEEL FRAMING, GENERAL

A. Steel Sheet: ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of grade and coating weight as follows:
   1. Grade: As required by structural performance.
   2. Coating: G60.

B. Steel Sheet for Vertical Deflection Clips: ASTM A 653/A 653M, structural steel, zinc coated, of grade and coating as follows:
   1. Grade: As required by structural performance.
   2. Coating: G90.

2.4 EXTERIOR NON-LOAD-BEARING WALL FRAMING

A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
   1. Minimum Base-Metal Thickness: 0.0428 inch.
3. Depth: 8 inches, unless noted otherwise.

B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:
   1. Minimum Base-Metal Thickness: 0.0428 inch.

C. Vertical Deflection Clips: Manufacturer's standard head clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.

D. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal loads and transfer them to the primary structure, and as follows:
   1. Minimum Base-Metal Thickness: 0.0677 inch.
   2. Flange Width: 1 inch (25 mm) plus the design gap for one-story structures.

E. Double Deflection Tracks: Manufacturer's double, deep-leg, U-shaped steel tracks, consisting of nested inner and outer tracks; unpunched, with unstiffened flanges.
   1. Outer Track: Of web depth to allow free vertical movement of inner track, with flanges designed to support horizontal loads and transfer them to the primary structure, and as follows:
      a. Minimum Base-Metal Thickness: 0.0677 inch.
      b. Flange Width: 1 inch plus the design gap for one-story structures.
   2. Inner Track: Of web depth indicated, and as follows:
      a. Minimum Base-Metal Thickness: 0.0677 inch.
      b. Flange Width: Dimension equal to sum of outer deflection track flange width plus 1 inch.

F. Drift Clips: Manufacturer's standard bypass or head clips, capable of isolating wall stud from upward and downward vertical displacement and lateral drift of primary structure through positive mechanical attachment to stud web and structure.

2.5 INTERIOR NON-LOAD-BEARING WALL FRAMING DESIGNATED AS CFSF-S

A. Steel Studs: Manufacturer’s standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows.
   1. Minimum Base-Metal Thickness: 0.0428 inch.
   3. Depth: 3-5/8 inches, unless noted otherwise.

B. Steel Track: Manufacturer’s standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:
   1. Minimum Base-Metal Thickness: 0.0428 inch.
   2. Flange width: 1-1/4 inches.

C. Vertical Deflection Clips: Manufacturer’s standard clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.
2.6 SOFFIT FRAMING

A. Exterior Soffit Frame: Manufacturer's standard C-shaped steel sections, of web depths indicated, with stiffened flanges, and as follows:
   1. Minimum Base-Metal Thickness: 0.0428.
   3. Depth: 3-5/8 inches, minimum.

2.7 FRAMING ACCESSORIES

A. Fabricate steel-framing accessories from steel sheet, ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of same grade and coating weight used for framing members.

B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:
   1. Supplementary framing.
   2. Bracing, bridging, and solid blocking.
   3. Web stiffeners.
   4. Anchor clips.
   5. End clips.
   6. Foundation clips.
   7. Gusset plates.
   9. Joist hangers and end closures.

2.8 ANCHORS, CLIPS, AND FASTENERS

A. Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123/A 123M.

B. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with allowable load capacities calculated according to ICC-ES AC70, greater than or equal to the design load, as determined by testing per ASTM E 1190 conducted by a qualified testing agency.

C. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping, steel drill screws.
   1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.

D. Welding Electrodes: Comply with AWS standards.

2.9 MISCELLANEOUS MATERIALS

A. Galvanizing Repair Paint: ASTM A 780.

B. Shims: Load bearing, high-density multi-monomer plastic, and non-leaching; or of cold-formed steel of same grade and coating as framing members supported by shims.

C. Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to match width of bottom track or rim track members.
2.10 FABRICATION

A. Fabricate cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.

1. Fabricate framing assemblies using jigs or templates.
2. Cut framing members by sawing or shearing; do not torch cut.
3. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, pneumatic pin fastening, or riveting as standard with fabricator. Wire tying of framing members is not permitted.
   a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
   b. Locate mechanical fasteners and install according to Shop Drawings, with screw penetrating joined members by no fewer than three exposed screw threads.
4. Fasten other materials to cold-formed steel framing by welding, bolting, pneumatic pin fastening, or screw fastening, according to Shop Drawings.

B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies to prevent damage or permanent distortion.

C. Fabrication Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:

1. Spacing: Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
2. Squareness: Fabricate each cold-formed steel framing assembly to a maximum out-of-square tolerance of 1/8 inch.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine supporting substrates and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

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

3.2 PREPARATION

A. Before sprayed fire-resistive materials are applied, attach continuous angles, supplementary framing, or tracks to structural members indicated to receive sprayed fire-resistive materials.

B. After applying sprayed fire-resistive materials, remove only as much of these materials as needed to complete installation of cold-formed framing without reducing thickness of fire-resistant materials below that are required to obtain fire-resistance rating indicated. Protect remaining fire-resistive materials from damage.

C. Install load bearing shims or grout between the underside of load-bearing wall bottom track and the top of foundation wall or slab at locations with a gap larger than 1/4 inch to ensure a uniform bearing surface on supporting concrete or masonry construction.
D. Install sealer gaskets at the underside of wall bottom track or rim track and at the top of foundation wall or slab at stud or joist locations.

3.3 INSTALLATION, GENERAL

A. Cold-formed steel framing may be shop or field fabricated for installation, or it may be field assembled.

B. Install cold-formed steel framing according to AISI S200 and to manufacturer's written instructions unless more stringent requirements are indicated.

C. Install shop- or field-fabricated, cold-formed framing and securely anchor to supporting structure.
   1. Screw, bolt, or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding 1/16 inch.

D. Install cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened.
   1. Cut framing members by sawing or shearing; do not torch cut.
   2. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted.
      a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
      b. Locate mechanical fasteners and install according to Shop Drawings, and complying with requirements for spacing, edge distances, and screw penetration.

E. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.

F. Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.

G. Do not bridge building expansion joints with cold-formed steel framing. Independently frame both sides of joints.

H. Install insulation, specified in Section 072100 “Thermal Insulation,” in built-up exterior framing members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.

I. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's approved or standard punched openings.

J. Erection Tolerances: Install cold-formed steel framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:
   1. Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
3.4 EXTERIOR NON-LOAD-BEARING WALL INSTALLATION

A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure as indicated.

B. Fasten both flanges of studs to top and bottom track unless otherwise indicated. Space studs as follows:
   1. Stud Spacing: 16 inches, unless noted otherwise.

C. Set studs plumb, except as needed for diagonal bracing or required for non-plumb walls or warped surfaces and similar requirements.

D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.
   1. Install single deep-leg deflection tracks and anchor to building structure.
   2. Install double deep-leg deflection tracks and anchor outer track to building structure.
   3. Connect vertical deflection clips to studs and anchor to building structure.
   4. Connect drift clips to cold-formed metal framing and anchor to building structure.

E. Install horizontal bridging in wall studs, spaced vertically in rows indicated on Shop Drawings but not more than 48 inches apart. Fasten at each stud intersection.
   1. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 18 inches of single deflection track. Install a combination of bridging and stud or stud-track solid blocking of width and thickness matching studs, secured to stud webs or flanges.
      a. Install solid blocking at centers indicated on Shop Drawings.
   2. Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
   3. Bridging: Proprietary bridging bars installed according to manufacturer’s written instructions.

F. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.5 INTERIOR NON-LOAD BEARING WALL INSTALLATION

A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure.

B. Fasten both flanges of studs to top and bottom track unless otherwise indicated. Space studs as follows:
   1. Stud Spacing: 16 inches, unless noted otherwise.

C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.

D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.
   1. Install single deep-leg deflection tracks and anchor to building structure.
   2. Install double deep-leg deflection tracks and anchor outer track to building structure.
   3. Connect vertical deflection clips to studs and anchor to building structure.
4. Connect drift clips to cold-formed steel metal framing and anchor to building structure.

E. Install horizontal bridging in wall studs, spaced vertically in rows indicated on Shop Drawings but not more than 48 inches apart. Fasten at each stud intersection.
   1. Channel Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.
   2. Strap Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
   3. Bar Bridging: Proprietary bridging bars installed according to manufacturer’s written instructions.

F. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 18 inches of single deflection track. Install a combination of bridging and stud or stud-track solid blocking of width and thickness matching studs, secured to stud webs or flanges.
   1. Install solid blocking at centers indicated on Shop Drawings.

G. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.6 ERECTION TOLERANCES

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

3.7 FIELD QUALITY CONTROL

A. Testing: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Field and shop welds will be subject to testing and inspecting.

C. Testing agency will report test results promptly and in writing to Contractor and Architect.

D. Remove and replace work where test results indicate that it does not comply with specified requirements.

E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.8 REPAIRS AND PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed steel framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that cold-formed steel framing is without damage or deterioration at time of Substantial Completion.
END OF SECTION 054000
SECTION 055000 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 COORDINATION
A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers’ written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of metal fabrications that are anchored to or that receive other work. 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.

1.3 ACTION SUBMITTALS
A. Product Data: For the following:
   1. Nonslip aggregates and nonslip-aggregate surface finishes.
   2. Metal nosings and treads.
   3. Paint products.

B. Shop Drawings: Show fabrication and installation details. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items. Provide Shop Drawings for the following:
   1. Steel framing and supports for overhead doors.
   2. Steel framing and supports for countertops.
   3. Steel tube reinforcement for low partitions.
   4. Steel framing and supports for mechanical and electrical equipment.
   5. Steel framing and supports for applications where framing and supports are not specified in other Sections.
   6. Steel shapes for supporting elevator door sills.
   7. Shelf angles.
   8. Metal ladders.
   9. Miscellaneous steel trim including steel angle corner guards and steel edgings.
   10. Metal bollards.
   11. Abrasive metal nosings.
   12. Cast-iron wheel guards.
   13. Loose steel lintels.
   14. Overhead door channel frames.

C. Samples for Verification: For each type and finish of extruded nosing.

D. Delegated-Design Submittal: For installed products indicated to comply with design loads, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 INFORMATIONAL SUBMITTALS
A. Qualification Data: For professional engineer.
B. Mill Certificates: Signed by stainless-steel manufacturers, certifying that products furnished comply with requirements.
C. Welding certificates.
D. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.
E. Research/Evaluation Reports: For post-installed anchors, from ICC-ES.

1.5 QUALITY ASSURANCE
A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code - Steel."
B. Welding Qualifications: Qualify procedures and personnel according to the following:
   1. AWS D1.1, "Structural Welding Code - Steel."

1.6 FIELD CONDITIONS
A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS
A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design ladders.
B. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.
   1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 METALS
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.
B. Steel Plates, Shapes, and Bars: ASTM A 36.
C. Steel Tubing: ASTM A 500, cold-formed steel tubing.
D. Steel Pipe: ASTM A 53, Standard Weight (Schedule 40) unless otherwise indicated or required by structural loads.
E. Slotted Channel Framing: Cold-formed metal box channels (struts) complying with MFMA-4.
   2. Material: Hot-rolled steel, ASTM A 1011, structural steel, Grade 33; 0.0677-inch minimum thickness; coated with rust-inhibitive, baked-on, acrylic enamel.
F. Cast Iron: Either gray iron, ASTM A 48, or malleable iron, ASTM A 47, unless otherwise indicated.

2.3 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 or ASTM F 1941, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.
1. Provide stainless-steel fasteners for fastening aluminum.
2. Provide Torx-head or hex head fasteners with center rejection pin where vandal-resistant fasteners are indicated.

B. Wet Areas: For wet or damp areas, including pools, pool pump and treatment rooms, locker rooms, rooms with showers, saunas, kitchens with washes or hoods, whirlpool bath rooms, mechanical rooms with steam piping, and similar spaces, provide Type 304 stainless-steel fasteners or zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 5.

C. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A; with hex nuts, ASTM A 563; and, where indicated, flat washers.

D. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts, ASTM F 593; with hex nuts, ASTM F 594; and, where indicated, flat washers; Alloy Group 1.

E. Anchor Bolts: ASTM F 1554, Grade 36, of dimensions indicated; with nuts, ASTM A 563; and, where indicated, flat washers.
1. Hot-dip galvanize or provide mechanically deposited, zinc coating where item being fastened is indicated to be galvanized.

F. Anchors, General: 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 F 488, conducted by a qualified independent testing agency.

G. Cast-in-Place Anchors in Concrete: Either threaded type or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A 47 malleable iron or ASTM A 27 cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F 2329.

H. Post-Installed Anchors: Torque-controlled expansion anchors.
1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, unless otherwise indicated.

I. Slotted-Channel Inserts: Cold-formed, hot-dip galvanized-steel box channels (struts) complying with MFMA-4, 1-5/8 by 7/8 inches by length indicated with anchor straps or studs not less than 3 inches long at not more than 8 inches o.c. Provide with temporary filler and tee-head bolts, complete with washers and nuts, all zinc-plated to comply with ASTM B 633, Class Fe/Zn 5, as needed for fastening to inserts.

2.4 MISCELLANEOUS MATERIALS
A. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.

B. Water-Based Primer: Emulsion type, anticorrosive primer for mildly corrosive environments that is resistant to flash rusting when applied to cleaned steel, complying with MPI#107 and compatible with topcoat.

C. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.
1. Available Products:
   a. AkzoNobel International, Devoe Coatings; Cathacoat 313.
   c. Carboline Company; Carbozinc 621.
e. Sherwin-Williams Company (The); Corothane I GalvaPac Zine Primer.

D. Shop Primer for Galvanized Steel: Primer formulated for exterior use over zinc-coated metal and compatible with finish paint systems indicated.

E. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

F. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.


H. Concrete: Comply with requirements in Division 03 Section "Cast-in-Place Concrete" for normal-weight, air-entrained, concrete with a minimum 28-day compressive strength of 3000 psi.

2.5 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 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 or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.

G. Fabricate seams and other connections that are 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.

J. 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
2.6 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.
   1. Fabricate units from slotted channel framing where indicated.
   2. Furnish inserts for units installed after concrete is placed.

C. Fabricate supports for operable partitions from continuous steel beams of sizes indicated with attached bearing plates, anchors, and braces as indicated. Drill or punch bottom flanges of beams to receive partition track hanger rods; locate holes where indicated on operable partition Shop Drawings.

D. Fabricate steel framing and supports for countertops. Countertop fabrications are specified in Division 06 Section “Interior Architectural Woodwork.”

E. Fabricate elevator hoist and divider beams from steel tube or W-section. Coordinate with elevator manufacturer to provide size required for elevator cab weight and guide rail support.

F. Galvanize miscellaneous framing and supports where indicated.

G. Prime miscellaneous framing and supports with zinc-rich primer where indicated.

2.7 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 and prime with zinc-rich primer.

D. Furnish wedge-type concrete inserts, complete with fasteners, to attach shelf angles to cast-in-place concrete.

2.8 METAL LADDERS

A. General:
   1. Comply with ANSI A14.3.
   2. For elevator pit ladders, comply with ASME A17.1/CSA B44.

B. Steel Ladders:
   1. Space siderails 18 inches apart unless otherwise indicated.
   2. Siderails:
      a. Continuous, 1/2-by-2-1/2-inch steel flat bars, with eased edges.
   4. Fit rungs in centerline of siderails; plug-weld and grind smooth on outer rail faces.
   5. Provide nonslip surfaces on top of each rung, either by coating rung with aluminum-oxide granules set in epoxy-resin adhesive or by using a type of manufactured rung filled with aluminum-oxide grout. In lieu of an applied coating, the Contractor may
alternately provide one of the following available products:
   a. Harso Industrial IKG, a division of Harso Corporation; “Mebac.”
   b. SlipNOT Metal Safety Flooring; W.S. Molnar Company; “SlipNOT.”

6. Support each ladder at top and bottom and not more than 60 inches o.c. with welded or bolted steel brackets.

7. Galvanize ladders including brackets.

2.9 OVERHEAD DOOR CHANNEL FRAMES
   A. Fabricate steel door channel frames from structural shapes and bars of size and to dimensions indicated. Galvanize frames at exterior doors. Where door head is formed by steel lintel plate or otherwise indicated not to have frame member, provide jambs only.
   B. Provide steel strap anchors, 1/8 by 2 inches, with a minimum 6-inch embedment and 2-inch hook, unless otherwise indicated, for securing channel jambs into adjoining concrete or masonry. Weld anchors to frame jambs. Space anchors no more than 12 inches from both bottom and head of frame, and not more than 30 inches on center.

2.10 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.

2.11 ABRASIVE METAL NOSINGS
   A. Extruded Units: Aluminum, 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. UPNOVR, Inc. (ACL Industries, Inc.)
   b. American Safety Tread Co., Inc.
   c. Amstep Products.
   d. Armstrong Products, Inc.
   e. Balco, Inc.
   f. Granite State Casting Co.
   g. Nystrom, Inc.
   h. Wooster Products Inc.

2. Provide ribbed units, with abrasive filler strips projecting 1/16 inch above aluminum extrusion.

3. Nosings: Square-back units, 3 inches wide, for casting into stair treads and landings.

B. Nosing Length: 8 inches less than tread width unless indicated otherwise.

C. Provide anchors for embedding units in concrete, either integral or applied to units, as standard with manufacturer.

D. Drill for mechanical anchors and countersink. Locate holes not more than 4 inches from ends and not more than 12 inches o.c., evenly spaced between ends, unless otherwise indicated. Provide closer spacing if recommended by manufacturer.
1. Provide two rows of holes for units more than 5 inches wide, with two holes aligned at ends and intermediate holes staggered.

E. Apply clear lacquer to concealed surfaces of extruded units.

2.12 CAST-IRON WHEEL GUARDS
A. Provide wheel guards made from cast-iron, 3/4-inch-thick, hollow-core construction, of size and shape indicated. Provide holes for countersunk anchor bolts and grouting.

2.13 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.

B. Galvanize plates.

2.14 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. Fabricate in single lengths for each opening unless otherwise 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. Galvanize loose steel lintels located in exterior walls.

D. Prime loose steel lintels located in exterior walls with zinc-rich primer.

2.15 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 no fewer than two integrally welded steel strap anchors for embedding in concrete.

2.16 FINISHES, GENERAL
A. Finish metal fabrications after assembly.

B. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

2.17 STEEL AND IRON FINISHES
A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153 for steel and iron hardware and with ASTM A 123 for other steel and iron products.

1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.

B. Preparation for Shop Priming Galvanized Items: After galvanizing, thoroughly clean railings of grease, dirt, oil, flux, and other foreign matter, and treat with metallic phosphate process.

C. Shop prime iron and steel items unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.

1. Shop prime with universal shop primer unless zinc-rich primer indicated.

D. Preparation for Shop Priming: Prepare surfaces to comply with requirements indicated below:


3. Other Items: SSPC-SP 3, "Power Tool Cleaning."

E. Shop Priming: Apply shop primer to 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.

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. Fill all holes, including 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.

E. 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 screws, wood screws, and other connectors.

F. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

G. Corrosion Protection: Coat concealed surfaces of aluminum that come into contact with grout, concrete, masonry, wood, or dissimilar metals with the following:
   1. Cast Aluminum: Heavy coat of bituminous paint.
   2. Extruded Aluminum: Two coats of clear lacquer.

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. Anchor supports for operable partitions, overhead doors, and overhead grilles securely to, and rigidly brace from, building structure.

C. 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.
D. 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.

3.3 INSTALLING CAST-IRON WHEEL GUARDS
   A. Anchor wheel guards to concrete or masonry construction to comply with manufacturer’s written instructions. Fill cores solidly with concrete.

3.4 INSTALLING BEARING AND LEVELING 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 nonshrink grout. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.5 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. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Division 09 Section “Painting.”
   C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION 055000
SECTION 055100 - METAL STAIRS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 PERFORMANCE REQUIREMENTS
   A. Delegated Design: Design metal stairs, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
   B. Structural Performance of Stairs: Metal stairs shall withstand the effects of gravity loads and the following loads and stresses 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 unless noted otherwise. Limit deflection to L/720 for treads and platforms to receive brittle (stone, ceramic tile, terrazzo).
   C. Head Clearance: In addition to clearances indicated, maintain other clearances required by the building code, including, but not limited to, a minimum of 80 inches head clearance along all paths of travel (the “walk line”) as measured above stair noses and walking surfaces.
   D. Structural Performance of Handrails and Railings: Specified in Division 05 Section “Pipe and Tube Railings.”
   E. Seismic Performance: Metal stairs shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
      1. Component Importance Factor is 1.5.

1.3 ACTION SUBMITTALS
   A. Product Data: For metal stairs and the following:
      1. Paint products.
      2. Grout.
   B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
   C. Samples: For products involving selection of color, texture, or design.
   D. Delegated-Design Submittal: For installed products 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. Qualification Data: For qualified professional engineer.
   B. Welding certificates.

1.5 QUALITY ASSURANCE
   A. Installer Qualifications: Fabricator of products.
B. 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.

C. Welding Qualifications: Qualify procedures and personnel according to the following:
   1. AWS D1.1, “Structural Welding Code - Steel.”

1.6 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers’ 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 they will not encroach on required stair width and will be within the fire-resistance-rated stair enclosure.

D. Coordinate with installation of related work, including but not limited to railing systems specified in other Division 5 Sections.

PART 2 - PRODUCTS

2.1 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.

2.2 FERROUS METALS

A. Steel Plates, Shapes, and Bars: ASTM A 36.
B. Steel Tubing: ASTM A 500 (cold formed) or ASTM A 513.
C. Steel Bars for Grating Treads: ASTM A 36 or steel strip, ASTM A 1011 or ASTM A 1018.
D. Wire Rod for Grating Crossbars: ASTM A 510.
E. Uncoated, Hot-Rolled Steel Sheet: ASTM A 1011, either commercial steel, Type B, or structural steel, Grade 30, unless another grade is required by design loads.
F. Cast Iron: Either gray iron, ASTM A 48, or malleable iron, ASTM A 47, unless otherwise indicated.
G. Woven-Wire Mesh: Intermediate-crimp, square pattern, 2-inch woven-wire mesh, made from 0.135-inch nominal diameter wire complying with ASTM A 510.

2.3 FASTENERS

A. General: Provide zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941, Class Fe/Zn 12 for exterior use, and Class Fe/Zn 5 where built into exterior walls. Select fasteners for type, grade, and class required.

2.4 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
B. Low-Emitting Materials: Paints and coatings 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. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
   1. Use primer with a VOC content of 420 g/L (3.5 lb/gal.) or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

E. Non-shrink, Non-metallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

2.5 FABRICATION, 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. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

D. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

E. Form exposed work with accurate angles and surfaces and straight edges.

F. 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.

G. 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.

H. Fabricate joints that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

2.6 STEEL-FRAMED STAIRS

A. Stair Framing:
   1. Fabricate stringers of steel sections indicated.
      a. Provide closures for exposed ends of channel and tube stringers.
2. Construct platforms of steel headers and miscellaneous framing members as needed to comply with performance requirements.

3. Weld or bolt stringers to headers; weld or bolt framing members to stringers and headers. If using bolts, fabricate and join so bolts are not exposed on finished surfaces.

4. Where masonry walls support metal stairs, provide temporary supporting struts designed for erecting steel stair components before installing masonry.

B. Metal Stairs:

1. Provide subplatforms of configuration and construction indicated, or if not indicated, of same metal as risers and subtreads and in thicknesses required to support design loading. Attach subplatform to platform framing members with welds.

C. Metal-Pan Stairs: Form risers, subread pans, and subplatforms to configurations shown from steel sheet of thickness needed to comply with performance requirements but not less than 0.067 inch.

1. Steel Sheet: Uncoated hot-rolled steel sheet unless otherwise indicated.

2. Stair Run with Exposed Underside: Directly weld metal pans to stringers; locate welds on top of subtreads where they will be concealed by concrete fill. Do not weld risers to stringers.

3. Stair Run with Concealed Underside: Attach risers and subtreads to stringers with brackets made of steel angles or bars. Weld brackets to stringers and attach metal pans to brackets by welding, riveting, or bolting.

4. Cast treads with abrasive contrast nosings as specified in Division 05 Section “Metal Fabrications.”

5. 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 flat metal under surfaces to produce smooth soffits.

D. Metal Bar-Grating Stairs: Form treads and platforms to configurations shown from metal bar grating; fabricate to comply with NAAMM MBG 531, “Metal Bar Grating Manual.”

1. Fabricate treads and platforms from welded or pressure-locked steel grating with openings in gratings no more than 3/4 inch (19 mm) in least dimension.

2. Surface: Plain.

3. Finish: Galvanized.

4. Fabricate grating treads with rolled-steel floor plate nosing and with steel angle or steel plate carrier at each end for stringer connections. Secure treads to stringers with bolts.

5. Fabricate grating platforms with nosing matching that on grating treads. Provide toe-plates at open-sided edges of grating platforms. Weld grating to platform framing.

6. Fabricate risers from woven wire mesh.

2.7 FINISHES

A. Comply with NAAMM’s “Metal Finishes Manual for Architectural and Metal Products” for recommendations for applying and designating finishes.

B. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153 for steel and iron hardware and with ASTM A 123 for other steel and iron products.

1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.

2. 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.
3. All exterior stairs and all associated components shall be hot-dip galvanized.

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-SP 3, “Power Tool Cleaning.”

D. Apply shop primer to uncoated surfaces of metal stair components, except those with galvanized finishes and 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.

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.

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. 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.

F. Field Welding: Comply with requirements for welding in “Fabrication, General” Article.

G. Place and finish concrete fill for treads and platforms to comply with Division 03 Section “Cast-in-Place Concrete.”

H. Install abrasive nosings with anchors fully embedded in concrete. Center nosings on tread width.

3.2 ADJUSTING AND CLEANING

A. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Division 09 Section “Painting.”

B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION 055100
SECTION 055213 - PIPE AND TUBE RAILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 COORDINATION
   A. Coordinate installation of anchorages for railings. 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. Schedule installation so wall attachments are made only to completed walls. Do not support
railings temporarily by any means that do not satisfy structural performance requirements.

1.3 ACTION SUBMITTALS
   A. Product Data: For the following:
      1. Railing brackets.
      2. Grout, anchoring cement, and paint products.
   B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
   C. Samples: For each type of exposed finish required.
   D. Delegated-Design Submittal: For railings, including analysis data signed and sealed by the
qualified professional engineer responsible for their preparation.

1.4 INFORMATIONAL SUBMITTALS
   A. Qualification Data: For qualified professional engineer.
   B. Welding certificates.

1.5 QUALITY ASSURANCE
   A. Welding Qualifications: Welders shall be AWS certified and shall be qualified for welding
processes involved and, if pertinent, have undergone recertification. Qualify procedures and
personnel according to the following:
      1. AWS D1.1, “Structural Welding Code - Steel.”

1.6 DELIVERY, STORAGE, AND HANDLING
   A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable,
temporary protective covering before shipping.

1.7 FIELD CONDITIONS
   A. Field Measurements: Verify actual locations of walls and other construction contiguous with
metal fabrications by field measurements before fabrication.
      1. Established Dimensions: Where field measurements cannot be made without
delaying the Work, establish dimensions and proceed with fabricating railings
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.
PART 2 - PRODUCTS

2.1 MANUFACTURERS
   A. Stainless-Steel Pipe and Tube Railings:
      1. Stainless-Steel Pipe and Tube Railings:
         a. Blum, Julius & Co., Inc.
         b. Paragon Aquatics; Division of Pentair Pool Products, Inc.
         c. Stainless Fabricators, Inc.
         d. Sterling Dula Architectural Products, Inc.
         e. Tri Tech, Inc.
         f. Tubular Specialties Manufacturing, Inc.
         g. Tuttle Railing Systems.
         h. Wagner, R & B, Inc.; a division of Wagner Collaborative Metal Works.
   B. Source Limitations: Obtain each type of railing from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS
   A. Delegated Design: Engage a qualified professional engineer, as defined in Division 01 Section “Quality Requirements,” to design railings, including attachment to building construction.
   B. Structural Performance: Railings, including attachment to building construction, shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
      1. Handrails and Top Rails of Guards:
         a. Uniform load of 50 lbf/ ft. applied in any direction.
         b. Concentrated load of 200 lbf applied in any direction.
         c. Uniform and concentrated loads need not be assumed to act concurrently.
   C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.
      1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.
   D. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.
   E. Accessibility Requirements: Comply with applicable provisions in the Department of Justice 2010 ADA Standards for Accessible Design and ICC/ANSI A117.1.

2.3 METALS, GENERAL
   A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.
   B. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails unless otherwise indicated.

2.4 STEEL AND IRON
   A. Tubing: ASTM A 500 (cold formed) or ASTM A 513.
   B. Pipe: ASTM A 53, Type F or Type S, Grade A, Standard Weight (Schedule 40), unless another grade and weight are required by structural loads.
      1. Provide galvanized finish for exterior installations and where indicated.
C. Plates, Shapes, and Bars: ASTM A 36.
D. Cast Iron: Either gray iron, ASTM A 48, or malleable iron, ASTM A 47, unless otherwise indicated.

2.5 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 240 or ASTM A 666, Type 304.

2.6 FASTENERS
A. General: Provide the following:
   1. Ungalvanized-Steel Railings: Plated steel fasteners complying with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5 for zinc coating.
   2. Hot-Dip Galvanized Railings: Type 304 stainless-steel or hot-dip zinc-coated steel fasteners complying with ASTM A 153 or ASTM F 2329 for zinc coating.
   3. Stainless-Steel Railings: Type 304 stainless-steel fasteners.
B. Fasteners for Anchoring Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction indicated and capable of withstanding design loads.
C. Fasteners for Interconnecting Railing Components:
   1. Provide concealed fasteners for interconnecting railing components and for attaching them to other work, unless otherwise indicated.
   2. Provide tamper-resistant flat-head machine screws for exposed fasteners unless otherwise indicated.
D. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors capable of sustaining, without failure, a load equal to 6 times the load imposed when installed in unit masonry and 4 times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.

2.7 MISCELLANEOUS MATERIALS
A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
   1. For stainless-steel railings, provide type and alloy as recommended by producer of metal to be welded and as required for color match, strength, and compatibility in fabricated items.
B. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
   1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.
C. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.
   1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
b. Carboline Company; Carbozinc 621.
c. ICI Devoe Coatings; Catha-Coat 313.
f. Sherwin-Williams Company (The); Corothane I GalvaPac Zinc Primer.

D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.
E. Non-shrink, Non-metallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.
F. Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound.
   1. Water-Resistant Product: At exterior locations provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended by manufacturer for exterior use.

2.8 FABRICATION
A. General: Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.
   1. Picket Infill: 3/4-inch-square bar pickets equally spaced, with less than 4 inches clear between pickets, unless indicated otherwise.
B. Shop-assemble railings to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.
C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
D. Form work true to line and level with accurate angles and surfaces.
E. Fabricate connections that are exposed to weather in a manner that excludes water. Provide weep holes where water may accumulate.
F. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.
G. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
   1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
   2. Obtain fusion without undercut or overlap.
   3. Remove flux immediately.
   4. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.
H. Form Changes in Direction as Follows:
   1. For 90-degree changes in direction, provide 6-inch radius bends unless noted otherwise. (Flush bends are not acceptable for any application.)
   2. For “sweep” (greater than 90-degree) changes in direction, provide 12-inch radius curves unless noted otherwise.
I. For changes in direction made by bending, use 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.

J. Close exposed ends of railing members with prefabricated end fittings.

K. 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.

L. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.

M. 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.

N. Woven-Wire Mesh Infill Panels: Fabricate infill panels from woven-wire mesh crimped into 1-by-1/2-by-1/8-inch metal channel frames. Make wire mesh and frames from same metal as railings in which they are installed.

   1. Orient wire mesh with as indicated on Drawings.

2.9 STEEL AND IRON FINISHES

A. Galvanized Railings:

   1. Hot-dip galvanize exterior and indicated steel railings, including hardware, after fabrication.
   2. Comply with ASTM A 123 for hot-dip galvanized railings.
   4. Fill vent and drain holes that are exposed in the finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.

B. For galvanized railings, provide hot-dip galvanized fittings, brackets, fasteners, sleeves, and other ferrous components.

C. For nongalvanized-steel railings, provide nongalvanized ferrous-metal fittings, brackets, fasteners, and sleeves; however, galvanize anchors to be embedded in exterior concrete or masonry.

D. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with requirements indicated below:

   3. Other Railings: SSPC-SP 3, “Power Tool Cleaning.”

E. Primer Application: Apply shop primer to prepared surfaces of railings unless otherwise indicated. Comply with requirements in SSPC-PA 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. Shop prime uncoated railings with universal shop primer unless zinc-rich primer is indicated.
   2. Do not apply primer to galvanized surfaces.

F. Powder-Coat Finish, Interior Handrails: AAMA 2603 except with a minimum dry film thickness of 1.5 mils (0.04 mm). Comply with coating manufacturer's printed instructions for cleaning, conversion coating, and applying and baking finish.

   1. Color and Gloss: As selected by Architect from manufacturer's full range.
PART 3 - EXECUTION

3.1 EXAMINATION
   A. Examine gypsum board assemblies, where reinforced to receive anchors, to verify that locations of concealed reinforcements are clearly marked for Installer. Locate reinforcements and mark locations if not already done.

3.2 INSTALLATION, GENERAL
   A. Fit exposed connections together to form tight, hairline joints.
   B. Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.
      1. Do not weld, cut, or abrade surfaces of railing components that are coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
      2. Set posts plumb within a tolerance of 1/16 inch in 3 feet.
      3. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.
      4. Align handrail bends with face of stair noses and maintain consistent height above noses and landings for entire length of handrails. Variations in height for one handrail on a flight, and between handrails on the same flight shall not exceed 1/2 inch. Installed handrails shall comply with ADA requirements.
   C. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.
   D. Adjust railings before anchoring to ensure matching alignment at abutting joints.
   E. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

3.3 RAILING CONNECTIONS
   A. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in “Fabrication” Article whether welding is performed in the shop or in the field.
   B. Expansion Joints: Install expansion joints at locations indicated but not farther apart than required to accommodate thermal movement. Provide slip-joint internal sleeve extending 2 inches beyond joint on either side, fasten internal sleeve securely to one side, and locate joint within 6 inches of post.

3.4 ANCHORING POSTS
   A. Form or core-drill holes not less than 5 inches deep and 3/4 inch larger than OD of post for installing posts in concrete. Clean holes of loose material, insert posts, and fill annular space between post and concrete with nonshrink, nonmetallic grout, mixed and placed to comply with anchoring material manufacturer’s written instructions.
   B. Leave anchorage joint exposed; wipe off surplus anchoring material; and leave 1/8-inch buildup, sloped away from post.
   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 stainless-steel pipe railings, weld flanges to post and bolt to supporting surfaces.
2. For steel pipe railings, weld flanges to post and bolt to metal supporting surfaces.
3. At metal stairs, weld railing posts directly to steel stringer supporting members.

3.5 ATTACHING RAILINGS
   A. Attach railings to wall with wall brackets. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.
   B. Secure wall brackets to building construction as follows:
      1. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.
      2. For hollow masonry anchorage, use toggle bolts.
      3. For steel-framed partitions, use hanger or lag bolts set into fire-retardant-treated wood backing between studs. Coordinate with stud installation to locate backing members.
      4. For steel-framed partitions, use self-tapping screws fastened to steel framing or to concealed steel reinforcements.

3.6 ADJUSTING AND CLEANING
   A. Clean by washing thoroughly with clean water and soap and rinsing with clean water.
   B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Division 09 Section "Painting."
   C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas, and repair galvanizing to comply with ASTM A 780.

3.7 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.

END OF SECTION 055213
SECTION 061000 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 DEFINITIONS
   A. Exposed Framing: Framing not concealed by other construction.
   B. Dimension Lumber: Lumber of 2 inches nominal or greater but less than 5 inches nominal in least dimension.
   C. Lumber grading agencies, and the abbreviations used to reference them, include the following:
      2. NLGA: National Lumber Grades Authority.
      3. RIS: Redwood Inspection Service.
      5. WCLIB: West Coast Lumber Inspection Bureau.

1.3 ACTION SUBMITTLS
   A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
      1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
      2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
      3. For fire-retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5664.
      4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
      5. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

1.4 INFORMATIONAL SUBMITTLS
   A. Evaluation Reports: For the following, from ICC-ES:
      1. Wood-preservative-treated wood.
      2. Fire-retardant-treated wood.
      5. Expansion anchors.
      6. Metal framing anchors.
1.5 QUALITY ASSURANCE
A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.6 DELIVERY, STORAGE, AND HANDLING
A. Stack lumber flat with spacers beneath and between each bundle to provide air circulation. Protect lumber from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL
A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rule-writing agency certified by the 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. Factory mark each piece of lumber with grade stamp of grading agency.
2. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece.
3. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
4. Provide dressed lumber, S4S, unless otherwise indicated.
B. Maximum Moisture Content of Lumber: 15 percent for 2-inch nominal thickness or less, 19 percent for more than 2-inch nominal thickness unless otherwise indicated.

2.2 WOOD-PRESERVATIVE-TREATED LUMBER
A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with the ground, Use Category UC3b for exterior construction not in contact with the ground, and Use Category UC4a for items in contact with the ground.
1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium. Do not use inorganic boron (SBX) for sill plates.
2. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.
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.
1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece.
D. Application: Treat items indicated on Drawings, and the following:
1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
3. Wood floor plates that are installed over concrete slabs-on-grade.

2.3 FIRE-RETARDANT-TREATED MATERIALS

A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.

B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame spread index of 25 or less and a smoke developed index of 450 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.

1. Use treatment that does not promote corrosion of metal fasteners.

2. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.

3. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D 3201 at 92 percent relative humidity. Use where exterior type is not indicated.

4. Design Value Adjustment Factors: Treated lumber shall be tested according ASTM D 5664 and design value adjustment factors shall be calculated according to ASTM D 6841.

C. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Kiln-dry plywood after treatment to a maximum moisture content of 15 percent.

D. FRT Materials: Exposure to precipitation shall be avoided. If treated material does become damp or wet, it shall be replaced or permitted to completely dry prior to being covered by other construction materials.

E. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.

1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece.

F. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not bleed through, contain colorants, or otherwise adversely affect finishes.

G. Application: All rough carpentry work that is not indicated to preservative-treated shall be fire-retardant treated.

2.4 MISCELLANEOUS LUMBER

A. General: 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.
5. Furring.

B. For items of dimension lumber size, provide Construction or No. 2 grade lumber and any of the following species:

1. Hem-fir (north); NLGA.
2. Mixed southern pine; SPIB.
3. Spruce-pine-fir; NLGA.
4. Hem-fir; WCLIB or WWPA.
5. Spruce-pine-fir (south); NeLMA, WCLIB, or WWPA.
6. Western woods; WCLIB or WWPA.

C. For concealed boards, provide lumber with 19 percent maximum moisture content and any of the following species and grades:
   1. Mixed southern pine; No. 2 grade; SPIB.
   2. Hem-fir or hem-fir (north); Standard or No. 3 Common grade; NLGA, WCLIB, or WWPA.
   3. Spruce-pine-fir (south) or spruce-pine-fir; Construction or No. 2 Common grade; NeLMA, NLGA, WCLIB, or WWPA.

D. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.

E. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.

F. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

2.5 SUBFLOORING AND UNDERLAYMENT

A. Plywood Subflooring: Exposure 1 single-floor panels or sheathing.
   1. Nominal Thickness: As indicated.


C. Underlayment, General: Provide underlayment in nominal thicknesses indicated or, if not indicated, not less than 1/4 inch over smooth subfloors and not less than 3/8 inch over board or uneven subfloors.

D. Plywood Underlayment for Resilient Flooring: DOC PS 1, Exposure 1 Underlayment with fully sanded face.

E. Plywood Underlayment for Carpet: DOC PS 1, Exposure 1, Underlayment.

2.6 PLYWOOD BACKING PANELS

A. Equipment Backing Panels: DOC PS 1, Exposure 1, C-D Plugged, fire-retardant treated, in thickness indicated or, if not indicated, not less than 3/4-inch nominal thickness.

2.7 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
   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 A 153/A 153M.

B. Nails, Brads, and Staples: ASTM F 1667.


D. Wood Screws: ASME B18.6.1.

E. Lag Bolts: ASME B18.2.1.
F. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers.

G. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry assemblies 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 and inspecting agency.

H. Screws for Fastening Parapet Nailers:
   1. For steel framing: #10 SIP low profile flat head screws intended for wood-to-metal connections, at spacing indicated.
   2. For masonry backup: 1/4-inch diameter low profile flat head type concrete screw anchors, at spacing indicated. Length to suit embedment into CMU of 1-1/4 inches minimum.
      a. Pullout capacity: 100 lb minimum at 1 inch embedment in face shell of hollow CMU.

2.8 METAL FRAMING ANCHORS
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. Cleveland Steel Specialty Co.
   2. KC Metals Products, Inc.
   3. Phoenix Metal Products, Inc.
   4. Simpson Strong Tie Co., Inc.
   5. USP Structural Connectors.

B. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer, that meet or exceed those indicated. Manufacturer’s published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

2.9 MISCELLANEOUS MATERIALS
A. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber or rubberized-asphalt compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.025 inch.

B. Adhesives for Gluing Furring to Concrete or Masonry: Formulation complying with ASTM D 3498 that is approved for use indicated by adhesive manufacturer.

C. Water-Repellent Preservative: NWWDA-tested and -accepted formulation containing 3-iodo-2-propynyl butyl carbamate, combined with an insecticide containing chlorpyrifos as its active ingredient.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL
A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit.
Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.

B. Framing Standard: Comply with AF&PA’s WCD 1, “Details for Conventional Wood Frame Construction,” unless otherwise indicated.

C. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels. Install fire-retardant treated plywood backing panels with classification marking of testing agency exposed to view.

D. Metal Framing Anchors: Install metal framing anchors to comply with manufacturer’s written instructions. Install fasteners through each fastener hole.

E. Do not splice structural members between supports unless otherwise indicated.

F. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
   1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches o.c.

G. Provide fire blocking in furred spaces, stud spaces, and other concealed cavities as indicated and as follows:
   1. Fire block furred spaces of walls, at each floor level, at ceiling, and at not more than 96 inches o.c. with solid wood blocking or noncombustible materials accurately fitted to close furred spaces.
   2. Fire block concealed spaces behind combustible cornices and exterior trim at not more than 20 feet o.c.

H. Sort and select lumber so that natural characteristics will not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

I. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
   1. Use inorganic boron for items that are continuously protected from liquid water.
   2. Use copper naphthenate for items not continuously protected from liquid water.

J. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
   1. NES NER-272 for power-driven fasteners.

K. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.

3.2 WOOD GROUND, BLOCKING, AND NAILER INSTALLATION

A. Install where indicated and where required for screening or attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.

B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.
   1. For roofing work, comply with FM Global Loss Prevention Sheet 1-49 and roofing manufacturer’s requirements.
3.3 INSTALLATION OF WOOD NAILERS AT PARAPETS

A. General: Secure wood nailers and plywood to prepared substrate using mechanical fasteners to attain loading design requirements. Adhesive anchorage in lieu of mechanical fasteners for wood nailer anchorage is not acceptable.
   1. Coordinate with installation of continuous insulation and air barrier materials to top of parapet substrate (preceding trade) and installation of roofing materials and coping assembly (subsequent trades).

B. Installation at CMU Parapets: Secure parapet blocking to CMU with screw anchors in 2 rows at 64 inches on center, staggered, except within 10 feet of building corners provide 2 rows at 48 inches on center. Embedment length into CMU shall be 1-1/4 inch minimum. Install screw heads flush with uppermost surface of blocking or plywood sheathing if any. Install screws in accordance with manufacturer’s instructions.

C. Installation at CFSF-S Framed Parapets: Secure blocking to steel framing with screws in 2 rows at 16 inches on center, except within 10 feet of building corners provide 2 rows at 12 inches on center.
   1. Provide attachment to cold formed steel framing in accordance with APA Form No. T625C, Table 1 for 3/4 inch plywood panel thickness, wall stud spacing, and wind exposure category indicated.

3.4 WOOD FURRING INSTALLATION

A. Install level and plumb with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.

B. Furring to Receive Plywood or Hardboard Paneling: Install 1-by-3-inch nominal-size furring at 24 inches o.c.

C. Furring to Receive Gypsum Board: Install 1-by-2-inch nominal-size furring vertically at 16 inches o.c.

3.5 WOOD STRUCTURAL PANEL INSTALLATION


B. Fastening Methods: Fasten panels as indicated below:
   1. Subflooring:
      a. Glue and nail to wood framing.
      b. Screw to cold-formed metal framing.
      c. Space panels 1/8 inch apart at edges and ends.
   2. Underlayment:
      a. Screw to subflooring.
      b. Space panels 1/32 inch apart at edges and ends.

3.6 PROTECTION

A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.
END OF SECTION 061000
SECTION 061600 - SHEATHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 ACTION SUBMITTALS
A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
   1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Indicate type of preservative used and net amount of preservative retained.
   2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Include physical properties of treated materials.
   3. For fire-retardant treatments, include physical properties of treated plywood both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5516.
   4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
   5. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

A. Evaluation Reports: For following products, from ICC-ES:
   1. Fire-retardant-treated plywood.

1.3 INFORMATIONAL SUBMITTALS
A. Evaluation Reports: For following products, from ICC-ES:

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

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

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS
A. Fire-Test-Response Characteristics: For assemblies with fire-resistance ratings, provide materials and construction identical to those of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.
2.2 WOOD PANEL PRODUCTS
   A. Plywood: Either DOC PS 1 or DOC PS 2 unless otherwise indicated.
   B. Oriented Strand Board: DOC PS 2.
   C. Thickness: As needed to comply with requirements specified, but not less than thickness indicated.
   D. Factory mark panels to indicate compliance with applicable standard.

2.3 FIRE-RETARDANT-TREATED PLYWOOD
   A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article that are acceptable to authorities having jurisdiction and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
      1. Fire-retardant-treatment shall not include ammonium phosphates for plywood sheathing for vertical parapet wall applications.
   B. Fire-Retardant-Treated Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet (3.2 m) beyond the centerline of the burners at any time during the test.
      1. Use treatment that does not promote corrosion of metal fasteners.
      2. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.
      3. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D 3201 at 92 percent relative humidity. Use where exterior type is not indicated.
      4. Design Value Adjustment Factors: Treated lumber plywood shall be tested according ASTM D 5516 and design value adjustment factors shall be calculated according to ASTM D 6305. Span ratings after treatment shall be not less than span ratings specified.
   C. Kiln-dry material after treatment to a maximum moisture content of 15 percent. Do not use material that is warped or does not comply with requirements for untreated material.
   D. FRT Materials: Exposure to precipitation shall be avoided. If treated material does become wet, it shall be replaced or permitted to completely dry prior to being covered by other construction materials.
   E. Identify fire-retardant-treated plywood with appropriate classification marking of qualified testing agency.
   F. Application: Provide FRT plywood and wood sheathing at all locations not indicated to be preservative-treated.

2.4 WALL SHEATHING
   A. Plywood Wall Sheathing: Exposure 1 sheathing.
      1. Nominal Thickness: As indicated. Not less than 1/2-inch.
      1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
2. Paints: Decorative paints and other finishes may be used on backing and sheathing for esthetic purposes, subject to approval of the Architect, but are not to be used for corrosion prevention.

2.6 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.

1. For roof and wall sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M unless indicated otherwise.

B. Screws for Fastening Wood Structural Panels to Cold-Formed Steel Framing: ASTM C 954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened.

1. For wall and roof sheathing panels, provide screws with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.

C. Screws for Fastening Gypsum Sheathing to Cold-Formed Steel Framing: Steel drill screws, in length recommended by sheathing manufacturer for thickness of sheathing to be attached, with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.

1. For (CFSF-NS) steel framing less than 0.0329 inch thick, use screws that comply with ASTM C 1002.

2. For (CFSF-S) steel framing from 0.033 to 0.112 inch thick, use screws that comply with ASTM C 954.

2.7 SHEATHING JOINT-AND-PENETRATION TREATMENT MATERIALS

A. Sealant for Glass-Mat Gypsum Sheathing Board: Elastomeric, 100% solids, moisture-curing polyether joint sealant compatible with joint substrates formed by gypsum sheathing and other materials, recommended by sheathing manufacturer for application indicated, and complying with requirements for elastomeric sealants specified in Division 7 Section “Joint Sealants.”

1. Provide polyether based, 100% solids, moisture-curing elastomeric sealant.

a. BASF; “MasterSeal NP 150.”

b. STS Coatings; "GreatSeal LT 100 Liquid Tape."
2.8 MISCELLANEOUS MATERIALS

A. Adhesives for Field Gluing Panels to Framing: Formulation complying with ASTM D 3498 that is approved for use with type of construction panel indicated by manufacturers of both adhesives and panels.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.

B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.

C. Securely attach to substrate by fastening as indicated, complying with the following:
   1. NES NER-272 for power-driven fasteners.
   2. Table 2304.9.1, “Fastening Schedule,” in the Construction Code.

D. Use common wire nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections. Install fasteners without splitting wood.

E. Coordinate wall and roof sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.

F. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

G. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

3.2 WOOD STRUCTURAL PANEL INSTALLATION

      a. Provide wall (including parapet) sheathing attachment to cold formed steel framing in accordance with Table 1 for panel thickness, wall stud spacing, and wind exposure category indicated.

B. Fastening Methods: Fasten panels as indicated below:
   1. Wall and Roof Sheathing:
      a. Screw to cold-formed steel framing.
      b. Space panels 1/8 inch apart at edges and ends.
      c. Roof Sheathing: Provide “Ply-Clips” of type and spacing as recommended by APA for standard, square edged plywood roof sheathing, where sheathing is anchored directly to trusses and framing members.

3.3 GYPSUM SHEATHING INSTALLATION

A. Comply with GA-253 and with manufacturer’s written instructions.
1. Fasten gypsum sheathing to wood framing with nails or screws.
2. Fasten gypsum sheathing to cold-formed steel framing with screws.
4. Install boards with a 1/4-inch gap where they abut masonry or similar materials that might retain moisture, to prevent wicking.

B. Apply fasteners so heads bear tightly against face of sheathing, but do not cut into facing.

C. Vertical Installation: Install board vertical edges centered over studs. Abut ends and edges of each board with those of adjacent boards. Attach boards at perimeter and within field of board to each stud.
1. Space fasteners approximately 8 inches o.c. and set back a minimum of 3/8 inch from edges and ends of boards.

D. Seal sheathing joints according to sheathing manufacturer’s written instructions.
1. Apply polyether-based sealant with extended width nozzle for nominal 1-inch wide coverage to glass-mat gypsum sheathing board joints. Apply sealant to exposed fasteners heads with a trowel so fasteners are completely covered. Seal other penetrations and openings.
2. Coordinate with subsequent application of air barrier system.

3.4 CEMENTITIOUS BACKER UNIT INSTALLATION

A. Install panels and treat joints according to ANSI A108.11 and manufacturer’s written instructions for type of application indicated.

END OF SECTION 061600
SECTION 064023 - INTERIOR ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 DEFINITIONS
   A. Interior architectural woodwork includes wood furring, blocking, shims, and hanging strips
      for installing woodwork items unless concealed within other construction before woodwork
      installation.
   B. For purposes of this contract, “Architectural Woodwork” includes (1) millwork/casework
      type items, (2) multi-piece standing and running trim and rails associated with new bench
      assemblies, and (3) some specialty work requiring both shop fabricated and field assembled
      high quality woodwork items. Some of the work could traditionally be considered “finish
      carpentry;” because of the special composite construction and generally high quality
      required, all is considered “architectural woodwork.”

1.3 ACTION SUBMITTALS
   A. Product Data: For each type of product indicated, including cabinet hardware and
      accessories, handrail brackets, and finishing materials and processes.
      1. Include data for adhesives.
      2. Waterborne Treatments: For products receiving a waterborne treatment, include
         statement that moisture content of treated materials was reduced to levels specified
         before shipment to Project site.
   B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale
      details, attachment devices, and other components.
      1. Show full-size details.
      2. Show locations and sizes of furring, blocking, and hanging strips, including blocking
         and reinforcement concealed by construction and specified in other Sections.
      3. Show locations and sizes of cutouts and holes for items installed in architectural
         woodwork.
      4. For blueprint-matched work, show veneer leaves with dimensions, grain direction,
         exposed face, and identification numbers indicating the flitch and sequence within the
         flitch for each leaf.
   C. Samples for Verification: For the following:
      1. Lumber with or for Transparent Finish: Not less than 5 inches wide by 24 inches
         long, for each species and cut, finished on one side and one edge. Include AWI
         premium grade required back-priming/sealing on 1 side and 1 edge.
      2. Veneer Leaves: Representative of and selected from flitches to be used for
         transparent-finished interior architectural woodwork.
      3. Veneer-faced panel products with or for transparent finish, 8 by 10 inches, for each
         species and cut. Include at least one face-veneer seam and finish as specified. For
         each transparent finish, provide set of three Samples showing typical range of color
         and grain to be expected in finished Work.
      4. Lumber and Panel Products with Shop-Applied Opaque Finish: 5 inches wide by 12
         inches long for lumber and 8 by 10 inches for panels, for each finish system and
         color. Finish one-half of exposed surface.
      5. Plastic laminates, 8 by 10 inches, for each type, color, pattern, and surface finish,
         with 1 sample applied to core material and specified edge material applied to 1 edge.
6. Decorative resin glazing, 8 by 10 inches, for each type, color, pattern.
7. Solid-surfacing materials, 6 inches square.
8. Simulated stone quartz surfacing materials, 6 inches square.
9. Corner pieces as follows:
   a. Miter joints for standing trim.

1.4 INFORMATIONAL SUBMITTALS
A. Woodwork Quality Standard Compliance License: Provide license showing proof of
certification in AWI Quality Certification Program.
B. Qualification Data: For woodwork manufacturer/fabricator and Installer.
C. Evaluation Reports: For preservative-treated and fire-retardant-treated wood materials, from
ICC-ES.
D. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS
A. Woodwork Quality Standard Certificate: Provide AWI Quality Certification Program
“Certificate of Compliance” indicating that woodwork, including installation, complies with
requirements of grades specified.

1.6 QUALITY ASSURANCE
A. Fabricator`s Qualifications: 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.
   1. Fabricator`s Certification: Licensed participant in AWI’s Quality Certification
      Program.
   2. Installer Qualifications: Fabricator of products and licensed participant in AWI’s
      Quality Certification Program.
B. Quality Standard: Unless otherwise indicated, comply with “Architectural Woodwork
Standards – Edition Two,” 2019 (AWS), published jointly by Architectural Woodwork
Institute (AWI), Woodwork Institute (WI), and Architectural Woodwork Manufacturer’s
Association of Canada (AWMAC) for grades of interior architectural woodwork indicated
for construction, finishes, installation, and other requirements.
   1. This project has been registered as AWI/QCP number 20.1246.
C. Accessibility Requirements: Where casework is indicated to comply with accessibility
requirements, comply with the Department of Justice ADA Standards for Accessible Design
and ICC/ANSI A117.1.
D. Fire-Test-Response Characteristics: Where fire-retardant materials or products are indicated,
provide materials and products with specified fire-test-response characteristics as
determined by testing identical products per test method indicated by UL, ITS, or another
testing and inspecting agency acceptable to authorities having jurisdiction. Identify with
appropriate markings of applicable testing and inspecting agency in the form of separable
paper label or, where required by authorities having jurisdiction, imprint on surfaces of
materials that will be concealed from view after installation.
E. Forest Certification: Provide interior architectural woodwork produced from wood obtained
from forests certified by an FSC-accredited certification body to comply with FSC 1.2,
“Principles and Criteria.”
F. Mockups: Build mockups to verify selections made under Sample submittals, to
demonstrate aesthetic effects, and to set quality standards for materials and execution.
   1. Build mockups of typical interior architectural woodwork as shown on Drawings.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Owner specifically approves such deviations by Change Order.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING
   A. Comply with the Architectural Woodwork Standards, Section 2.
   B. Do not deliver interior architectural woodwork until painting and similar finish operations that might damage woodwork have been completed in installation areas.
   C. Store woodwork in installation areas or in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.
      1. Handle and store fire-retardant-treated wood to comply with chemical treatment manufacturer’s written instructions.

1.8 FIELD CONDITIONS
   A. Environmental Limitations: Do not deliver or install interior architectural woodwork until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F and relative humidity between 25 and 55 percent during the remainder of the construction period.
   B. Field Measurements: Where interior architectural woodwork is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings.
      1. Locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before being concealed by construction, and indicate measurements on Shop Drawings.
      2. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating woodwork without field measurements. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

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 architectural woodwork can be supported and installed as indicated.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS
   A. Fire-Rated Frames: Complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings indicated on Drawings, based on testing according to NFPA 252 or UL 10C without hose stream test. After 5 minutes into the NFPA 252 test, the neutral pressure level in the furnace shall be established at 40 inches or less above the sill.
      1. Smoke- and Draft-Control Assemblies: Listed and labeled for smoke and draft control by a qualified testing agency acceptable to authorities having jurisdiction, based on testing according to UL 1784 and installed in compliance with NFPA 105.
   B. Fire-Rated, Borrowed-Lite Assemblies: Complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 257 or UL 9.
2.2 ARCHITECTURAL WOODWORK, GENERAL
A. Quality Standard: Unless otherwise indicated, comply with the Architectural Woodwork Standards for grades of interior architectural woodwork indicated for construction, finishes, installation, and other requirements.
   1. The Contract Documents contain requirements that are more stringent than the Architectural Woodwork Standards. Comply with Contract Documents and Architectural Woodwork Standards.

2.3 MATERIALS
A. General: Provide materials that comply with requirements of AWI’s quality standard for each type of woodwork and quality grade specified, unless otherwise indicated.
B. Wood Species and Cut for Transparent Finish: Maple.
C. Wood Species for Opaque Finish: Any closed-grain hardwood.
D. Wood Products: Comply with the following:
   2. Medium-Density Fiberboard: ANSI A208.2, Grade MD.
   3. Particleboard: Straw-based particleboard complying with requirements in ANSI A208.1, Grade M-2, except for density.
E. Thermoset Decorative Panels: Particleboard or medium-density fiberboard finished with thermally fused, melamine-impregnated decorative paper.
   1. Provide PVC or polyester edge banding on components with exposed or semi-exposed edges.
F. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or, if not indicated, as required by woodwork quality standard.
   1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering high-pressure decorative laminates that may be incorporated into the Work include, but are not limited to, the following:
      a. Formica Group, Div. of Fletcher Building.
      d. Wilsonart LLC.
G. Solid-Surfacing Material: Homogeneous solid sheets of filled plastic resin complying with ISSFA-2.
   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. Avonite Surfaces, a Brand of Aristech Surfaces, LLC; “Avonite.”
      b. E. I. du Pont de Nemours and Company; “Corian.”
      c. Formica Group, Div. of Fletcher Building; “Solid Surfacing.”
      d. Hanwha L&C; “Hanex.”
      e. LG Hausys America; “HI-MACS.”
      f. Lotte Advanced Materials Co., Ltd.; “Staron.”
      g. Wilsonart LLC; “Solid Surface.”
   2. Type: Standard type, unless Special Purpose type is indicated.
   4. Colors and Patterns: As selected by Architect from manufacturer's full range.
5. Physical Characteristics:
   a. Fungal and Bacterial Resistance: No growth, per ASTM G 21 and G 22.
   b. Tensile Strength: 4000 psi minimum per ASTM D 638.
   c. Barcol Hardness: 56 minimum per ASTM D 2583.
   d. Izod Impact Resistance: 0.28 ft-lb/in minimum per ASTM D 256 Method A.
   e. Ball Impact Resistance: No fracture at 112 inch drop minimum per NEMA LD 3-3 (1/2 lb. ball on 1/2” material).
   f. Stain Resistance: Pass per ANSI Z124.3 and/or ANSI Z124.6.
   g. Boiling Water Resistance: No effect per NEMA LD 3-3 or ISSFA SST 8.1-00.
   h. High Temperature Resistance: No effect per NEMA LD 3-3 or ISSFA SST 9.1-00.
   i. Flame Spread: <25 per ASTM E 84.
   j. Smoke Developed: <400 per ASTM E 84.

H. Agglomerate Stone Surfacing (Quartz Surfacing Material): Engineered stone material shall consist of approximately 93% quartz aggregate blended with 7% resins, additives, and environmentally safe non-fade pigments.
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. Cambria.
   b. Cosentino; “Silestone.”
   c. E. I. du Pont de Nemours and Company; “Corian Quartz.”
   d. Hanwha L&C; “HanStone.”
   e. LG Hausys America; “Viatera.”
   f. CaesarStone.
   g. Technistone.
   h. Wilsonart
2. Colors and Patterns: As selected by Architect from manufacturer's full range.
3. Thickness: 20 mm (3/4-inch).

4. Physical Characteristics
   a. Abrasive Wear Index: Minimum 139, per ASTM C 501.
   b. Absorption: Less than 0.05% per ASTM C 97.
   c. Compressive Strength: Minimum 24,700 psi per ASTM C 170.
   d. Breaking Strength: Minimum 1,600 lbf per ASTM C 648.
   e. Thermal Shock: Passes (five cycles) per ASTM C 484.
   g. Frost Resistance: Unaffected per ASTM C 1026.
   h. Stain Resistance: Passes per ANSI Z124.6.
   i. Flame Spread: <25 per ASTM E 84.
   j. Smoke Developed: <400 per ASTM E 84.

I. Edgebanding for Plastic Laminate: Rigid PVC extrusions, through color with satin finish, 3 mm thick at doors and drawer fronts, 0.5 mm thick elsewhere.

2.4 FIRE-RETARDANT-TREATED MATERIALS

A. General: Fire retardant treated floor platform and like structural framing, and blocking are specified in Division 6 Section “Rough Carpentry.” Where such internal framing is included in the woodwork fabrications, use fire retardant treated material as indicated. No actual finish woodwork items (trim, casings, bases, casework panel and worked lumber components etc.) are fire retardant treated, unless otherwise indicated.
B. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this Article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified.
   1. Do not use treated materials that do not comply with requirements of referenced woodworking standard or that are warped, discolored, or otherwise defective.
   2. Use fire-retardant-treatment formulations that do not bleed through or otherwise adversely affect finishes. Do not use colorants to distinguish treated materials from untreated materials.
   3. Identify fire-retardant-treated materials with appropriate classification marking of UL, U.S. Testing, Timber Products Inspection, or another testing and inspecting agency acceptable to authorities having jurisdiction.

C. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Comply with performance requirements of AWPA C20 (lumber) and AWPA C27 (plywood). Use the following treatment type:
   1. Interior Type A: Low-hygroscopic formulation.
   2. Mill lumber before treatment and implement special procedures during treatment and drying processes that prevent lumber from warping and developing discolorations from drying sticks or other causes, marring, and other defects affecting appearance of treated woodwork.
   3. Kiln-dry materials before and after treatment to levels required for untreated materials.

D. Fire-Retardant Particleboard: Panels complying with the following requirements, made from softwood particles and fire-retardant chemicals mixed together at time of panel manufacture to achieve flame-spread index of 25 or less and smoke-developed index of 25 or less per ASTM E 84.
   1. For panels 3/4-inch thick and less, comply with ANSI A208.1 for Grade M-2 except for the following minimum properties: modulus of rupture, 1600 psi; modulus of elasticity, 300,000 psi; internal bond, 80 psi; and screw-holding capacity on face and edge, 250 and 225 lbf, respectively.
   2. For panels 13/16 to 1-1/4 inches thick, comply with ANSI A208.1 for Grade M-1 except for the following minimum properties: modulus of rupture, 1300 psi; modulus of elasticity, 250,000 psi; linear expansion, 0.50 percent; and screw-holding capacity on face and edge, 250 and 175 lbf, respectively.
   3. Subject to compliance with requirements, provide “Duraflake FR” by Flakeboard Company.

E. Fire-Retardant Fiberboard: Medium-density fiberboard panels complying with ANSI A208.2, made from softwood fibers, synthetic resins, and fire-retardant chemicals mixed together at time of panel manufacture to achieve flame-spread index of 25 or less and smoke-developed index of 200 or less per ASTM E 84.
   1. Product: Subject to compliance with requirements, provide “Medite FR” by SierraPine Ltd.; Medite Div.

2.5 MISCELLANEOUS MATERIALS
   A. Furring, Blocking, Shims, and Nailers: Softwood or hardwood lumber, kiln-dried to less than 15 percent moisture content. Provide fire-retardant-treated and pressure-preservative treated softwood lumber where indicated.
   B. Provide self-drilling screws for metal-framing supports, as recommended by metal-framing manufacturer.
C. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage.
   1. Provide metal expansion sleeves or expansion bolts for post-installed anchors.
   2. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.

D. Steel Plates and Angles: ASTM A36, shop primed, (field paint in Division 9 Section “Paints”). (miscellaneous clips etc.)


F. Installation Adhesive: Product recommended by fabricator for each substrate for secure anchorage.
   1. Do not use adhesives that contain urea formaldehyde.
   2. Adhesive shall comply with the testing and product requirements of the California Department of Public Health’s "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

G. Adhesive for Bonding Plastic Laminate: Contact cement.
   1. Adhesive for Bonding Edges: Hot-melt adhesive or as specified above for faces.

2.6 INTERIOR STANDING AND RUNNING TRIM FOR TRANSPARENT FINISH

A. Grade: Premium.

B. Wood Species and Cut: Match species and cut indicated for other types of transparent-finished architectural woodwork located in same area of building unless otherwise indicated.
   1. Provide split species on trim that faces areas with different wood species, matching each face of woodwork to species and cut of finish wood surfaces in areas finished.
   2. For trim items other than base wider than available lumber, use veneered construction. Do not glue for width.
      a. For veneered base, use hardwood lumber core, glued for width.
   3. For base wider than available lumber, glue for width. Do not use veneered construction.
   4. For rails thicker than available lumber, use veneered construction. Do not glue for thickness.

C. Backout or groove backs of flat trim members and kerf backs of other wide, flat members, except for members with ends exposed in finished work.

D. Assemble casings in plant except where limitations of access to place of installation require field assembly.

E. Assemble moldings in plant to maximum extent possible. Miter corners in plant and prepare for field assembly with bolted fittings designed to pull connections together.

2.7 INTERIOR STANDING AND RUNNING TRIM FOR OPAQUE FINISH

A. Grade: Premium.
   1. Wood Species: Any closed-grain hardwood.

B. Backout or groove backs of flat trim members and kerf backs of other wide, flat members, except for members with ends exposed in finished work.

C. Assemble casings in plant except where limitations of access to place of installation require field assembly.
D. Assemble moldings in plant to maximum extent possible. Miter corners in plant and prepare for field assembly with bolted fittings designed to pull connections together.

2.8 CLOSET AND UTILITY SHELVING
   A. Grade: Custom.
   B. Shelf Material: 3/4-inch veneer-faced panel product with solid-lumber edge.
   C. Cleats: 3/4-inch solid lumber.
   D. Wood Species: Match species indicated for door to closet where shelving is located.
   F. Rod Flanges: Aluminum.
   G. Wood Finish: Transparent.

2.9 INTERIOR FRAMES AND JAMBS FOR TRANSPARENT FINISH
   A. Grade: Premium.
   B. Wood Species and Cut: Match species and cut indicated for other types of transparent-finished architectural woodwork located in same area of building unless otherwise indicated.
      1. Provide split species on frames and jambs that face areas with different wood species, matching each face of woodwork to species and cut of finish wood surfaces in areas finished.
   C. For frames or jambs wider than available lumber, use veneered construction. Do not glue for width.
   D. Fire-Rated Interior Frames and Jambs: Products fabricated from fire-retardant particleboard or fire-retardant MDF with veneered exposed surfaces and 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. Fire Rating: 20 minutes.

2.10 INTERIOR FRAMES AND JAMBS FOR OPAQUE FINISH
   A. Grade: Premium.
   B. Wood Species: Any closed-grain hardwood.
   C. Fire-Rated Interior Frames and Jambs: Products fabricated from fire-retardant particleboard with veneered exposed surfaces or fire-retardant MDF and 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. Fire Rating: 20 minutes.

2.11 INTERIOR WOOD RAILINGS
   A. Grade: Premium.
   C. Finishes for Stair Parts:
      2. Handrails: Transparent.
      3. Scotia, Cove, and Other Moldings: Transparent.
   D. Handrail Brackets: Cast aluminum with wall flange drilled for exposed anchor and with support arm for screwing to underside of rail. Size to provide 1-1/2-inch clearance between handrail and face of wall.
E. Handrail/Bumper Rail Brackets: Pairs of extruded-aluminum channels: one for fastening to back of rail and one for fastening to face of wall, assembled in overlapping fashion and fastened together at top and bottom with self-tapping screws. Size to provide 1-1/2-inch clearance between handrail and wall.

2.12 FLUSH WOOD PANELING FOR TRANSPARENT FINISH

A. Grade: Premium.

B. Wood Species and Cut: Match species and cut indicated for other types of transparent-finished architectural woodwork located in same area of building, unless otherwise indicated.
   1. Lumber Trim and Edges: At fabricator’s option, trim and edges indicated as solid wood (except moldings) may be either lumber or veneered construction compatible with grain and color of veneered panels.

C. Matching of Adjacent Veneer Leaves: Book match.

D. Veneer Matching within Panel Face: Running match.

E. Panel-Matching Method: No matching between panels is required. Select and arrange panels for similarity of grain pattern and color between adjacent panels.

F. Vertical Panel-Matching Method: Continuous match; veneer leaves of upper panels are continuations of veneer leaves of lower panels.

G. Fire-Retardant-Treated Paneling: Provide panels consisting of wood veneer and fire-retardant particleboard or fire-retardant medium-density fiberboard. Panels shall have flame-spread index of 75 or less and smoke-developed index of 450 or less per ASTM E 84.

H. Aluminum Millwork Trim: Extruded accessories of profiles and dimensions indicated.
   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:
   2. Basis-of-Design Products: Design is based on indicated profiles manufactured by Fry Reglet Corp. 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. Flannery, Inc.
      b. Fry Reglet Corp.
      c. Gordon, Inc.
      d. Pittcon Industries.
      e. Stockton Products.
   3. Trim Profile Characteristics: Provide the following trim types, where indicated. Provide profiles in depth required to match wood paneling depth indicated.
      a. Straight Edge Reveal Channel: 1/2-inch width reveals between millwork panels.
      b. Reveal “F” Channel: 1/2-inch width reveals where millwork is adjacent to a different material.
      c. Straight Edge “L” Angle: Straight edge at ends of millwork panels.
      d. Inside Corner: Straight edge with exposed metal profile at 90° inside corners.
      e. Outside Corner: Straight edge with exposed metal profile at 90° outside corners.
      f. Reveal Base: Metal base flange with L-angle to receive bottom edge of millwork. Exposed base height 4 inches.
      g. Bar/Post: Solid 1/4-inch bar/post between millwork panels.
h. Bar/Post Termination: Solid 1/4-inch “L” shape termination where millwork is adjacent to other materials.
i. Bar/Post Outside Corner: Solid 1/4-inch bar/post for use at 90° outside corners. Miter millwork panels to fit against post.

4. Accessories: Provide manufacturer’s factory-fabricated intersection components, including custom fabrications as required for reveal layout indicated.

5. Aluminum: Alloy and temper with not less than the strength and durability properties of ASTM B 221, Alloy 6063-T5.


2.13 FLUSH WOOD PANELING AND WAINSCOTS FOR OPAQUE FINISH
A. Grade: Premium.
B. Wood Species and Cut: Any close-grained hardwood.
   1. Lumber Trim and Edges: At fabricator’s option, trim and edges indicated as solid wood (except moldings) may be either lumber or veneered construction compatible with grain and color of veneered panels.
   C. Fire-Retardant-Treated Paneling: Provide panels consisting of wood veneer and fire-retardant particleboard or fire-retardant medium-density fiberboard. Panels shall have flame-spread index of 75 or less and smoke-developed index of 450 or less per ASTM E 84.

2.14 INTERIOR ORNAMENTAL WORK FOR TRANSPARENT FINISH
A. Interior ornamental work for transparent finish includes the following:
   1. Balustrades.
   2. Columns.
   4. Mantels.
   5. Pediment heads.
   6. Pilasters.
B. Grade: Premium.
C. Wood Species and Cut: Match species and cut indicated for other types of transparent-finished architectural woodwork located in same area of building, unless otherwise indicated.

2.15 INTERIOR ORNAMENTAL WORK FOR OPAQUE FINISH
A. Interior ornamental work for opaque finish includes the following:
   1. Balustrades.
   2. Columns.
   4. Mantels.
   5. Pediment heads.
   6. Pilasters.
B. Grade: Premium.
C. Wood Species: Any closed-grain hardwood.

2.16 WOOD CABINETS FOR TRANSPARENT FINISH
A. Grade: Premium, except as noted for drawer construction.
B. Type of Construction: Frameless.
C. Wood Species and Cut for Exposed Surfaces: Match species and cut indicated for other types of transparent-finished architectural woodwork located in same area of building unless otherwise indicated. 
   1. Grain Direction: Vertically for drawer fronts, doors, and fixed panels.
   5. Veneer Matching within Room: Provide cabinet veneers in each room or other space from a single fitch with doors, drawer fronts, and other surfaces matched in a sequenced set with continuous match where veneers are interrupted perpendicular to the grain.
   6. Comply with veneer and other matching requirements indicated for blueprint-matched paneling.

D. Semi-exposed Surfaces: Provide surface materials indicated below:
   1. Surfaces Other Than Drawer Bodies: Same species and cut indicated for exposed surfaces.
   2. Drawer Sides and Backs: Per AWI standard for “Custom” Grade: 15/32-inch minimum, except provide 5/8-inch minimum at drawer boxes wider than 30 inches.
   3. Drawer Bottoms: Per AWI standard for “Custom” Grade, Match material used at drawer sides and backs, 15/32-inch minimum.

E. Provide dust panels of 1/4-inch plywood or tempered hardboard above compartments and drawers, unless located directly under tops.

2.17 PLASTIC-LAMINATE CABINETS

A. Grade: Premium, except as noted for drawer construction.
   1. Wall Cabinet Door Pulls: 96 mm routed pull in bottom edge.
   2. Base Cabinet Door and Drawer Pulls: Flush pull design indicated.
   3. Cabinet Body Construction:
      a. Tops and bottoms are glued and doweled to cabinet sides and internal cabinet components such as fixed horizontal, 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.
   4. Tops, bottoms and sides of all cabinets are 3/4-inch thick particleboard core.
      a. Cabinet Backs - Semi-exposed: Minimum 3/8-inch thick prefinished particleboard or 1/4-inch thick medium-density fiberboard fully captured four sides or 1/2-inch prefinished particleboard full overlay construction. Provide 3/4-inch x 4 inch anchor or hanging strip except where backs are 1/2-inch or thicker per AWI standard.
      b. Provide either of the following types of base construction to support cabinet load transfer, isolate the cabinet ends from contact with floor, and permit leveling.
      c. Separate Sub-base: Cabinet sub-base shall be separate and continuous (no cabinet body sides-to-floor), exterior grade plywood with concealed fastening to cabinet bottom. Sub-base shall be ladder-type construction of individual front, back, and intermediates, to form a secure and level platform to which cabinets attach. Recess sub-base at exposed cabinet end panels 1/4 inch from face of finished end, for flush installation of finished base material by other trades.
      d. Integral Base: Provide end panels, cabinet bottoms, and horizontal toe kick members integrally joined together for structural strength and to facilitate load
transfer directly through cabinet ends to the floor. Provide 1-3/8" x 3" x 3/8" thick injection molded, chemical resistant, polypropylene isolation supports factory-applied at the four corners of each toe base to prevent cabinets from contacting the floor. Internally-mount isolation supports to permit surface-application of continuous resilient base.

B. Reveal Dimension: Not more than 3/4-inch.

C. Laminate Cladding for Exposed Surfaces: High-pressure decorative laminate complying with the following requirements:
1. Horizontal Surfaces Other Than Tops: Grade HGS.
2. Postformed Surfaces: Grade HGP.
3. Vertical Surfaces: Grade VGS.
4. Cabinet Body and Shelf Edges: PVC tape, 0.5 mm (0.018-inch) minimum thickness, matching laminate in color, pattern, and finish.
5. Door and Drawer Front Edges: PVC edge banding, 3 mm (0.12-inch) thick, matching laminate in color, pattern, and finish. Provide “eased” edges and corners.

D. Materials for Semi-exposed Surfaces:
1. Surfaces Other Than Drawer Bodies: High-pressure decorative laminate, Grade VGS.
   a. Edges of Plastic-Laminate Shelves: PVC tape, 0.018-inch (0.5-mm) minimum thickness, matching laminate in color, pattern, and finish.
   b. For semi-exposed backs of panels with exposed plastic-laminate surfaces, provide surface of high-pressure decorative laminate, Grade CLS.
2. Drawer Sides and Backs: Per AWI standard for “Custom” Grade: 15/32-inch minimum, except provide 5/8-inch minimum at drawer boxes wider than 30 inches.
3. Drawer Bottoms: Match material used at drawer sides and backs, 15/32-inch minimum; or 1/4-inch thick thermally fused melamine clad medium-density fiberboard fully captured four sides.

E. Concealed Backs of Panels with Exposed Plastic Laminate Surfaces: High-pressure decorative laminate, Grade BKL.

F. Colors, Patterns, and Finishes:
1. Selected by Architect from laminate manufacturer’s full range (standard and premium lines) of product in standard textured finish (textured gloss, fine textured or suede finish). High gloss, heavy textured, metallic, or other special surface products (abrasion-resistant, chemical-resistant) will not be required for use in this project.

G. Provide dust panels of 1/4-inch plywood or tempered hardboard above compartments and drawers, unless located directly under tops.

2.18 SOLID-SURFACING-MATERIAL COUNTERTOPS AND WINDOW STOOLS

A. Grade: Premium.

B. Solid-Surfacing-Material Thickness: 3/4-inch.

C. Colors, Patterns, and Finishes: As selected by Architect from manufacturer's full range.

D. Fabricate tops and stools in one piece, unless otherwise indicated. Comply with solid-surfacing-material manufacturer’s written recommendations for adhesives, sealers, fabrication, and finishing.
1. Fabricate tops and stools with shop-applied edges of materials and configuration indicated.
2. Fabricate tops with shop-applied backsplashes loose backsplashes for field application.
3. Fabricate window stools with loose apron trim, if indicated, for field application. Scribe stools to fit jambs as indicated.

E. Edge Treatment: As indicated.

F. Install integral sink bowls in countertops in shop.

G. Drill holes in countertops for plumbing fittings and soap dispensers in shop.

2.19 AGGLOMERATE STONE SURFACING COUNTERTOPS

A. Grade: Premium.

B. Size, Thickness, and Finish:
   1. Minimum length without joint: 6-feet.
   2. Width of countertops shall be one piece without joints.
   3. Thickness of agglomerate stone surfacing: 30 mm slab.
   4. Finish: Polished surface and exposed edges.

C. Colors, Patterns, and Finishes: Selected by Architect from agglomerate stone surfacing manufacturer’s full range (standard and premium lines) of products.

D. Fabricate tops in one piece, unless otherwise indicated. Comply with agglomerate stone surfacing material manufacturer’s written recommendations for adhesives, sealers, fabrication, and finishing.
   1. Fabricate tops with shop-applied edges of materials and configuration indicated.
   2. Fabricate tops with loose backsplashes for field application.

E. Edge treatment: Double bevel.

F. Drill holes in countertops for grommets, in shop.

2.20 COURTROOM CUSTOM CASEWORK AND WOODWORK

A. General: Provide assemblies fabricated to dimensions, profiles & general details indicated and coordinated with related work provided under other sections of these specifications. Coordinate indicated work with construction of stepped platform specified in Division 6 Section, “Rough Carpentry.”
   1. Internal construction and extent of prefabrication of complete assemblies shall be in accordance with final shop drawings. Drawing indications of 2x lumber internal framing are intended to represent “generic” internal construction. Particleboard material is generally preferred for case type pieces, lumber or particleboard for “paneling” type applications as determined by woodworker to be most beneficial for the specific woodwork item. Similarly, joinery details indicated depict options conforming to “Premium” grade criteria specified.

2. Maintain smooth curves and radii indicated for exposed surfaces. Provide bending grade panel material and utilize laminated multiple layers as determined by woodworker to attain required curved surfaces. Fabricate radiused top edge trim in accordance with “Premium” grade criteria of AWI Section 6 “Radius Moldings.”

3. Provide for electrical wiring, cabling etc. required for complete installation. Coordinate all electrical device outlet locations with Division 26 work. Such devices include, but are not limited to, microphones, audio mute, audio priority, data, telephone, video, speaker, receptacles.

4. Provide flush panel fronts (panel materials with reveals) as indicated in the drawings for indicated assemblies. Provide panel material that can successfully be routed, filled and sanded sufficiently smooth for paint finish. Edge band exposed panel edges. Construct and support vertical reveals in “bow-front” panel applications to avoid stressed delamination of radiused panel material. (Provide edge banded panels and solid lumber reveal in lieu of routed reveal if panels are over stressed by radius.)
B. Quality Standards: Comply with AWS Sections and standards as follows:

1. AWS Section 10 for “Premium” grade wood cabinets for transparent finish.
   a. AWI Type of Cabinet Construction: Flush overlay.
   b. Wood Species for Exposed Surfaces: Match species and cut indicated for other types of transparent-finished architectural woodwork located in same area of building unless otherwise indicated. Run and match grain vertically for veneered panel product material for doors, drawer fronts, fixed panels.
   c. Wood Species for Semi-Exposed Surfaces: Match species and cut for exposed surfaces.

2. AWS Section 8 “Wall Surfacing” (paneling) for “Premium” grade as applies to flush panelized fronts of judge’s bench assembly and spectator rail elements.
   a. Flat Panel, Transparent Finish: Panel product for transparent finish (wood veneer laminated over various cores). Provide sequenced, book-matched veneers, balance and center matched - i.e. ‘blueprint matched’ panels and components per AWS Section 4 for use in continuous front pieces. Provide horizontal grain for bow fronts only; vertical grain for planar surfaces.
   b. Veneer Species for Exposed Surfaces, Transparent Finish: Match species and cut indicated for other types of transparent-finished architectural woodwork located in same area of building unless otherwise indicated.
   c. Trim Lumber: Lumber matching wood veneer face for species and cut.
   d. Reveal Finish: Aluminum

3. AWS Section 6 “Interior & Exterior Millwork” “Ornamental Woodwork” for “Custom” grade as applies to pilasters, pediments and entablatures of backdrops of judges’ benches.
   a. Pilasters and entablature at district courtroom.
   b. Pilasters and pedimented entablature at superior courtroom.
   c. Veneer Species for Exposed Surfaces, Transparent Finish: Match species and cut indicated for other types of transparent-finished architectural woodwork located in same area of building unless otherwise indicated.

4. Judges Bench/Clerk Desk/Probation Officer Desk: Provide assembly indicated, composed of shop and field constructed elements to best accomplish high quality, close tolerance work indicated & required. Include “cubicle” components in general composite assembly.
   a. Provide counter/casework assembly indicated, featuring painted panel & solid lumber components.
   b. Provide quartz desk top
   c. Provide fiberglass armor protective front construction indicated; sequence construction to maintain continuity of this (firearm) barrier. Provide back-up strips of armor behind outlet locations securely fastened to solid blocking as indicated.
   d. Provide computer monitor carriages (with keyboard tray) and countertop vision glazing (Nova retrofit kit) at Judge and Clerk stations.
   e. Provide routed pull and scheduled slides for pencil & keyboard drawers.
   f. Provide keyboard slide as indicated.
   g. Provide ventilation area in indicated cabinet doors by means of four horizontal 1/2" x 8" long routed slots with rounded ends, spaced at 1-1/4" o.c. (Confirm ventilation area location in doors and acceptability of any proposed modifications to slotting pattern on shop drawings prior to fabrication.) Fill and sand routed surfaces and paint flat black.
   h. Coordinate work with construction of stepped platform.
i. Provide removable 6" high platform at clerk portion of bench in all courtrooms.

j. (Removable flooring at courtroom platforms, for future under-floor access, is included in work of Division 6 Section “Rough Carpentry.” Fabricated aluminum ramp is included in work of Division 5 Section “Metal Fabrications.”)

5. Lectern (Podium): Conform to details and dimensions indicated.

6. Witness Box & Podium (All courtrooms): Conform to details and dimensions indicated.
   a. Provide removable 6" high platform at witness stands.
   b. (Removable flooring at courtroom platforms, for future under-floor access, is included in work of Division 6 Section “Rough Carpentry.” Fabricated aluminum ramp is included in work of Division 5 Section “Metal Fabrications.”)

7. Spectator Rails: Conform to details & dimensions indicated. Secure railing assembly to concrete floor with fabricated steel channels indicated; sequence construction to permit installation. Coordinate with edge of raised access flooring and concrete slab depression.

8. Tables: Freestanding custom casework items. Conform to details and dimensions indicated.

2.21 CABINET HARDWARE AND ACCESSORIES

A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets, except for items specified in Division 8 Section “Door Hardware.” Provide all hardware necessary for complete and functioning cabinets whether included in specification or not.

B. Butt Hinges: BHMA A156.9 Grade 1, 2-3/4-inch (70-mm), 5-knuckle stainless steel hinges made from 0.095-inch-thick metal, with antifriction bearings and rounded hospital tips, and as follows:
   1. Concealed Hinges for Flush Doors: BHMA A156.9, B01361.
   2. Semi-concealed Hinges for Overlay Doors: BHMA A156.9, B01521.
   3. Provide two hinges for doors less than 48 inches high, and provide three hinges for doors more than 48 inches high.

C. Gate Spring Pivot Hinge – Double-Acting: Mortised application, BHMA A156.17, K13321 or K63321 ball-bearing pivot with fixed spring tension. Provide jamb bracket width to suit gate/door thickness. Bommer Type 7022, McKinney 4007MRB, Rixson Model 355, or equivalent.

D. Furniture Casters: Swivel zinc-plated steel casters with nominal 3 inches diameter by 1-inch to 1-1/4 inch wheels with sealed bearings and non-marking radiused polyurethane or rubber tread. Provide without brakes unless indicated otherwise. Where brakes are indicated, provide type that locks both swivel and wheel.
   1. Load Rating: 150 pounds per caster unless indicated otherwise.
   2. Available Manufacturers. Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. Caster City.
      b. Hamilton Caster & Mfg.
      c. R&K Industrial Wheels.
E. Heavy Duty Casters: Swivel zinc-plated steel casters with nominal 5 inches diameter by 1-1/2 inch to 2 inch wheels with sealed bearings and non-marking polyurethane or hard rubber tread. Provide without brakes unless indicated otherwise. Where brakes are indicated, provide type that locks both swivel and wheel.
1. Load Rating: 675 pounds per caster unless indicated otherwise.
2. Available Manufacturers. Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. Caster City.
   b. Hamilton Caster & Mfg.
   c. R&K Industrial Wheels.

F. Back-Mounted Pulls: BHMA A156.9, B02011.

G. Catches: Roller catches, BHMA A156.9, B03071. Provide large roller catches, BHMA A156.9, B03112 for extra-large cabinet doors, such as full-height cabinets.

H. Adjustable Shelf Standards and Supports: BHMA A156.9, B04071; with shelf rests, B04081.

I. Shelf Rests: Injection molded plastic friction fit 2-pin locking shelf rests complying with BHMA A156.9, Type B04013. Provide integral retaining clip to fit 3/4 inch or 1 inch thick shelving and provides non-tip feature for shelving. Supports may be field fixed if desired. Structural load to 1200 pounds (300 pounds per support) without failure.

J. Shelf Rests: BHMA A156.9, B04013; metal.

K. Drawer Slides: Powder-coated, self-closing, heavy-duty drawer slides, designed to prevent drawer rebound; with nylon-tired, ball-bearing rollers; and meeting BHMA A156.9, Type B05011 (bottom edge mount) or B05051 (side mount), and rated as follows:
   1. Drawers except as noted: Minimum 100 lbf dynamic load rating at 50,000 cycles. Minimum 150 lb loading static edge load test rating for one minute duration on fully extended drawer. Provide standard (3/4) extension travel.

L. Drawer Slides: BHMA A156.9, B05091.
   1. Standard Duty (Grade 1, Grade 2, and Grade 3): Side mounted and extending under bottom edge of drawer; full-extension type; zinc-plated steel with polymer rollers.
   2. Heavy Duty (Grade 1HD-100 and Grade 1HD-200): Side mounted; full-extension type; zinc-plated steel ball-bearing slides.
      a. Box Drawer Slides: 100 lbf (440 N). Accuride #7432, Knape & Vogt #KV8414, or Fulterer #FR 5000 Series.
      c. File Drawer Slides: 200 lbf (890 N). Accuride #3640A, Knape & Vogt #KV8800, or Fulterer #FR 5302 (> 30-inch wide drawers)
   3. Extra-Heavy Duty (Grade 1): Side mounted; full-extension type; zinc-plated steel ball-bearing slides.

M. Keyboard Platform: Retractable platform for standard 20-inch keyboard, with mouse pad (right-hand side) and wrist/palm rest.
1. Available Products. Subject to compliance with requirements, provide one of the following products or approved equivalent:
   a. Accuride “CBERGO-TRAY 200.”
   b. Doug Mockett #KP7/M2-90.
   c. Fulterer #FR 1602.
   e. WorkRite Ergonomics “Banana Board.”

N. Cash Drawers: Automatic solenoid-operated cash drawer with drawer front slot(s). Provide manufacturer standard security lock. Coordinate drive connection with Owner’s point of sale equipment.
   1. Available Products: Subject to compliance with requirements, available products include, but are not limited to, the following:
      a. MMF POS; “VAL-u Line.”
      b. Posiflex; CR6300.
      c. APG Cash Drawer; Series 100.
   2. Construction:
      a. Drawer Body: 14-20 gauge steel with scratch-resistant powder coat finish.
      b. Rails: Manufacturer’s standard roller suspension system with bumpers or buffers to cushion operation.
   4. Accessories:
      a. 5 bill and 5 coin US till with metal bill weights and coin roll storage.
      b. Mounting brackets.
      c. Cable for connection to printer/register.

O. Flush Pulls: BHMA A156.9, B02201.

P. Door Locks: BHMA A156.11, E07121.

Q. Drawer Locks: BHMA A156.11, E07041.

R. Grommets for Cable Passage through Countertops: 2.5 inch OD, black, molded-plastic grommets and matching removable plastic caps with slot for wire passage.
   1. Grommet Size: To suit nominal 2 1/2-inch diameter hole, 2 9/32-inch inside diameter and 5/8 inch deep.
   2. Cap Size: 2 7/16-inch overall diameter, with a cord slot 3/4-inch wide.
   3. Available Products: Subject to compliance with requirements, available products include, but are not limited to, the following:
      a. Doug Mockett and Co., Inc.; “EDP.”
      b. Sugatsune; “S76.”

S. Extruded vinyl channel or trough shapes indicated. Black color and screw-mounting unless noted otherwise. Provide indicated series by Doug Mockett and Co., Inc.
   1. J-shape wire manager for edge-of-counter mounting, where indicated. 1-inch wide channel, 1-1/2-inches high, with 7/16-inch slot at top for cables. Mockett “WM2”
   2. Bulk wire manager for under counter applications, where indicated. Heavy wall 3 by 3-inch open top channel. Mockett “WM9”
   3. Enclosed wire manager, where indicated. 2-1/8 inches high by 1-5/16 inches wide wire management channel with “hinged” front panel that snaps open and shut to insert and retain data cables. Mockett WM3-90

T. Wire Management: Coated steel J-hook type formed with rounded edges and designed to support data cable, with quick-latch cable retainer.
1. Available Products: Subject to compliance with requirements, available products include, but are not limited to, the following:
   a. Erica; “Caddy CAT HP” series.
   b. ICC; “J-Hook MSJHK” series.
   c. Cooper Tools; “BCH” series.
2. Width: 2-inch unless indicated otherwise.

U. Undercounter Utility Braces: Heavy-duty prefabricated steel braces for full cantilevered support of countertop from rear wall without reducing knee space. Provide braces designed to accommodate leveling cleats and passage of conduit and piping and complete with predrilled holes for screw fasteners.
   1. Load Capacity: 500 pounds minimum per pair at 16 inches o.c. as installed, and up to 1000 pounds per pair as fabricated. Install at 16 inches o.c. along full length of countertops unsupported by cabinetry unless indicated otherwise.
   2. Size: 21 inches x 28 inches minimum for standard 30-inch deep counter unless indicated otherwise. Provide smaller sizes suitable for smaller counters as approved.
      a. 8" x 12"
   3. Finish: Factory finish baked enamel or primed and ready for field painting. Factory finish color as selected by Architect from manufacturer’s full range.
   4. Available Products. Subject to compliance with requirements, provide one of the following products or approved equivalent:
      a. A & M Hardware, Inc.; “Standard Bracket.”
      b. Best Brackets; “ADA Workstation Support Standard Steel Bracket.”
      c. FastCap; “SpeedBrace.”
      d. Lyman Associates; “Counter Top Supports.”

V. Fixed L-Shelf Brackets: Fixed L-bracket for shelf depth indicated for minimum 500 lb. loading capacity per pair of brackets. Steel construction with enamel finish, color selected by Architect.
   1. Basic L Bracket
   2. L Bracket with Strut
      a. 12" deep x 8" height
      b. 16" deep x 10" height
      c. 20" deep x 13" height
      d. 22" deep x 14" height

W. Ballistic-Resistant Fiberglass Armor Panels, Level 4: Provide lightweight ballistic armor produced to afford protection for .30 caliber rifle with 180 grain soft point bullet, and muzzle velocity of 2540 feet per second tested in accordance with requirements of UL 752/Level 4 ballistic testing. Product shall be fiberglass-reinforced composite structural flat sheet material of nominal 1-3/16-inch thickness indicated.
   1. Products: Subject to compliance with requirements, provide one of the following products:
      a. “ArmorCore UL752 Level 4” made by Waco Composites, Ltd.

X. Mail/Copy Station: Modular paper sorting assembly of closed-back, open-front case modules with horizontal shelves adjustable for multiple heights, fabricated of fire-resistant, impact-resistant, high-strength plastic or coated steel. Provide nominal 12-inch width by 16-inch depth modules by height indicated.
   1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited
to, the following:

a. Office Products Cooperative.
b. Hamilton Sorter Company.
c. Datum Filing Systems.

Y. Wood Vent: Oak register designed for installation in toe kick space under cabinets.
   1. Overall size 3 15/16” x 16”.

Z. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.
   1. Satin Chromium Plated: BHMA 626 for brass or bronze base; BHMA 652 for steel base.
   2. Satin Stainless Steel: BHMA 630.

AA. For concealed hardware, provide manufacturer’s standard finish that complies with product class requirements in BHMA A156.9.

BB. Undersink Vinyl Basin Guard: Provide high impact vinyl acrylic molded undersink barrier panel for ADA compliant (wheelchair accessible) sink counters. Include minimum .090” formed panel and sidewall mounting pieces. Material shall have maximum flame spread of 15 when tested per ASTM E84. Color as selected by Architect from manufacturer’s standards. Design standard is “Basin Guard” manufactured by Truebro, Inc.

2.22 ORNAMENTAL SPECIALTY HARDWARE

A. Dual high/low prong vertical type chrome finish with escutcheon base. Provide Delta #79235 “Addison,” Gatco #580 “Austin,” Franklin Brass #125861 “Crestfield,” or equivalent.

B. Divider Panel Support Brackets: Cylindrical stainless-steel brackets with concealed mounting sized for 1-inch panels held in place by headless socket set screw. Provide custom unit as indicated with eased edges, tapped set screw hole, drilled and countersunk hole to suit anchor, and #4 satin stainless finish. 3Form #3-15-1644-K “Twist” is also acceptable.

C. Point Supports (“Standoffs”): Cylindrical stainless steel spacer for mounting glazing or thin panels, with finished cap and threaded rod. Cap shall be security type with set screw or require special tool for removal. Provide indicated size from 3form, Sugatsune, or Gyford Productions.
   1. Standoff Barrel Size: 20 mm (3/4-inch) to 22 mm (55/64-inch) diameter by length indicated.
   2. Standoff barrel 20 mm (3/4-inch) diameter x 25 mm (1-inch).

2.23 FABRICATION

A. Interior Woodwork Grade: Unless otherwise indicated, provide Premium-grade interior woodwork complying with referenced quality standard.

B. Wood Moisture Content: Comply with requirements of referenced quality standard for wood moisture content in relation to ambient relative humidity during fabrication and in installation areas.

C. Sand fire-retardant-treated wood lightly to remove raised grain on exposed surfaces before fabrication.

D. Fabricate interior architectural woodwork to dimensions, profiles, and details indicated. Ease edges to radius indicated for the following:
E. Unless indicated otherwise, where wood studs are indicated, provide nominal 2 x 4 wood stud framing at 16 inches on center.

F. Complete fabrication, including assembly, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide allowance for scribing, trimming, and fitting.
   1. Notify Architect seven days in advance of the dates and times interior architectural woodwork fabrication will be complete.
   2. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that parts fit as intended, and check measurements of assemblies against field measurements indicated on approved Shop Drawings before disassembling for shipment.

G. Shop-cut openings to maximum extent possible to receive hardware, appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.
   1. Seal edges of openings in countertops with a coat of varnish.

H. Install glass to comply with applicable requirements in Division 8 Section “Glazing” and in GANA’s “Glazing Manual.” For glass in wood frames, secure glass with removable stops.

2.24 SHOP PRIMING

A. Preparations for Finishing: Comply with the Architectural Woodwork Standards for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing interior architectural woodwork, as applicable to each unit of work.
   1. Backpriming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of woodwork. Apply two coats to back of paneling and to end-grain surfaces. Concealed surfaces of plastic-laminate-clad woodwork do not require backpriming when surfaced with plastic laminate, backing paper, or thermoset decorative materials.

B. Shop Priming: Shop apply the prime coat, including backpriming, if any, for items specified to be field finished. Refer to Division 9 painting Sections for material and application requirements.

2.25 SHOP FINISHING

A. Finish interior architectural woodwork with transparent finish at fabrication shop. Defer only final touchup, cleaning, and polishing until after installation. Refer to Division 9 painting Sections for finishing opaque-finished architectural woodwork.

B. Preparation for Finishing: Comply with Architectural Woodwork Standards, Section 5 for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing interior architectural woodwork, as applicable to each unit of work.
   1. Backpriming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of interior architectural woodwork. Apply two coats to end-grain surfaces.

C. Architectural Woodwork Standards Grade: Premium.
   3. Wash Coat for Closed-Grain Woods: Apply wash-coat sealer to woodwork made from closed-grain wood before staining and finishing.
5. Open Finish for Open-Grain Woods: Do not apply filler to open-grain woods.
6. Filled Finish for Open-Grain Woods: After staining, apply wash-coat sealer and allow to dry. Apply paste wood filler and wipe off excess. Tint filler to match stained wood.
7. Sheen: Satin, 31-45 gloss units measured on 60-degree gloss meter according to ASTM D 523.

PART 3 - EXECUTION

3.1 PREPARATION
A. Before installation, condition interior architectural woodwork to humidity conditions in installation areas for not less than 72 hours prior to beginning of installation.
B. Before installing interior architectural woodwork, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming of concealed surfaces.

3.2 INSTALLATION
A. Grade: Install interior architectural woodwork to comply with same grade as item to be installed.
B. Assemble interior architectural woodwork and complete fabrication at Project site to the extent that it was not completed during shop fabrication.
C. Install interior architectural woodwork level, plumb, true in line, and without distortion. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches.
D. Scribe and cut interior architectural woodwork to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
E. Preservative-Treated Wood: Where cut or drilled in field, treat cut ends and drilled holes according to AWPA M4.
F. Fire-Retardant-Treated Wood: Install fire-retardant-treated wood to comply with chemical treatment manufacturer’s written instructions, including those for adhesives used to install woodwork.
G. Anchor interior architectural woodwork to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with interior architectural woodwork. For shop-finished items, use filler matching finish of items being installed. For exposed fasteners in cabinets, provide cover caps matching adjacent color.
H. Standing and Running Trim:
1. Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to greatest extent possible.
2. Do not use pieces less than 36 inches long, except where shorter single-length pieces are necessary.
3. Scarf running joints and stagger in adjacent and related members.
4. Fill gaps, if any, between top of base and wall with plastic wood filler; sand smooth; and finish same as wood base if finished [<>].
5. Install standing and running trim with no more variation from a straight line than 1/8 inch in 96 inches.
I. Railings:
1. Install rails with no more than 1/8 inch in 96-inch variation from a straight line.
2. **Stair Rails:** Glue and dowel or pin balusters to treads and railings, and railings to newel posts.
   a. Secure with countersunk, concealed fasteners and blind nailing.
   b. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with wood surface.

3. **Wall Rails:** Support rails on wall brackets securely fastened to wall framing.
   a. Space rail brackets not more than 48 inches o.c.

J. **Paneling:** Anchor paneling to supporting substrate with concealed panel-hanger clips. Do not use face fastening, unless covered by trim.
1. Install flush paneling with no more than 1/16-inch in 96-inch vertical cup or bow and 1/8-inch in 96-inch horizontal variation from a true plane.

K. **Cabinets:** Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.
1. Install cabinets with no more than 1/8-inch in 96-inch sag, bow, or other variation from a straight line.
2. Maintain veneer sequence matching of cabinets with transparent finish.
3. Resilient base at base cabinets is specified in Division 9 Section “Resilient Base and Accessories.”
4. For removable panels, provide zee clips. Arrange panel clearances to adjacent work to allow removal. At under-sink cabinetry access panels, provide steel cable retainer of a length that allows the removable panel to be set aside for clear service access, secured with tamper-resistant fasteners. Alternatively, provide a lock to secure the panel.
5. Fasten wall cabinets 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.
6. Present keys to Owner’s representative. Identify keys by room number and casework type. Obtain receipt from Owner.

L. **Countertops:** Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.
1. Align adjacent solid-surfacing-material countertops and form seams to comply with manufacturer’s written recommendations using adhesive in color to match countertop. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
2. Install countertops with no more than 1/8-inch in 96-inch sag, bow, or other variation from a straight line.
3. Secure backsplashes to tops with concealed metal brackets at 16 inches o.c. and to walls with adhesive.
4. Calk space between backsplash and wall with sealant specified in Division 7 Section “Joint Sealants.”

M. **Window Stools:** Anchor securely by approved concealed method underside of window stools.
1. Align adjacent solid-surfacing-material window stool sections of multi-piece stools and form seams to comply with manufacturer’s written recommendations using adhesive in color to match stools. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
2. Install window stools with no more than 1/8-inch in 96-inch sag, bow, or other variation from a straight line.
3. Caulk space between window stools and both window unit and wall jambs with sealant specified in Division 7 Section “Joint Sealants.”

3.3 FIELD QUALITY CONTROL
A. Inspections: Provide inspection of installed Work through AWI’s Quality Certification Program certifying that woodwork, including installation, complies with requirements of the Architectural Woodwork Standards for the specified grade. AWI program of self-certification by manufacturer in lieu of third-party inspection is not acceptable.
   1. Inspection entity shall prepare and submit report of inspection.

3.4 REPAIR, ADJUSTING, AND TOUCHUP
A. Repair damaged and defective woodwork, where possible, to eliminate functional and visual defects and to result in interior architectural woodwork being in compliance with requirements of Architectural Woodwork Standards for the specified grade.
B. Where not possible to repair, replace defective woodwork.
C. Adjust joinery for uniform appearance. Clean, lubricate, and adjust hardware.
D. Shop Finish: Touch up finishing work specified in this Section after installation of interior architectural woodwork.
   1. Fill nail holes with matching filler where exposed.
   2. Apply specified finish coats, including stains and paste fillers if any, to exposed surfaces where only sealer/prime coats are shop applied.
E. Field Finish: See Division 09 Sections for final finishing of installed interior architectural woodwork not indicated to be shop finished.

3.5 CLEANING
A. Clean interior architectural woodwork on exposed and semiexposed surfaces.

END OF SECTION 064023
SECTION 071326 - SELF-ADHERING SHEET WATERPROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Provisions of the Contract and of the Contract Documents apply to this Section.

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 and sheet flashings, installation procedures, testing and inspection procedures, and protection and repairs.

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. 4-by-4-inch square of drainage panel.

1.4 INFORMATIONAL SUBMITTALS
   A. Qualification Data: For Installer.
   B. Sample Warranties: For special warranties.

1.5 QUALITY ASSURANCE
   A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by waterproofing manufacturer.

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: Five years from date of Substantial Completion.
B. Installer’s Special Warranty: Specified form, signed by Installer, covering Work of this Section, for warranty period of two years.
   1. Warranty includes removing and reinstalling drainage panels and insulation.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL
   A. Source Limitations for Waterproofing System: Obtain waterproofing materials and molded-sheet drainage panels from single source from single manufacturer.

2.2 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. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
      b. CETCO Building Materials Group; Envirosheet.
      c. GCP Applied Technologies Inc.; Bituthene 4000.
      d. Henry Company; Blueskin WP 200.
      e. MAPEI Corporation; Mapethene.
      f. Mar-flex Waterproofing & Building Products; ArmorSheet 600/601.
      g. Meadows, W.R.; Mel-Rol.
      h. Polyguard Products; Polyguard 650.
      i. 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.
      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, Water Method.
      h. Hydrostatic-Head Resistance: 200 feet minimum; ASTM D 5385.

2.3 AUXILIARY MATERIALS
   A. General: Furnish auxiliary materials recommended by waterproofing manufacturer for intended use and compatible with sheet waterproofing.
      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. Sheet Strips: Self-adhering, rubberized-asphalt sheet strips of same material and thickness as sheet waterproofing.

G. Metal Termination Bars: Aluminum bars, approximately 1 by 1/8 inch thick, predrilled at 9-inch centers.

2.4 MOLDED-SHEET DRAINAGE PANELS

A. Nonwoven-Geotextile-Faced, Molded-Sheet Drainage Panel: 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. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
   b. Carlisle Coatings & Waterproofing Inc.; CCW MiraDRAIN 6200.
   c. GCP Applied Technologies Inc.; Hydroduct 220.

2.5 INSULATION

A. Insulation, General: Comply with Division 07 Section “Thermal Insulation.”

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. 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 isolation joints, expansion joints, and discontinuous deck-to-wall and deck-to-deck 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. Re-prime 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. Apply continuous sheets over already-installed sheet strips, bridging substrate cracks, construction, and contraction joints.

E. Seal edges of sheet-waterproofing terminations with mastic.

F. Install sheet-waterproofing and auxiliary materials to tie into adjacent waterproofing.

G. Repair tears, voids, and lapped seams in waterproofing not complying with requirements. Slit and flatten fishmouths and blisters. Patch with sheet waterproofing extending 6 inches beyond repaired areas in all directions.

H. Immediately install protection course with butted joints over waterproofing membrane.

   1. Molded-sheet drainage panels may be used in place of a separate protection course to vertical applications when approved by waterproofing manufacturer and installed immediately.

3.4 MOLDED-SHEET DRAINAGE-PANEL INSTALLATION

A. Place and secure molded-sheet drainage panels, with geotextile facing away from wall or deck substrate, according to manufacturer’s written instructions. 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.
3.5 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.

3.6 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 insulation drainage panels from damage due to UV light, harmful weather exposures, physical abuse, and other causes. Provide temporary coverings where insulation is 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 071326
SECTION 072100 - THERMAL INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 ACTION SUBMITTALS
A. Product Data: For each type of product, including data indicating compliance with the applicable “Quality Assurance” requirements.
B. Installation Instructions: Manufacturer’s current printed installation instructions for spray polyurethane foam insulation applications indicated. Include installation instructions for foam insulation manufacturer’s ignition barrier material addressed in manufacturer’s Research Evaluation Report.

1.3 INFORMATIONAL SUBMITTALS
A. Product Test Reports: For each product, for tests performed by a qualified testing agency.

1.4 PERFORMANCE
A. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
B. NFPA 285 Tested Assembly: Provide foam plastic insulation products located in exterior wall assemblies that have been tested in accordance with NFPA 285 which represent those exterior wall assemblies for this Project.
   1. Potential heat in Btu per square feet shall not exceed the potential heat of the foam plastic insulation contained in the wall assembly tested as determined by tests in accordance with NFPA 259.

1.5 QUALITY ASSURANCE
A. Integrated Exterior Mockups: Attend preinstallation conference and provide thermal insulation work for integrated exterior mockup as specified in Division 01 Section “Quality Requirements.”

1.6 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 until just before installation time.
   3. Quickly complete installation and concealment of foam-plastic board insulation in each area of construction.
PART 2 - PRODUCTS

2.1 EXTRUDED POLYSTYRENE FOAM-PLASTIC BOARD
   A. Extruded polystyrene boards in this article are also called “XPS” and “XEPS.” Roman numeral designators in ASTM C 578 are assigned in a fixed random sequence, and their numeric order does not reflect increasing strength or other characteristics.
   B. Extruded Polystyrene Board, Type IV: ASTM C 578, Type IV, 25-psi minimum compressive strength; unfaced; maximum flame-spread and smoke-developed indexes of 25 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. Dow Chemical Company (The).
         c. Owens Corning.
         d. Kingspan Insulation LLC Corporation.

2.2 POLYISOCYANURATE FOAM-PLASTIC BOARD
   A. Polyisocyanurate Board, Foil Faced: ASTM C 1289, reinforced foil faced, Type I, Class 1, or foil faced, reinforced core, Type I, Class 2, 25-psi minimum compressive strength, maximum flame-spread and smoke-developed indexes of 25 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:
         b. Dow Chemical Company (The).
         c. Hunter Panels.
         d. Rmax, Inc.
      3. Unreinforced foil exterior facer on unreinforced core is not acceptable.

2.3 GLASS-FIBER BLANKET
   A. Glass-Fiber Blanket, Unfaced: ASTM C 665, Type I; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.
      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. CertainTeed Corporation.
         b. Guardian Building Products, Inc.
         c. Johns Manville; a Berkshire Hathaway company.
         d. Knauf Insulation.
         e. Owens Corning.
2.4 MINERAL-WOOL BLANKETS
A. Mineral-Wool Blanket, Unfaced: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.
   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. Johns Manville; a Berkshire Hathaway company.
      b. Rockwool NA.
      c. Thermafiber, Inc.; an Owens Corning company.

2.5 MINERAL-WOOL BOARD
A. Mineral-Wool Board, Types IA and IB, Unfaced: ASTM C 612, Types IA and IB; with maximum flame-spread and smoke-developed indexes of 15 and zero, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics. Nominal density of 4 lb/cu. ft. (64 kg/cu. m).
   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. Johns Manville; a Berkshire Hathaway company.
      b. Rockwool NA.
      c. Thermafiber, Inc.; an Owens Corning company.

2.6 SPRAY-APPLIED CELLULOSIC INSULATION
A. Self-Supported, Spray-Applied Cellulosic Insulation: ASTM C 1149, Type I (materials applied with liquid adhesive; suitable for either exposed or enclosed applications), chemically treated for flame-resistance, processing, and handling characteristics.
   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. Central Fiber LLC.
      b. GreenFiber.
      c. Hamilton Manufacturing Inc.
      d. International Cellulose Corp.
      e. Nu-Wool Co., Inc.

2.7 INSULATION FASTENERS
A. Adhesively Attached, Spindle-Type Anchors: Perforated plate welded to projecting spindle; capable of holding insulation of specified thickness securely in position indicated with self-locking washer in place.
   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. AGM Industries, Inc.; Series T TACTOO Insul-Hangers.
      b. Gemco; Perforated Base Insulation Hangers.
      c. Durodyne; Dynastick Insulation Hangers PBH.
      d. Midwest Fasteners, Inc.; Spindle.
   2. Plate: Perforated, galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.
3. Spindle: Copper-coated, low-carbon steel; fully annealed; 0.105 inch in diameter; length to suit depth of insulation.

B. Adhesively Attached, Angle-Shaped, Spindle-Type Anchors: Angle welded to projecting spindle; capable of holding insulation of specified thickness securely in position with self-locking washer in place.
   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. AGM Industries, Inc.; 90° Insulation Hangers.
      b. Gemco; 90-Degree Insulation Hangers.
   2. Angle: Formed from 0.030-inch-thick, perforated, galvanized carbon-steel sheet with each leg 2 inches square.
   3. Spindle: Copper-coated, low-carbon steel; fully annealed; 0.105 inch in diameter; length to suit depth of insulation.

C. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch-thick galvanized-steel sheet, with beveled edge for increased stiffness, sized as required to hold insulation securely in place, but not less than 1-1/4 inches square or in diameter.
   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. AGM Industries, Inc.
      b. Gemco.
      c. Durodyne.
      d. Midwest Fasteners, Inc.
   2. Protect ends with capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap in the following locations:
      a. Crawl spaces.
      b. Ceiling plenums.
      c. Attic spaces.
      d. Where indicated.

D. Anchor Adhesive: Product with demonstrated capability to bond insulation anchors securely to substrates without damaging insulation, fasteners, or substrates.
   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. AGM Industries, Inc.; TACTOO Adhesive.
      b. Gemco; Tuff Bond Hanger Adhesive.
      c. Durodyne; PBA.
      d. Midwest Fasteners, Inc.; IHA-177.

E. Drive Insert Mechanically-Attached Anchor at Concrete or Masonry: One-piece drive-in plastic anchor with threaded shank for pull-out resistance and large diameter insulation-retaining head. Provide length to suit application.
   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. Hilti; IDP Insulation Anchor System.
      b. Techneta; Insulation Anchor.

2.8 ACCESSORIES

A. Insulation for Miscellaneous Voids:
1. Glass-Fiber Insulation: ASTM C 764, Type II, loose fill; with maximum flame-spread and smoke-developed indexes of 5, per ASTM E 84.
2. Spray Polyurethane Foam Insulation: ASTM C 1029, Type II, closed cell, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84.

B. Adhesive for Bonding Insulation: Product compatible with insulation and air and water barrier materials, and with demonstrated capability to bond insulation securely to substrates without damaging insulation and substrates.

PART 3 - EXECUTION

3.1 PREPARATION
A. Clean substrates of substances that are harmful to insulation, including removing projections capable of puncturing insulation or vapor retarders, or that interfere with insulation attachment.

3.2 INSTALLATION, GENERAL
A. Comply with insulation manufacturer’s written instructions applicable to products and applications.
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. Fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
D. Provide sizes to fit applications and selected from manufacturer’s standard thicknesses, widths, and lengths. Apply single layer of insulation units unless multiple layers are otherwise shown or required to make up total thickness or to achieve R-value.

3.3 INSTALLATION OF FOUNDATION WALL INSULATION
A. Size or cut board insulation to tightly fit between masonry tie and reinforcement courses.
B. Adhesive Installation: Install with adhesive or press into tacky waterproofing or dampproofing according to manufacturer’s written instructions. Install tight to face of backup masonry or concrete leaving no voids.

3.4 INSTALLATION OF BOARD INSULATION, GENERAL
A. Install board insulation on substrates by adhesively attached, spindle-type insulation anchors as follows:
   1. Fasten insulation anchors to substrates with insulation anchor adhesive according to anchor manufacturer’s written instructions. Space anchors according to insulation manufacturer’s written instructions for insulation type, thickness, and application indicated.
   2. Where cavity is indicated, apply clutch clip insulation standoffs to each spindle to create cavity width indicated between substrate and insulation.
   3. After adhesive has dried, install board insulation by pressing insulation into position over spindles and securing it tightly in place with insulation-retaining washers, taking care not to compress insulation below indicated thickness.
   4. Where insulation will not be covered by other building materials, apply capped washers to tips of spindles.
3.5 INSTALLATION OF CAVITY-WALL INSULATION
A. Foam-Plastic Board Insulation: Install pads of adhesive spaced approximately 24 inches o.c. both ways on inside face and as recommended by manufacturer. Fit courses of insulation between wall ties and other obstructions, with edges butted tightly in both directions. Press units firmly against inside substrates.
   1. Supplement adhesive attachment of insulation by securing boards with two-piece wall ties designed for this purpose and specified in Section 042000 "Unit Masonry."

3.6 INSTALLATION OF INSULATION IN FRAMED CONSTRUCTION
A. Blanket Insulation: Install in cavities formed by framing members according to the following requirements:
   1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
   2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
   3. Maintain 3-inch clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
   4. For metal-framed wall cavities where cavity heights exceed 96 inches (2438 mm), support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.

B. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:
   1. Glass-Fiber Insulation: Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft.
   2. Spray Polyurethane Insulation: Apply according to manufacturer’s written instructions.

C. Spray-Applied Cellulosic Insulation: Apply spray-applied insulation according to manufacturer’s written instructions. Do not apply insulation until installation of pipes, ducts, conduits, wiring, and electrical outlets in walls is completed and windows, electrical boxes, and other items not indicated to receive insulation are masked. After insulation is applied, make flush with face of studs by using method recommended by insulation manufacturer.

3.7 INSTALLATION OF CURTAIN-WALL INSULATION
A. Install board insulation in curtain-wall construction according to curtain-wall manufacturer’s written instructions.
   1. Hold insulation in place by securing metal clips and straps or integral pockets within window frames, spaced at intervals recommended in writing by insulation manufacturer to hold insulation securely in place without touching spandrel glass. Maintain cavity width of dimension indicated on Drawings between insulation and glass.
   2. Install insulation to fit snugly without bowing.

3.8 INSTALLATION OF INSULATION IN CEILINGS FOR SOUND ATTENUATION
A. Where glass-fiber blankets are indicated for sound attenuation above ceilings, install blanket insulation over entire ceiling area in thicknesses indicated. Extend insulation 48 inches up either side of partitions.
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 072100
SECTION 072727 - SPRAYED POLYURETHANE FOAM AIR BARRIER

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 DEFINITIONS
A. ABAA: Air Barrier Association of America.
B. Air Barrier Assembly: The collection of air barrier materials and auxiliary materials applied to an opaque wall, including joints and junctions to abutting construction, to control air movement through the wall.

1.3 PERFORMANCE REQUIREMENTS
A. Material Performance: Provide materials which have an air permeance not to exceed 0.004 cubic feet per minute per square foot under a pressure differential of 0.3 in. water (1.57 psf) (0.02 L/s x sq. m @ 75 Pa.) when tested according to ASTM E 2178.
   1. Design R value minimum R 6 per inch.
   2. Density of 1.9 pounds per cubic foot.
   3. Smoke development not greater than 450 and flame spread not greater than 25 when tested in accordance with ASTM E 84.
C. Assembly Performance: Provide a continuous air barrier assembly that has an air leakage rate not to exceed 0.040 cubic feet per square foot per minute under a pressure differential of 0.3 in. water (1.57 psf) (0.20 L/sm @ 75 Pa.) when tested in accordance with ASTM E 2357. Assembly shall perform as a liquid drainage plane flashed to discharge condensation or water penetration to the exterior. Assembly shall accommodate movements of building materials by providing expansion and control joints as required, with accessory air and vapor seal materials at such locations, changes in substrate and perimeter conditions.
   1. Assembly shall be capable of withstanding positive and negative combined design wind, fan and stack pressures on the envelope without damage or displacement, and shall transfer the load to the structure.
   2. Assembly shall not displace adjacent materials under full load.
   3. Assembly shall be joined in an airtight and flexible manner to the air barrier material of adjacent assemblies, allowing for the relative movement of assemblies due to thermal and moisture variations and creep, and anticipated seismic movement.
D. 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 or doors.
   3. Different wall 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 leakage pathways in the building envelope.

1.4 SUBMITTALS
   A. Submittals: Submit in accordance with Division 01 requirements.
   B. Quality Assurance Program: Submit evidence of current accreditation of the subcontractor and certification of the installers under the Air Barrier Association of America’s (ABAA) Quality Assurance Program. Submit accreditation number of subcontractor and certification number of installers.
   C. Product Data: Submit manufacturer’s product data, manufacturer’s printed instructions for evaluating, preparing, and treating substrate, temperature and other limitations of installation conditions, technical data, and tested physical and performance properties.
      1. Submit letter from primary materials manufacturer indicating approval of products not manufactured by primary manufacturer.
      2. Include statement that materials are compatible with adjacent materials proposed for use.
      3. Submit reports indicating that field peel-adhesion test on all materials to which sealants are adhered have been performed and the changes made, if required, to other approved materials, in order to achieve successful adhesion.
      4. Include data indicating compliance with the applicable “Quality Assurance” requirements.
   D. Shop Drawings: Submit shop drawings showing locations and extent of air barrier assemblies and details of all typical conditions, intersections with other envelope assemblies and materials, membrane counter-flashes, and details showing how gaps in the construction will be bridged, how inside and outside corners are negotiated, how materials that cover the air barrier are secured with air-tight condition maintained, and how miscellaneous penetrations such as conduits, pipes electric boxes and similar items are sealed.
      1. Include statement that materials are compatible with adjacent materials proposed for use.
      2. Include recommended values for field adhesion test on each substrate.
   E. Compatibility: Submit letter from manufacturer stating that materials proposed for use are permanently chemically compatible and adhesively compatible with adjacent materials proposed for use. Submit letter from manufacturer stating that cleaning materials used during installation are chemically compatible with adjacent materials proposed for use.

1.5 QUALITY ASSURANCE
   A. Air Barrier Subcontractor Qualifications: Subcontractor shall be currently accredited by the Air Barrier Association of America (ABAA) whose installers are certified in accordance with the ABAA Quality Assurance Program.
      1. Installers shall also be certified by ABAA/BPQI (Building Performance Quality Institute) in accordance with the training requirements outlined in the ULC S705.2-05 Installation Standard. Installers shall have their photo-identification certification cards in their possession and available on the project site, for inspection upon request.
   B. Manufacturer: Obtain primary materials from a single manufacturer regularly engaged in manufacturing air barrier membranes. Obtain secondary materials from a source acceptable to the primary materials manufacturer.
   C. NFPA 285 Tested Assembly: Provide foam plastic insulation products located in exterior wall assemblies that have been tested in accordance with NFPA 285 which represent those
exterior wall assemblies for this Project.

1. Potential heat in Btu per square feet shall not exceed the potential heat of the foam plastic insulation contained in the wall assembly tested as determined by tests in accordance with NFPA 259.

D. Preinstallation Conference: Conduct conference at Project site. Include installers of other construction connecting to the air barrier, including roofing, waterproofing, architectural precast concrete, masonry, sealants, windows, glazed curtain walls, and door frames.

1. Refer to Division 01 Section “Exterior Building Enclosure Air Barrier Requirements.”
2. Review manufacturer’s written instructions for evaluating, preparing, and treating substrate; technical data; and tested physical and performance properties of products.
3. Review air barrier requirements including surface preparation, substrate condition and pretreatment, minimum substrate curing period, forecasted weather conditions, special details and sheet flashings, mockups, installation procedures, sequence of installation, testing and inspecting procedures, and protection and repairs.

E. Field Quality Assurance: Implement the ABAA Quality Assurance Program requirements. Cooperate with ABAA inspectors and independent testing and inspection agencies engaged by the Owner. Do not cover air barrier until it has been inspected, tested and accepted.

F. Integrated Exterior Mockups: Attend preinstallation conference and provide air barrier system components for integrated exterior mockup as specified in Division 01 Section “Quality Requirements.”

G. Air Barrier Manufacturer’s Technical Representative Field Review: Air Barrier manufacturer’s technical representative shall review the work and provide copies of his observations in the form of a technical report to the Architect and the Owner. The Air Barrier Installer is responsible to notify the manufacturer’s technical representative of intended start date and schedule of Air Barrier work.

1. The Installer and Air Barrier manufacturer’s technical representative shall review the substrate surfaces (wall) to receive Air Barrier system prior to beginning installation.
2. The Air Barrier manufacturer’s technical representative shall visit the site to review the work no less than three times (startup, in-progress, and end-of-installation inspection) during the application of the system & submit copies of technical reports to the Architect and Owner within 7 days of the site visit.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in original packages or containers with seals unbroken, labeled with manufacturer’s name, product, date of manufacture, and directions for storage.

1. Packages and containers of foam plastic insulation and foam plastic insulation components delivered to the job site shall bear the label of an approved agency showing the manufacturer’s name, product listing, product identification and information sufficient to determine that the end use will comply with the code requirements.

B. Store materials in their original undamaged packages or containers in a clean, dry, protected location and within temperature range required by air barrier membrane manufacturer. Protect stored materials from direct sunlight.

C. Handle materials in accordance with manufacturer’s recommendations.

1.7 PROJECT CONDITIONS

A. Temperature: Install air barrier within range of ambient and substrate temperatures recommended by air barrier manufacturer. Do not apply air barrier to a damp or wet substrate.
B. Field Conditions: Do not install air barrier in snow, rain, fog, or mist. Do not install air barrier when the temperature of substrate surfaces and surrounding air temperatures are below those recommended by the manufacturer.

1.8 WARRANTY

A. Material Warranty: Provide manufacturer’s standard product warranty, for a minimum 3 years from date of Substantial Completion.

B. Installation Warranty: Provide air barrier subcontractor’s 2-year warranty from date of Substantial Completion, including all components of the air barrier assembly, against failures including loss of air tight seal, loss of watertight seal, loss of adhesion, loss of cohesion, failure to cure properly.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Spray Polyurethane Foam Air Barrier (“SPF”): Spray-applied proprietary materials as specified. Subject to compliance with requirements, provide one of the following:

1. BASF; Walltite.
2. Carlisle Spray Foam Insulation; SealTite D7 One Zero.
3. Demilec (USA) LLC.; Heatlok Soy 200 Plus.
4. Henry Company; Permax 2.0X.
5. Icynene Inc.; ProSeal (MD-C-200v3).
6. Johns Manville; CorBond III.
7. NCFI Polyurethanes; InsulBloc.

2.2 AUXILIARY MATERIALS

A. Membrane at Transitions in Substrate and Connections to Adjacent Elements: One of the following as acceptable to the spray polyurethane foam air barrier manufacturer:

1. CCW-705 by Carlisle Coatings and Waterproofing.
4. Poly-Wall Crack Guard by Protective Coatings Technology, Inc.
5. ExoAir 110 by Tremco, Inc.
6. Air Shield by W. R. Meadows, Inc.

B. Transition Membrane between Air Barrier Membrane and Roofing and Other Adjacent Materials: Comply with both air barrier manufacturer’s recommendations and material manufacturer’s recommendations.

C. Spray Foam Stop and Screed: L-shaped stop and screed designed as a SPF termination accessory, fabricated of stable UV-resistant plastic and acceptable to SPF manufacturer. Outer leg shall be sized to match 2-inch SPF thickness. “Jam-Ex” by Exo-Tec Manufacturing, Inc. or equivalent.

D. Counterflashing for Masonry Through-Wall Flashing: One of the following and as acceptable to the spray polyurethane foam air barrier manufacturer:

1. CCW-705 TWF by Carlisle Coatings and Waterproofing.
4. Poly-Wall Crack Guard by Protective Coatings Technology, Inc.
5. ExoAir TWF by Tremco, Inc.
6. Detail Strip by W. R. Meadows, Inc.

PART 3 - EXECUTION

3.1 EXAMINATION
   A. 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, excess mortar, or other contaminants.
   2. Verify that concrete has cured and aged for minimum time period recommended by air barrier manufacturer.
   3. Verify that concrete is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D 4263.
   4. Verify that masonry joints are flush and completely filled with mortar.
   5. Verify that sheathing joints are finished flush and sealants used are compatible with air barrier materials proposed for use. Perform field peel-adhesion test on materials to which sealants are adhered.
   6. Proceed with surface preparation and installation only after unsatisfactory conditions have been corrected.

3.2 SURFACE PREPARATION
   A. Remove irregularities in substrates and patch cracks to attain suitable substrate.
   1. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids in concrete with substrate patching membrane.
   2. Remove excess mortar from masonry ties, shelf angles, and other obstructions.
   3. Patch all holes and voids and smooth out any surface misalignments.
   4. Patch all masonry cracks, protrusions, small voids, offsets, details, irregularities and small deformities with cementitious patching mortar at least two hours before application.
   5. 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.
   6. Cover gaps in substrate plane and form a smooth transition from one substrate plane to another with appropriate transition material to provide continuous support for air barrier.

   B. Clean, prepare, and treat substrate according to manufacturer’s written instructions. Provide clean, dust-free, and dry substrate for air barrier application.
   1. Ensure that penetrating work by other trades is in place and complete.
   2. Prepare surfaces by brushing, scrubbing, scraping, or grinding to remove loose mortar, dust, oil, grease, oxidation, mill scale and other contaminants which will affect adhesion of the spray polyurethane foam.
   3. Wipe down metal surfaces to remove release agents or other non-compatible coatings.
   4. Ensure veneer anchors are in place.
   5. Provide spray foam stops or screeches, secured to substrate, for SPF termination details indicated and as needed at perimeter of SPF installation.

   C. Prime substrate for application of sheet membrane transition strips as recommended by manufacturer and as follows:
   1. Prime masonry, concrete substrates with conditioning primers.
2. Prime glass-fiber surfaced gypsum sheathing an adequate number of coats to achieve required bond, with adequate drying time between coats.
3. Prime wood, metal, and painted substrates with primer.
4. Prepare, treat, and seal vertical and horizontal surfaces at terminations and penetrations through air barrier and at protrusions.

D. Protection from Spray Applied Materials:
1. Protect adjacent surfaces not designated to receive air barrier to prevent spillage and overspray affecting other construction.
2. Ensure any required foam stop or back up material are in place to prevent over spray and achieve complete seal.
3. Comply with measures specified in Division 1 Section “Indoor Air Quality Requirements.”
4. Erect barriers, isolate area and post warning signs to advise non-protected personnel to avoid the spray area.

3.3 INSTALLATION
A. Transition Strip Installation: Install transition strip materials to provide continuity throughout the building envelope. Install materials in accordance with manufacturer’s recommendations and the following:
1. Apply primer for transition strips at rate recommended by manufacturer. Allow primer to dry completely before transition strip application. Apply as many coats as necessary for proper adhesion.
2. Position subsequent sheets of transition strips applied above so that membrane overlaps the membrane sheet below by a minimum of 2 inches, unless greater overlap is recommended by manufacturer. Roll into place with roller.
3. Overlap horizontally adjacent pieces of transition strips a minimum of 2 inches, unless greater overlap is recommended by manufacturer. Roll seams with roller.
4. Seal around all penetrations with a transition strip or other procedure in accordance with manufacturer’s recommendations.
5. 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, penetrations, and other intersection conditions using transition membranes and in accordance with the manufacturer’s recommendations.
6. Wall Openings: Prime concealed perimeter frame surfaces of windows, curtain walls, storefronts, and doors. Apply transition strip and air barrier materials to maintain continuity as indicated. Coordinate with installation of flashing materials:
7. At changes in substrate plane, provide transition material recommended by manufacturer to make a smooth transition from one plane to another.
8. Provide mechanically fastened non-corrosive metal sheet to span gaps in substrate plane and to make a smooth transition from one plane to the other. Membrane shall be continuously supported by substrate.
9. At through-wall flashings, provide an additional 6-inch-wide strip of manufacturer’s recommended membrane counterflashing to seal top of through-wall flashing to membrane. Seal exposed top edge of strip with bead of mastic as recommended by manufacturer.
10. At deflection and control joints, provide backup for the membrane to accommodate anticipated movement.
11. At expansion and seismic joints provide transition to the joint assemblies.
12. Apply a bead or trowel coat of mastic along membrane seams at reverse lapped seams, rough cuts, and as recommended by the manufacturer when membrane will be
exposed to the elements.

13. At end of each working day, seal top edge of self-adhered membrane to substrate with termination mastic if exposed.

14. Do not allow materials to come in contact with chemically incompatible materials.

15. Do not expose transition membrane to sunlight longer than as recommended by the manufacturer.

16. Inspect installation prior to enclosing assembly and repair damaged areas with spray polyurethane foam as recommended by manufacturer.

B. Spray Application of Polyurethane: Install materials in accordance with manufacturer’s recommendations, ULC S705.2, evaluation or tested assembly report, and the following:

1. Equipment used to spray polyurethane foam shall comply with ULC S705.2 and the manufacturer’s recommendations for the specific type of application. Record equipment settings on the Daily Work Record as required by the ULC S705.2 installation standard. Each proportioner unit shall supply only one spray gun.

2. Apply only when surfaces and environmental conditions are within limits prescribed by the material manufacturer and the ULC S705.2 Installation standard.

3. Apply in consecutive passes as recommended by manufacturer to thickness as indicated on drawings. Passes shall be not less than 1/2 inch and not greater than 2 inches. An additional pass of 2 inches shall only be done after the first pass has had time to cool down. At no time shall more than 4 inches be installed in a single day.

4. Install within manufacturer’s tolerances, but not more than minus 1/4 inch or plus 1/2 inch.

5. Do not install spray polyurethane foam within 3 inches of heat emitting devices such as light fixtures and chimneys.

6. Finished surface of foam insulation to be free of voids and embedded foreign objects.

7. Remove masking materials and over spray from adjacent areas immediately after foam surface has hardened. Ensure cleaning methods do not damage work performed by other sections.

8. Trim, as required, any excess thickness that would interfere with the application of cladding/covering system by other trades.

9. Clean and restore surfaces soiled or damaged by work of the section. Consult with section of work soiled before cleaning to ensure methods used will not damage the work.

10. Complete connections to other components and repair any gaps, holes or other damage using material which conforms to ULC S710.1 or ULC S711.1 and installed in accordance with ULC S710.2 or ULC S711.2 as applicable.

C. Coordination: Coordinate and cooperate with Division 7 Section “Thermal Barriers for Plastics” for installation of thermal barrier treatment of sprayed polyurethane foam exposed to the interior of the building.

3.4 FIELD QUALITY CONTROL

A. ABAA Site Inspections: Arrange and pay for site inspections by ABAA to verify conformance with the manufacturer’s instructions, the ULC S705.2 Installation standard, the ABAA Quality Assurance Program, and this section of the project specification.

1. Unless indicated otherwise, provide ABAA Quality Assurance Program audits in accordance with current “Frequency & Cost of Audits” posted on ABAA website. Forward written inspection reports to the Architect within 10 working days of the inspection and test being performed. In the case of any deficiencies, the ABAA-licensed inspector may verbally advise the licensed installer at the time of the inspection.
2. If the inspections reveal any defects, promptly remove and replace defective work at no additional expense to the Owner.

3. In addition to the ABAA site inspector, the air barrier manufacturer’s technical representative will make field reviews during installation and provide technical reports to Contractor, Owner and Architect.

B. Provide access for air barrier manufacturer’s technical representative to make inspections. Coordinate and cooperate with those inspections.

3.5 CLEANING AND PROTECTION

A. Protect air barrier assemblies from damage during application and remainder of construction period, according to manufacturer’s written instructions.

1. Coordinate with installation of materials which cover air barrier, to ensure exposure period does not exceed that recommended by the air barrier manufacturer.

B. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction and acceptable to the primary material manufacturer.

END OF SECTION 072727
SECTION 075423 - THERMOPLASTIC POLYOLEFIN (TPO) ROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 DEFINITIONS
A. Roofing Terminology: Definitions in ASTM D 1079 and glossary in NRCA’s “The NRCA Roofing and Waterproofing Manual” apply to work of this Section.
B. TPO: Thermoplastic polyolefin.

1.3 PREINSTALLATION MEETINGS
A. Preinstallation Roofing Conference: Conduct conference at Project site.
   1. Meet with Owner, Architect, 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 materials certification and procedures.
   3. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
   4. Review and finalize construction schedule, and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
   5. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
   6. Review structural loading limitations of roof deck during and after roofing.
   7. Review installation requirements for the wood blocking, wood curbs, and wood nailers.
   8. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that affects roofing system.
   9. Review governing regulations and requirements for insurance and certificates if applicable.
  10. Review temporary protection requirements for roofing system during and after installation.
  11. Review roof observation and repair procedures after roofing installation.

1.4 ACTION SUBMITTALS
A. Product Data: For each type of product.
B. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other work, including:
   1. Base flashings and membrane terminations.
   2. Tapered insulation, including slopes and preformed shapes (saddles, crickets, tapered edges).
   3. Roof plan showing orientation of steel roof deck and orientation of roofing, fastening spacings, and patterns for mechanically fastened membrane roofing.
   4. Insulation fastening patterns for corner, perimeter, and field-of-roof locations.
   5. Include details of roofing vapor retarder/air barrier membrane connection to wall air barrier system to accomplish continuous air barrier system for an airtight building.
enclosure.

C. Samples: For the following products:
   1. Sheet roofing, of color required, including T-shaped side and end lap seam.
   2. Roof insulation.
   3. Walkway pads or rolls.
   4. Six insulation fasteners of each type, length, and finish.

1.5 INFORMATIONAL SUBMITTALS
A. Qualification Data: For Installer and manufacturer.
B. Installation Instructions: Manufacturer’s current printed instructions for installation of materials and systems proposed. Address conditions of projects including concrete deck preparation, required weather and temperature conditions for installation, and all roofing system components.
C. Manufacturer Certificates: Signed by roofing manufacturer certifying that roofing system complies with requirements specified in “Performance Requirements” Article.
   1. Submit evidence of compliance with performance requirements.
D. Product Test Reports: For components of roofing system, tests performed by manufacturer and witnessed by a qualified testing agency.
E. Research/Evaluation Reports: For components of roofing system, from ICC-ES.
F. Sample Warranties: For manufacturer's special warranties.
G. Inspection Report: Copies of roofing system manufacturer's inspection report of completed roofing installation, and of field inspection reports for startup and in-progress inspections.

1.6 CLOSEOUT SUBMITTALS
A. Maintenance Data: For roofing system to include in maintenance manuals.

1.7 QUALITY ASSURANCE
A. Manufacturer Qualifications: A qualified manufacturer that is UL listed and FM Approvals approved for roofing system identical to that used for this Project.
B. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty.
C. Preinstallation Roofing Conference: Before starting roof deck construction, conduct conference at Project site.
   1. Meet with Owner, Architect, 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 printed and published instructions.
   3. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
   4. Review deck substrate requirements for conditions and finishes, including flatness and fastening.
   5. Review structural loading limitations of roof deck during and after roofing.
   6. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing system.
7. Review governing regulations and requirements for insurance and certificates if applicable.
8. Review temporary protection requirements for roofing system during and after installation.
9. Review roof observation and repair procedures after roofing installation.

D. Inspection Reports of Roofing Manufacturer's Representative: Roofing manufacturer's technical representative shall inspect the work and provide copies of his inspection reports to the Architect and the Owner. The Installer shall notify manufacturer's representative of intended start date & schedule of roofing work.
   1. The Installer and Roofing manufacturer's representative shall inspect the substrate surfaces (deck) to receive roofing system prior to beginning installation.
   2. The roofing manufacturer's representative shall inspect the work no less than three times (startup, in-progress, and end-of-installation warranty inspection) during the application of the system and submit copies of inspection reports to the Architect and Owner within 7 days of the inspection.

E. Integrated Exterior Mockups: Attend preinstallation conference and provide TPO membrane roofing work for integrated exterior mockup as specified in Division 01 Section “Quality Requirements.”

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.

B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.
   1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.

C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.

D. Handle and store roofing materials, and place equipment in a manner to avoid permanent deflection of deck.

1.9 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

1.10 WARRANTY

A. Special Warranty: Manufacturer's “edge-to-edge” or “total system” warranty, without monetary limitation, in which Manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period. Failure includes roof leaks.
   1. Special warranty includes roofing, base flashings, fasteners, substrate board, vapor retarder/air barrier, roof insulation, cover board, roofing accessories, and other components of membrane roofing system.
   2. Warranty Period: 20 years from date of Substantial Completion.
B. Special Project Warranty: Submit roofing Installer's warranty, on warranty form at end of this Section, signed by Installer, covering the Work of this Section, including all components as indicated for Special Warranty above, for the following warranty period:
1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS
A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
2. Firestone Building Products Company.

B. Source Limitations: Obtain all components for roofing system from same manufacturer as membrane roofing, or from manufacturer approved by membrane roofing manufacturer, as required to comply with terms of manufacturer's warranty.

2.2 PERFORMANCE REQUIREMENTS
A. General Performance: Installed roofing and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Roofing and base flashings shall remain watertight.
1. Accelerated Weathering: Roofing system shall withstand 2000 hours of exposure when tested according to ASTM G 152, ASTM G 154, or ASTM G 155.
2. Impact Resistance: Roofing system shall resist impact damage when tested according to ASTM D 3746 or ASTM D 4272, CGSB 37-GP-52M, or the "Resistance to Foot Traffic Test" in Section 5.5 of FM 4470.
3. Static Uplift Testing: In addition to wind uplift requirements, system tested per FM 4474, UL 580 or UL 1897.

B. Material Compatibility: Roofing materials shall be compatible with one another and adjacent materials under conditions of service and application required, as demonstrated by roofing manufacturer based on testing and field experience.

C. Roofing System Design: Provide membrane roofing system that is identical to systems that have been successfully tested by a qualified testing and inspecting agency to resist uplift pressure calculated according to ASCE/SEI 7 as established by the applicable building code and loading indicated.
1. Corner Uplift Pressure: Per building code and values indicated on Structural Drawings.
2. Perimeter Uplift Pressure: Per building code and values indicated on Structural Drawings.
3. Field-of-Roof Uplift Pressure: Per building code and values indicated on Structural Drawings.

D. Exterior Fire-Test Exposure: ASTM E 108 or UL 790, Class A; for application and roof slopes indicated; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

E. Fire-Resistance Ratings: Where indicated, provide fire-resistance-rated roof assemblies identical to those of assemblies tested for fire resistance per ASTM E 119 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
2.3 TPO ROOFING
   1. Thickness: 60 mils nominal; 15 mils min polyolefin thickness above reinforcing.
   2. Exposed Face Color: White.
   4. Physical Properties:
      5. Elongation at Break: 15 percent; ASTM D 751.
         a. Tearing Strength: 92 lbf; ASTM D 751, Procedure B.
         b. Puncture Resistance: 300 lbs. typical, FTM 101B (Method 2031)
         c. Brittleness Point: Minus 40 degrees F.
         d. Ozone Resistance: No cracks after sample, wrapped around a 3-inch- diameter mandrel, is exposed for 166 hours to a temperature of 104 degrees F and an ozone level of 100 ppmm; ASTM D 1149.
         e. Resistance to Heat Aging: 90 percent minimum retention of breaking strength and elongation at break, and 60 percent minimum tearing strength after 5,376 hours at 240 deg F; ASTM D 573.
         f. Water Absorption: Less than 4 percent mass change after 166 hours' immersion at 158 degrees F; ASTM D 471.
         g. Linear Dimension Change: Plus or minus 2 percent; ASTM D 1204.

2.4 AUXILIARY MEMBRANE ROOFING MATERIALS
A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with roofing.
   1. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.
B. Sheet Flashing: Manufacturer's standard unreinforced TPO sheet flashing, 55 mils thick, minimum, of same color as TPO sheet.
C. Bonding Adhesive: Manufacturer's standard bonding adhesive for membrane, and solvent-based bonding adhesive for base flashings.
D. Metal Termination Bars: Manufacturer's standard, predrilled stainless-steel or aluminum bars, approximately 1- by 1/8-inch-thick; with anchors.
E. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, lap sealants, termination reglets, and other accessories.

2.5 VAPOR RETARDER/AIR BARRIER
A. Self-Adhering, Vapor Retarder/Underlayment Sheet: 30 to 40 mils thick minimum, consisting of Slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.
   1. Thickness: 30 mils minimum.
   2. Air leakage: Less than 0.004 CFM/sq ft @1.6 lbs/sq ft (75 Pa.) per ASTM E2178.
   3. Vapor Permeance: 0.05 perms maximum per ASTM E96.
   5. Elongation: 200% per ASTM D412-modified.
7. Adhesion: 3.0 lbs/in. width (525 N/m) minimum per ASTM D903 for plywood.
8. Available Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
   a. Carlisle SynTec; VapAir Seal 725 TR.
   b. Firestone; V-Force Vapor Barrier.
   c. Johns Manville; JM Vapor Barrier SA

2.6 ROOF INSULATION
A. General: Preformed roof insulation boards manufactured or approved by TPO roofing manufacturer, selected from manufacturer's standard sizes suitable for application, of thicknesses indicated.
B. Polyisocyanurate Board Insulation: ASTM C 1289, Type II, Class 1, Grade 2 – 20 psi minimum compressive strength polyisocyanurate foam, felt or glass-fiber mat facer on both major surfaces. Provide 4-foot by 4-foot boards only.
C. Tapered Insulation: Provide factory-tapered insulation boards fabricated to slope of 1/4 inch per 12 inches unless otherwise indicated.
D. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.

2.7 INSULATION ACCESSORIES
A. General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatibility with roofing.
B. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Global 4470, designed for fastening roof insulation to substrate, and acceptable to roofing system manufacturer.
C. Insulation Adhesive: Insulation manufacturer's recommended adhesive formulated to attach roof insulation to substrate or to another insulation layer as follows:
   1. Bead-applied, low-rise, one-component or multicomponent urethane adhesive.
   2. Full-spread spray-applied, low-rise, two-component urethane adhesive.
D. Cover Board: Provide one of the following, subject to compliance with terms of warranty.
   1. ASTM C 1289, Type II, Class I, exceeding Grade 3, high density, closed-cell, polyisocyanurate foam core with coated glass-fiber mat facer on both major surfaces, with maximum 3% water absorption by weight per ASTM C473; mold-resistant per ASTM D3273, minimum 100 psi compressive strength per ASTM D 1621, 1/2-inch-thick.
      a. Carlisle; SecurShield HD.
      b. Firestone; Isogard HD Cover Board.

2.8 WALKWAYS
A. Flexible Walkways (Roof Protection Surface Pads): Factory-formed, nonporous, heavy-duty, slip-resisting, surface-textured walkway pads or rolls, approximately 3/16-inch-thick and acceptable to roofing system manufacturer.

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 Work:
1. Verify that roof openings and penetrations are in place, curbs are set and braced, and roof-drain bodies are securely clamped in place.
2. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.
3. Verify that surface plane flatness and fastening of steel roof deck complies with requirements in Division 05 Section “Steel Decking.”

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

3.2 PREPARATION
A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.
B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.
C. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at the end of the workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.
D. Install insulation strips according to acoustical roof deck manufacturer's written instructions.

3.3 SUBSTRATE BOARD INSTALLATION
A. Install substrate board with long joints in continuous straight lines, perpendicular to roof slopes with end joints staggered between rows. Tightly butt substrate boards together.

3.4 VAPOR-RETARDER/AIR BARRIER INSTALLATION
A. Self-Adhering-Sheet Vapor Retarder/Air Barrier: Prime substrate if required by manufacturer. Install self-adhering-sheet vapor retarder over area to receive vapor retarder/air barrier, side and end lapping each sheet a minimum of 3-1/2 inches and 6 inches, respectively. Seal laps by rolling.
1. Coordinate placement of vapor retarder/air barrier underlayment over substrate board on metal roof deck with other components of the building envelope to accomplish the air-tightness of the building enclosure which constitutes the total air barrier system specified in Division 01 Section “Exterior Enclosure Air Barrier Requirements.”
B. Completely seal vapor retarder/air barrier at terminations, obstructions, and penetrations to prevent air movement into roofing system.

3.5 INSULATION INSTALLATION
A. Coordinate installing roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.
B. Comply with roofing system and insulation manufacturer's written instructions for installing roof insulation.
C. Install insulation under area of roofing to achieve required thickness. Where overall insulation thickness is 2 inches or greater, install 2 or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches in each direction.
1. At sloping deck, provide two (2) layers of polyisocyanurate for total thickness to achieve a cumulative Long Term Thermal Resistance (LTTR) value of 30 per ASTM C1289-13 with a 1/2-inch cover board. Install the two (2) layers of insulation and
cover board with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches in each direction. Crickets, cants, and tapered edge strips are also in addition to the isocyanurate insulation board thickness.

2. At level decks, provide two (2) layers of polyisocyanurate for total thickness to achieve a cumulative Long Term Thermal Resistance (LTTR) value of 30 per ASTM C1289-13 with a 1/2-inch cover board. Install the two (2) layers of insulation and cover board with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches in each direction. Crickets, cants, and tapered edge strips are also in addition to the isocyanurate insulation board thickness for the primary roof planes.

D. Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water.

E. Install insulation with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4 inch with insulation.

1. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.

F. Install tapered edge strips at perimeter edges of roof that do not terminate at vertical surfaces.

G. Mechanically Fastened and Adhered Insulation: Install each layer of insulation to deck using mechanical fasteners or insulation manufacturer’s recommended adhesive, specifically designed and sized for fastening specified board-type roof insulation to deck type.

1. Mechanically fasten first layer of insulation to top flanges of steel deck to resist uplift pressure at corners, perimeter, and field of roof according to membrane roofing system manufacturers' written instructions. Fasteners shall not penetrate bottom flanges of steel roof deck.

2. Set each subsequent layer of insulation in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place. Provide insulation at 4-inch, 6-inch, or 12-inch on center bead spacing required for project to resist uplift pressure calculated according to ASCE/SEI 7 as established by IBC and loading indicated.

3. Set each subsequent layer of insulation in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.

H. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Offset joints of insulation below a minimum of 6 inches in each direction. Loosely butt cover boards together and secure to roofing assembly in a uniform coverage of full-spread insulation adhesive or in ribbons of bead-applied insulation adhesive.

1. Cover boards shall resist uplift pressure at corners, perimeter, and field of roof.

3.6 ADHERED ROOFING MEMBRANE INSTALLATION

A. Install roofing membrane system according to roofing system manufacturer's written instructions and applicable recommendations in ARMA/NRCA's “Thermoplastic Roof Assembly Design Guidelines.”

B. Adhere roofing over area to receive roofing according to roofing system manufacturer's written instructions. Unroll roofing and allow to relax before retaining.

C. Start installation of roofing in presence of roofing system manufacturer's technical personnel.

D. Accurately align roofing, and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.
E. Bonding Adhesive: Apply to substrate and underside of roofing at rate required by manufacturer, and allow to partially dry before installing roofing. Do not apply to splice area of roofing.

F. In addition to adhering, mechanically fasten roofing securely at terminations, penetrations, and perimeter of roofing.

G. Apply roofing with side laps shingled with slope of roof deck where possible.

H. Seams: Clean seam areas, overlap roofing, and hot-air weld side and end laps of roofing and sheet flashings according to manufacturer's written instructions, to ensure a watertight seam installation.
   1. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of sheet.
   2. Verify field strength of seams a minimum of twice daily, and repair seam sample areas.
   3. Repair tears, voids, and lapped seams in roofing that do not comply with requirements.

I. Spread sealant bed over deck-drain flange at roof drains, and securely seal roofing in place with clamping ring.

3.7 BASE FLASHING INSTALLATION

A. Install sheet flashings and preformed flashing accessories, and adhere to substrates according to roofing system manufacturer's written instructions.

B. Apply bonding adhesive to substrate and underside of sheet flashing at required rate, and allow to partially dry. Do not apply to seam area of flashing.

C. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing.

D. Clean seam areas, overlap, and firmly roll sheet flashings into the adhesive. Hot-air weld side and end laps to ensure a watertight seam installation.

E. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars.

3.8 WALKWAY INSTALLATION

A. Flexible Walkways: Unless otherwise indicated, provide walkways from points of access to the roof (e.g. roof ladders, roof scuttles, and doors) to and around roof-mounted equipment requiring regular maintenance, including but not being limited to; rooftop HVAC units and exhaust fans. Adhere walkway products to substrate with compatible adhesive according to roofing system manufacturer's printed and published instructions.
   1. If walkway pads are used, the maximum spacing between pads shall be 4 inches.

3.9 FIELD QUALITY CONTROL

A. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion.

B. Repair or remove and replace components of roofing system where inspections indicate that they do not comply with specified requirements.

C. Additional testing and inspecting, at Subcontractor's expense, will be performed to determine if replaced or additional work complies with specified requirements.
3.10 PROTECTING AND CLEANING
A. Protect roofing system from damage and wear during remainder of construction period. When remaining construction does not affect or endanger the quality or cleanliness of roofing, inspect roofing for deterioration, damage, and cleanliness, describing its nature and extent in a written report that includes representative photographs, with copies to Architect and Owner.
B. Correct deficiencies in or remove roofing system that does not comply with requirements, repair substrates, and repair or reinstall roofing system to a condition free of damage, deterioration, and dirt/clay at time of Substantial Completion and according to warranty requirements.
C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

3.11 ROOFING INSTALLER'S WARRANTY
A. WHEREAS ________________ of __________________________, herein called the “Roofing Installer,” has performed roofing and associated work (“work”) on the following project:
   1. Owner: .
   2. Address: .
   3. Building Name/Type: .
   4. Address: .
   5. Area of Work: .
   6. Acceptance Date: ________________.
   8. Expiration Date: ________________.
B. AND WHEREAS Roofing Installer has contracted (either directly with Owner or indirectly as a subcontractor) to warrant said work against leaks and faulty or defective materials and workmanship for designated Warranty Period,
C. NOW THEREFORE Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period he will, at his own cost and expense, make or cause to be made such repairs to or replacements of said work as are necessary to correct faulty and defective work and as are necessary to maintain said work in a watertight condition.
D. This Warranty is made subject to the following terms and conditions:
   1. Specifically excluded from this Warranty are damages to work and other parts of the building, and to building contents, caused by:
      a. Lightning;
      b. Peak gust wind speed exceeding mph (m/sec);
      c. Fire;
      d. Failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;
      e. Faulty construction of parapet walls, copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of the work;
      f. Vapor condensation on bottom of roofing; and
      g. Activity on roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner.
2. When work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Roofing Installer and until cost and expense thereof have been paid by Owner or by another responsible party so designated.

3. Roofing Installer is responsible for damage to work covered by this Warranty but is not liable for consequential damages to building or building contents resulting from leaks or faults or defects of work.

4. During Warranty Period, if Owner allows alteration of work by anyone other than Roofing Installer, including cutting, patching, and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty shall become null and void on date of said alterations, but only to the extent said alterations affect work covered by this Warranty. If Owner engages Roofing Installer to perform said alterations, Warranty shall not become null and void unless Roofing Installer, before starting said work, shall have notified Owner in writing, showing reasonable cause for claim, that said alterations would likely damage or deteriorate work, thereby reasonably justifying a limitation or termination of this Warranty.

5. During Warranty Period, if original use of roof is changed and it becomes used for, but was not originally specified for, a promenade, work deck, spray-cooled surface, flooded basin, or other use or service more severe than originally specified, this Warranty shall become null and void on date of said change, but only to the extent said change affects work covered by this Warranty.

6. Owner shall promptly notify Roofing Installer of observed, known, or suspected leaks, defects, or deterioration and shall afford reasonable opportunity for Roofing Installer to inspect work and to examine evidence of such leaks, defects, or deterioration.

7. This Warranty is recognized to be the only warranty of Roofing Installer on said work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Installer of responsibility for performance of original work according to requirements of the Contract Documents, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's General Contractor.

E. IN WITNESS THEREOF, this instrument has been duly executed this ________ day of ________________________.

1. Authorized Signature: ________________________________.

2. Name: ________________________________.

3. Title: ________________________________.

END OF SECTION 075423
SECTION 076201 - FLASHING, SHEET METAL AND ROOFING ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 PERFORMANCE REQUIREMENTS
   A. Manufacture and install copings and roof edge flashings tested according to ANSI/SPRI/FM 4435/ES-1 and capable of resisting the design pressures indicated on Drawings. Provide manufactured pre-engineered roof edge systems; brake-metal assemblies fabricated in accordance with NRCA are not acceptable in lieu of manufactured pre-engineered roof edge systems specified.
      1. Roof Edge Fascia System: Conform to ANSI/SPRI/FM 4435/ES-1 Test Method RE-1 for roof edge termination to secure the membrane to a minimum of 100 psf. Conform to ANSI/SPRI/FM 4435/ES-1 Test Method RE-2 pull-off test for fascia to meet design pressure requirement.

1.3 SUBMITTALS
   A. Product data: Manufacturer’s technical product data, installation instructions and general recommendations for each specified sheet material and fabricated product.
      1. Submit confirmation that roof edge systems conform to ANSI/SPRI/FM 4435/ES-1 performance requirements.
   B. Samples of specified fluorocarbon (“Kynar”) factory finishes on substrate material for coping and gravel stop items. Provide samples of minimum 2-inch square size of full range of manufacturer’s standard colors for selection.
   C. Shop drawings showing layout, profiles, methods of joining, and anchorage details, including major counterflashings, gutters and down spouts (coordinated with shingle roofing), conductor heads, copings, trim/fascia units and expansion joint systems. Note metal materials and gage. Identify work by others; Contractor is responsible for coordinating provision of all components included in accepted shop drawings. Provide layouts at 1:48 scale and details at 1:4 scale.
      1. Provide shop drawings of special details, including steps in roof expansion joint systems, and changes in coping width at increase in wall thickness.

1.4 QUALITY ASSURANCE
   A. Integrated Exterior Mockups: Attend preinstallation conference and provide flashing work for integrated exterior mockup as specified in Division 01 Section “Quality Requirements.”

1.5 PROJECT CONDITIONS
   A. Coordinate work of this section with interfacing and adjoining work for proper sequencing of each installation. Ensure best possible weather resistance and durability of work and protection of materials and finishes.
PART 2 - PRODUCTS

2.1 METALS
A. Aluminum: Alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated and with not less than the strength and durability of alloy and temper designated below:
   1. Factory-Painted Aluminum Sheet: ASTM B 209, 3003-H14, with a minimum thickness of 0.040 inch, unless otherwise indicated.
   2. Extruded Aluminum: ASTM B 221, alloy 6063-T52, with a minimum thickness of 0.080 inch for primary legs of extrusions that are anodized, unless otherwise indicated.
B. Stainless-Steel Sheet: ASTM A 167, Type 304, soft annealed, with No. 2D finish, except where harder temper is required for forming or performance; minimum 0.0187 inch thick, unless otherwise indicated.
C. Galvanized Steel Sheet: ASTM A 526, G 90, commercial quality, or ASTM A 527, G 90, lock-forming quality, hot-dip galvanized steel sheet with 0.20 percent copper, mill phosphatized where indicated for painting; not less than 0.0396 inch thick, unless otherwise indicated.

2.2 MISCELLANEOUS MATERIALS AND ACCESSORIES
A. Solder: ASTM B 32, Grade Sn50, used with rosin flux.
   1. Solder for Stainless Steel: ASTM B 32, Grade Sn60, used with an acid flux of type recommended by stainless-steel sheet manufacturer; use a non-corrosive rosin flux over tinned surfaces.
B. Fasteners: Same metal as flashing/sheet metal or, other non-corrosive metal as recommended by sheet manufacturer. Match finish of exposed heads with material being fastened.
C. Mastic Sealant: Polyisobutylene; non-hardening, non-skinning, non-drying, non-migrating sealant.
D. Elastomeric Sealant: Generic type recommended by manufacturer of metal and fabricator of components being sealed and complying with requirements for joint sealants as specified in Division 07 Section “Joint Sealants.”
E. Epoxy Seam Sealer: 2-part non-corrosive metal seam cementing compound, recommended by metal manufacturer for exterior/interior non-moving joints including riveted joints.
F. Metal Accessories: Provide sheet metal clips, straps, anchoring devices and similar accessory units as required for installation of work, matching or compatible with material being installed, non-corrosive, size and gage required for performance.
G. Downspout Strainers: 20-gage bronze or nonmagnetic stainless-steel mesh fabricated units, with selvaged edges and non-corrosive fasteners compatible with gutters and downspouts.
H. Splash Blocks: Provide standard precast concrete splash blocks, 3000 psi precast concrete dish-profile units manufactured for purpose. Light weight “pilot blocks” are not acceptable. Note: Provide for all roof storm water outfall conditions, condensation lines, and fire suppression system - both Division 07 and Division 23 applications, unless noted otherwise.

2.3 FABRICATED UNITS
A. General Metal Fabrication: Shop-fabricate work to greatest extent possible. Comply with details shown, and with applicable requirements of SMACNA “Architectural Sheet Metal
Manual” (2012- 7th edition) and other recognized industry practices. Fabricate for waterproof and weather-resistant performance; with expansion provisions for running work, sufficient to permanently prevent leakage, damage or deterioration of the work. Form work to fit substrates. Comply with material manufacturer instructions and recommendations for forming material. Form exposed sheet metal work without excessive oil-canning, buckling and tool marks, true to line and levels indicated, with exposed edges folded into hems.

1. Seams: Fabricate non-moving seams in sheet metal with flat-lock seams. For metal other than aluminum, tin edges to be seamed, form seams, and solder. Form aluminum seams with epoxy seam sealer; rivet joints for additional strength where required.

2. Expansion Provisions: Where lapped or bayonet-type expansion provisions in work cannot be used, or would not be sufficiently water/weatherproof, form expansion joints of interlocking hooked flanges, minimum 1-inch deep, filled with mastic sealant (concealed in joints).

3. Sealant Joints: Where movable, non-expansion type joints are indicated or required for proper performance of work, form metal to provide for proper installation of elastomeric sealant, to meet SMACNA standards.

4. Separations: Separate metal from non-compatible metal or corrosive substrates by coating concealed surfaces at locations of contact, with bituminous coating or other permanent separation recommended by manufacturer/fabricator.

5. End Dams: Provide end dams for through-wall flashing units.

2.4 REGLETS AND COUNTERFLASHINGS

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. Castle Metal Products.
2. Cheney Flashing Company.
3. Fry Reglet Corporation.
4. Heckmann Building Products Inc.
5. OMG EdgeSystems. (Formerly W.P. Hickman Company)
7. Metal-Era, Inc.
8. Metal-Fab Manufacturing, LLC.

B. Reglets: Manufactured units formed to provide secure interlocking of separate reglet and counterflashing pieces, from the following exposed metal:

1. Stainless Steel: 0.025 inch thick.
2. Corners: Factory mitered and soldered.
3. Masonry Type, Embedded: Provide reglets with offset top flange for embedment in masonry mortar joint.

C. Counterflashings: Manufactured units of heights to overlap top edges of base flashings by 4 inches and in lengths not exceeding 12 feet designed to snap into reglets or through-wall-flashing receiver and compress against base flashings with joints lapped, from the following exposed metal:

1. Formed Aluminum-Zinc Alloy-Coated (“Galvalume”) Steel Sheet: Thickness required by and manufactured according to SMACNA requirements and meeting ANSI SPRI ES-1 Rating.
2. Stainless Steel: 0.019 inch thick.
D. Accessories:
   1. Flexible-Flashig Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflushing or where reglet is provided separate from metal counterflushing.
   2. Counterflushing Wind-Restraint Clips: Provide clips to be installed before counterflushing to prevent wind uplift of counterflushing lower edge.

E. One-Piece Counterflushing (Surface-Applied): Provide one-piece counterflushing of formed metal. Form counter-flashing piece with a back-brake top flange/sealant channel, hemmed drip edge and continuous bend to maintain “spring” pressure against base flashing when in place. Metal profile is shown on drawings. Provide silicone elastomeric sealant as specified in Division 07 Section “Joint Sealants.”
   1. Formed Aluminum-Zinc Alloy-Coated (“Galvalume”) Steel Sheet: Thickness required by and manufactured according to SMACNA requirements and meeting ANSI SPRI ES-1 Rating.
   2. Counterflushing shall be installed with associated roofing work.

2.5 FASCIA SYSTEMS AND COPINGS:

A. Fascia for Single-Ply Roofing: Manufactured pre-engineered system consisting of formed 0.040-inch aluminum fascia, and minimum 24-gauge zinc-coated sheet steel water dam; of profile and height indicated; with prefabricated accessories including concealed splice plates, inside and outside corners and special fasteners. Provide prefabricated outside and inside corner, miters welded before finishing. Provide roof edge system tested in accordance with ANSI/SPRI/FM 4435/ES-1 Test Method RE-1 for roof edge termination to secure the membrane to a minimum of 100 psf and tested in accordance with ANSI/SPRI/FM 4435/ES-1 Test Method RE-2 pull-off test for fascia to meet design pressure requirement.
   1. Nominal fascia height of 5.5-inches unless indicated otherwise.
   3. Available Products: Subject to compliance with requirements, provide product approved by membrane roof manufacturer for total-system warranty compliance. Available products include, but are not limited to, the following:
      a. Imetco; ES-F Series Fascia.
      b. Metal-Era; Perma-Tite System 200.
      c. OMG EdgeSystems; Econosnap I.

B. Interlocking Multi-Part Coping System: Manufactured pre-engineered coping system (roofer-fabricated copings not acceptable) consisting of formed 0.050-inch aluminum coping of profile indicated, minimum 20-gauge zinc-coated steel anchor plates, and concealed splice plates. Provide prefabricated inside and outside corners, miters welded before finishing; without exposed fasteners. Provide roof edge system tested in accordance with ANSI/SPRI/FM 4435/ES-1 Test Method RE-3 pull-off test for coping to meet design pressure requirement.
   1. Design standard: Metal-Era Perma-Tite Coping Series II.
   2. Provide coping chair formed with support at mid-width of coping for coping width greater than 16-inches.
   3. Available Products: Subject to compliance with requirements, provide product approved by membrane roof manufacturer for total-system warranty compliance. Available products include, but are not limited to, the following:
      b. “Perma-Tite II ”; Metal-Era.
C. Provide manufactured formed fascia & manufactured coping assemblies from same manufacturer with same finish.

D. Fluoropolymer Coating: Provide a high-performance fluorocarbon coating conforming AAMA 2605 consisting of a minimum 70% fluoropolymer resin coating in a DFT of 0.9 mil minimum, 30% reflective gloss (ASTM D 523), over 0.15 mil minimum baked-on epoxy primer.
   1. Durability: Provide coating which has been field tested under normal range of weathering conditions for minimum of 20 years without significant peel, blister, flake, chip, crack or check in finish; and without chalking in excess of 8 (ASTM D 659) and fading in excess of 5 NBS units for vertical surfaces. (Values are reduced for exposures at an angle from the vertical position.)
   2. Provide colors selected by Architect from manufacturer’s standards or published standard 2-coat, non-metallic colors of PPG “Duranar” or Valspar “Fluoron.” One color is required for project.
   3. Provide “Kynar ADS” (air cured fluoropolymer resin coating) coating material to match “Kynar 500” coating for field touch-up use.

E. Special Warranty on Painted Finishes: Manufacturer’s standard form in which manufacturer agrees to repair finishes or replace roof accessories 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 per 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.

2.6 PREFABRICATED ROOF HATCHES:
   A. Roof Hatch: Single-leaf lid, 30- by 36-inch hatch, for 40 lbf/sq. ft. (1916 Pa) external loading and 20 lbf/sq. ft. (958 Pa) internal loading pressure. Frame with 12-inch height integral-curb, double or single-wall construction with minimum 2-inches of polyisocyanurate insulation, straight sides and integral cap flashing (roofing counter-flashing), with welded or sealed mechanical corner joints. Provide double-wall cover (lid) construction with minimum 2-inches of polyisocyanurate insulation core and manufacturer’s standard mill finish aluminum curb liner. Equip units with complete hardware set including hold-open devices, interior padlock hasps, and both interior and exterior latch handles. Provide gasketing. Fabricate curb and hatch lid of mill finish 0.090 inch aluminum
   1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering prefabricated roof hatch units which may be incorporated in the work include, but are not limited to, the following:
      a. Bilco Co.; Basis-of-Design Model #S-50TB.
      b. Milcor Inc.
      c. Nystrom Building Products.
      d. O’Keeffe’s.
      e. Surespan.
      f. Wasco Products, Inc.
   B. Telescoping Safety Post: Safety post designed with telescoping tubular section that locks automatically when fully extended. Upward and downward movement shall be controlled by a stainless steel spring balancing mechanism. Unit shall be completely assembled with fasteners for securing to the ladder rungs or side rails, in accordance with the manufacturer’s instructions. Provide safety yellow finished steel fabrication.
1. Available Products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:
   c. Milcor; Upright Safety Bar.
   d. Nystrom Building Products; SP Ladder Safety Post.

C. Hatch Railing System: Fixed railing and self-closing gate assembly conforming to OSHA 29 CFR 1910.23, mounted to roof hatch cap flashing. Provide size and configuration to suit hatch. Fabricate posts and rails from powder-coated, hot-dip galvanized steel pipe or tubing, aluminum pipe or tubing, or fire-retardant, pultruded fiberglass-reinforced polymer in safety yellow color. Provide corrosion-resistant fittings and hinges. Provide minimum 10-year material and workmanship warranty.

1. Available Products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:
   a. Bilco Co.; Bil-Guard Hatch Railing System.
   b. JL Industries, Inc.; Hatchguard Safety Rail System.
   c. Milcor; Safety Rail System.
   d. Nystrom Building Products; Series SRS Safety Railing System.
   e. Surespan; Sureguard Handrail System.

PART 3 - EXECUTION

3.1 INSTALLATION REQUIREMENTS

A. General: Except as otherwise indicated, comply with manufacturer’s installation instructions and recommendations, and with SMACNA (2003 - 6th edition) “Architectural Sheet Metal Manual.” Anchor units of work securely in place by methods indicated, providing for thermal expansion of metal units; conceal fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints and seams which will be permanently watertight and weatherproof.

B. Bed flanges of work in accordance with membrane roofing manufacturer’s recommendations as required for waterproof performance.

C. Reglet/Counterflashing Applications: Install receiver/reglet pieces to receive counterflashing. Where shown in masonry, furnish reglets to mason, for installation as work of Division 04 Section "Unit Masonry."

1. Built-in: Insert preformed counterflashing piece in installed receiver/reglet and secured by snap-in seal arrangement, so that bottom of flashing makes permanent spring clamping contact with base flashing. Following field bend of receiver cap, place continuous backer rod and elastomeric sealant in masonry joint above reglet/receiver.

2. Install counterflashing in reglets, either by snap-in seal arrangement, or by welding in place for anchorage and filling reglet with mastic or elastomeric sealant, as indicated and depending on degree of sealant exposure.

3. Surface Applied: Install surface applied reglets to receive counterflashing in manner and by methods indicated. Install counterflashing in reglets by snap-in continuous field bend of receiver cap seal arrangement: fill reglet with mastic or elastomeric sealant, as indicated.

D. Surface-Applied One-Piece Counterflashing: Install surface applied counterflashing in manner and by methods indicated. Install counterflashing securely to substrate with neoprene foam tape if required and batten bar if required (not anticipated for 16 oz./sq. ft.
copper), and fill reglet with mastic or elastomeric sealant, as indicated.

E. One-Piece Counterflushing in Saw-cut Joint: Saw cut reglet joint in brick joints to uniform 3/4-inch depth for step flashing pattern indicated. Insert preformed counter flashing to full depth of saw cut and secure with lead wedges at 12-inches o.c., so that bottom of flashing makes permanent spring clamping contact with base flashing. Place continuous backer rod and elastomeric sealant in cut joint reglet.

F. Scuppers: Install fabricated scupper in accordance with membrane roofing manufacturer’s detail. Refer to Division 07 Section "Thermoplastic Polyolefin (TPO) Roofing."

G. Copings: Install cleats, anchor plates, and other anchoring and attachment accessories and devices with concealed fasteners. Anchor copings to meet performance requirements.
   1. Interlock face and back leg drip edges of snap-on coping cap into cleated anchor plates. Anchor to substrate at manufacturer’s required spacing to meet performance requirements.
      a. Coping Width Less Than 16 Inches: For standard 10-foot length coping sections, anchor at standard 40-inch centers. For standard 12-foot length coping sections, anchor at standard 48-inch centers.
      b. Coping Width 16 Inches or Greater: For standard 10-foot length coping sections, anchor at 30-inch centers. For standard 12-foot length coping sections, anchor at standard 36-inch centers.
   2. Provide custom perforated metal vent component as indicated.

3.2 CLEANING AND PROTECTION
   A. Clean exposed metal surfaces, removing substances that might cause corrosion of metal or deterioration of finishes.
   B. Protection: Protect flashing and sheet metal work during construction, to ensure that work will be without damage or deterioration, other than natural weathering at time of Substantial Completion.

END OF SECTION 076201
SECTION 078100 - APPLIED FIREPROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. Provisions of the Contract and Contract Documents apply to this Section.

1.2 PREINSTALLATION MEETINGS
A. Preinstallation Conference: Conduct conference at Project site.
   1. Review products, design ratings, restrained and unrestrained conditions, densities, thicknesses, bond strengths, and other performance requirements.
   2. Review and finalize construction schedule and verify sequencing and coordination requirements.
   3. Review weather predictions, ambient conditions, and proposed temporary protections for SFRM during and after installation.
   4. Review surface conditions and preparations.
   5. Review field quality-control testing procedures.

1.3 ACTION SUBMITTALS
A. Product Data: For each type of product.
B. Shop Drawings: Framing plans, schedules, or both, indicating the following:
   1. Extent of fireproofing for each construction and fire-resistance rating.
   2. Applicable fire-resistance design designations of a qualified testing and inspecting agency acceptable to authorities having jurisdiction.
   3. Minimum fireproofing thicknesses needed to achieve required fire-resistance rating of each structural component and assembly.
      a. All design applications for this project are for unrestrained conditions unless explicitly stated otherwise in the documents for specific locations.
      b. Fire-resistance design thicknesses for open web steel joists shall be based on testing at a maximum allowable stress of 30 ksi matching SJI’s “Standard Specifications Load Tables and Weight Tables for Steel Joists and Joist Girders.”
   4. Treatment of fireproofing after application.

1.4 INFORMATIONAL SUBMITTALS
A. Qualification Data: For Installer and testing agency.
B. Product Certificates: For each type of fireproofing.
C. Evaluation Reports: For fireproofing, from ICC-ES.
D. Preconstruction Test Reports: For fireproofing.
E. Warranties: Sample form for special warranties specified in this Section.
F. Inspection Report: Copies of SFRM system manufacturer’s inspection report of completed SFRM installation, and of field inspection reports for startup and in-progress inspections.

1.5 QUALITY ASSURANCE
A. Installer Qualifications: A firm or individual certified, licensed, or otherwise qualified by fireproofing manufacturer as experienced and with sufficient trained staff to install manufacturer’s products according to specified requirements.
B. Inspection Reports of SFRM Manufacturer’s Representative: SFRM manufacturer’s representative shall inspect the work and provide copies of his inspection reports to the Architect and the Owner. The Installer shall notify manufacturer’s representative of intended start date and schedule of roofing work.
1. The Installer and SFRM manufacturer’s representative shall inspect the substrate surfaces and applications to receive SFRM system prior to beginning installation.
2. The SFRM manufacturer’s representative shall inspect the work no less than three times (startup, in-progress, and end-of-installation warranty inspection) during the application of the system & submit copies of inspection reports to the Architect & Owner within 7 days of the inspection.

1.6 FIELD CONDITIONS
A. Environmental Limitations: Do not apply fireproofing when ambient or substrate temperature is 44 deg F or lower unless temporary protection and heat are provided to maintain temperature at or above this level for 24 hours before, during, and for 24 hours after product application.
B. Ventilation: Ventilate building spaces during and after application of fireproofing, providing complete air exchanges according to manufacturer’s written instructions. Use natural means or, if they are inadequate, forced-air circulation until fireproofing dries thoroughly.

1.7 COORDINATION
A. Sequence and coordinate application of SFRM with other related work specified in other Sections to comply with the following requirements:
1. Provide temporary enclosure as required to confine spraying operations and protect the environment.
2. Provide temporary enclosures for applications to prevent deterioration of fire-resistive material due to exposure to weather and to unfavorable ambient conditions for humidity, temperature, and ventilation.
3. Avoid unnecessary exposure of fire-resistive material to abrasion and other damage likely to occur during construction operations subsequent to its application.

1.8 WARRANTY
A. Special Warranty: Installer’s form in which installer agrees to repair or replace applied fireproofing that fails in materials or workmanship within specified warranty period.
1. Failures include, but are not limited to, the following:
   a. Cracking, flaking, spalling, or eroding in excess of specified requirements; peeling; or delaminating of applied fireproofing from substrates.
   b. Not covered under the warranty are failures due to damage by occupants and Owner’s maintenance personnel, exposure to environmental conditions other than those investigated and approved during fire-response testing, and other causes not reasonably foreseeable under conditions of normal use.
2. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL
A. Assemblies: Provide fireproofing, including auxiliary materials, according to requirements of each fire-resistance design and manufacturer’s written instructions.
B. Source Limitations: Obtain fireproofing for each fire-resistance design from single source.
C. Fire-Resistance Design: Indicated on Drawings, tested according to ASTM E 119 or UL 263 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
   1. Steel members are to be considered unrestrained unless specifically noted otherwise.
D. Asbestos: Provide products containing no detectable asbestos.

2.2 SPRAYED FIRE-RESISTIVE MATERIALS

A. SFRM: Manufacturer’s standard, factory-mixed, lightweight, dry formulation, complying with indicated fire-resistance design, and mixed with water at Project site to form a slurry or mortar before conveyance and application or conveyed in a dry state and mixed with atomized water at place of application.
   1. Standard Density Cementitious Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
      a. Carboline Company, subsidiary of RPM International; Pyrolite 15.
      b. GCP Applied Technologies; Monokote MK-6 Series.
      c. Isolatek International; Cafo 300.
      d. Schundler Company (The); Classic 5 LD.
      e. Southwest Fireproofing Products Co.; Type 5GP.
   2. Sprayed Fiber Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
      a. Isolatek International; Cafo Blaze-Shield II.
   3. Bond Strength: Minimum 300-lbf/sq. ft. cohesive and adhesive strength based on field testing according to ASTM E 736.
   4. Density: Not less than 15 lb/cu. ft. and as specified in the approved fire-resistance design, according to ASTM E 605.
   5. Thickness: As required for fire-resistance design indicated, measured according to requirements of fire-resistance design or ASTM E 605, whichever is thicker, but not less than 0.375 inch.
   6. Combustion Characteristics: Less than 5 MJ/m2 total, 20 kw/m2 peak heat release 20 kw/m2 peak heat release according to ASTM E 1354. ASTM E 136.
   7. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
      a. Flame-Spread Index: 10 or less.
      b. Smoke-Developed Index: 10 or less.
   8. Compressive Strength: Minimum 10 lbf/sq. in. (68.9 kPa) according to ASTM E 761.
   10. Deflection: No cracking, spalling, or delamination according to ASTM E 759.
   11. Effect of Impact on Bonding: No cracking, spalling, or delamination according to ASTM E 760.
   12. Air Erosion: Maximum weight loss of 0.005 g/sq. ft. (0.054 g/sq. m) 0.025 g/sq. ft. (0.270 g/sq. m) in 24 hours according to ASTM E 859.
   13. Fungal Resistance: Treat products with manufacturer’s standard antimicrobial formulation to result in no growth on specimens per ASTM G 21 or rating of 10 according to ASTM D 3274 when tested according to ASTM D 3273.
   14. Finish: As selected by Architect from manufacturer’s standard finishes.

B. Medium Density Cementitious Products:
1. Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
   a. Carboline Company, subsidiary of RPM International; Type 7MD.
   b. GCP Applied Technologies; Monokote Z-106/HY
   c. Isolake International; Cafo 400.
2. Bond Strength: Minimum 2000-lbf/sq. ft. cohesive and adhesive strength based on field testing according to ASTM E 736.
3. Density: Not less than 22 lb/cu. ft. and as specified in the approved fire-resistance design, according to ASTM E 605.
4. Thickness: As required for fire-resistance design indicated, measured according to requirements of fire-resistance design or ASTM E 605, whichever is thicker, but not less than 0.375 inch.
5. Combustion Characteristics: Less than 5 MJ/m2 total, 20 kw/m2 peak heat release 20 kw/m2 peak heat release according to ASTM E 1354.
6. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
   a. Flame-Spread Index: 10 or less.
   b. Smoke-Developed Index: 10 or less.
7. Compressive Strength: Minimum 100 lbf/sq. in. according to ASTM E 761.
9. Deflection: No cracking, spalling, or delamination according to ASTM E 759.
10. Effect of Impact on Bonding: No cracking, spalling, or delamination according to ASTM E 760.
11. Air Erosion: Maximum weight loss of 0.025 g/sq. ft. in 24 hours according to ASTM E 859.
12. Fungal Resistance: Treat products with manufacturer’s standard antimicrobial formulation to result in no growth on specimens per ASTM G 21.

2.3 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that are compatible with fireproofing and substrates and are approved by UL or another testing and inspecting agency acceptable to authorities having jurisdiction for use in fire-resistance designs indicated.

B. Substrate Primers: Primers approved by fireproofing manufacturer and complying with one or both of the following requirements:
   1. Primer and substrate are identical to those tested in required fire-resistance design by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
   2. Primer’s bond strength in required fire-resistance design complies with specified bond strength for fireproofing and with requirements in UL’s “Fire Resistance Directory” or in the listings of another qualified testing agency acceptable to authorities having jurisdiction, based on a series of bond tests according to ASTM E 736.

C. Bonding Agent: Product approved by fireproofing manufacturer and complying with requirements in UL’s “Fire Resistance Directory” or in the listings of another qualified testing agency acceptable to authorities having jurisdiction.

D. Metal Lath: Expanded metal lath fabricated from material of weight, configuration, and finish required, according to fire-resistance designs indicated and fireproofing manufacturer’s written recommendations. Include clips, lathing accessories, corner beads, and
other anchorage devices required to attach lath to substrates and to receive fireproofing.

E. Sealer: Transparent-drying, water-dispersible, tinted protective coating recommended in writing by fireproofing manufacturer for each fire-resistance design.

F. Topcoat: Suitable for application over applied fireproofing; of type recommended in writing by fireproofing manufacturer for each fire-resistance design.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for substrates and other conditions affecting performance of the Work and according to each fire-resistance design. Verify compliance with the following:
   1. Substrates are free of dirt, oil, grease, release agents, rolling compounds, mill scale, loose scale, incompatible primers, paints, and encapsulants, or other foreign substances capable of impairing bond of fireproofing with substrates under conditions of normal use or fire exposure.
   2. Objects penetrating fireproofing, including clips, hangers, support sleeves, and similar items, are securely attached to substrates.
   3. Substrates receiving fireproofing are not obstructed by ducts, piping, equipment, or other suspended construction that will interfere with fireproofing application.

B. Verify that concrete work on steel deck has been completed before beginning fireproofing work.

C. Verify that roof construction, installation of roof-top HVAC equipment, and other related work is complete before beginning fireproofing work.

D. Conduct tests according to fireproofing manufacturer’s written recommendations to verify that substrates are free of substances capable of interfering with bond.

E. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

F. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Cover other work subject to damage from fallout or overspray of fireproofing materials during application.

B. Clean substrates of substances that could impair bond of fireproofing.

C. Prime substrates where included in fire-resistance design and where recommended in writing by fireproofing manufacturer unless compatible shop primer has been applied and is in satisfactory condition to receive fireproofing.

D. For applications visible on completion of Project, repair substrates to remove surface imperfections that could affect uniformity of texture and thickness in finished surface of fireproofing. Remove minor projections and fill voids that would telegraph through fire-resistant products after application.

3.3 APPLICATION

A. Construct fireproofing assemblies that are identical to fire-resistance design indicated and products as specified, tested, and substantiated by test reports; for thickness, primers, sealers, topcoats, finishing, and other materials and procedures affecting fireproofing work.

B. Comply with fireproofing manufacturer’s written instructions for mixing materials, application procedures, and types of equipment used to mix, convey, and apply fireproofing;
as applicable to particular conditions of installation and as required to achieve fire-resistance ratings indicated.

C. Coordinate application of fireproofing with other construction to minimize need to cut or remove fireproofing.
   1. Do not begin applying fireproofing until clips, hangers, supports, sleeves, and other items penetrating fireproofing are in place.
   2. Defer installing ducts, piping, and other items that would interfere with applying fireproofing until application of fireproofing is completed.
   3. Coat non-structural elements attached to rated structural members, including but not being limited to, CFSF members, clips, hangers, support sleeves, and similar items, with the same thickness of material applied to the rated structural members, for a distance of 2-feet-0-inch from the point of contact to the rated structural members.

D. Metal Decks:
   1. Do not apply fireproofing to underside of metal deck substrates until concrete topping, if any, has been completed.
   2. Do not apply fireproofing to underside of metal roof deck until roofing has been completed; prohibit roof traffic during application and drying of fireproofing.

E. Install auxiliary materials as required, as detailed, and according to fire-resistance design and fireproofing manufacturer’s written recommendations for conditions of exposure and intended use. For auxiliary materials, use attachment and anchorage devices of type recommended in writing by fireproofing manufacturer.

F. Spray apply fireproofing to maximum extent possible. Following the spraying operation in each area, complete the coverage by trowel application or other placement method recommended in writing by fireproofing manufacturer.

G. Extend fireproofing in full thickness over entire area of each substrate to be protected.

H. Install body of fireproofing in a single course unless otherwise recommended in writing by fireproofing manufacturer.

I. Where sealers are used, apply products that are tinted to differentiate them from fireproofing over which they are applied.

J. Provide a uniform finish complying with description indicated for each type of fireproofing material and matching finish approved for required mockups.

K. Cure fireproofing according to fireproofing manufacturer’s written recommendations.

L. Do not install enclosing or concealing construction until after fireproofing has been applied, inspected, and tested and corrections have been made to deficient applications.

3.4 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:
   1. Test and inspect as required by the NCBC.
   2. Testing Services: All spray-applied fireproofing shall be tested after installation according to ASTM E-605 and ASTM E-736, latest editions. Mastics shall be tested in accordance with AWCI 12-B.

B. Perform the tests and inspections of completed Work in successive stages. Do not proceed with application of fireproofing for the next area until test results for previously completed applications of fireproofing show compliance with requirements. Tested values must equal or exceed values as specified and as indicated and required for approved fire-resistance design.

C. Fireproofing will be considered defective if it does not pass tests and inspections.
1. Remove and replace fireproofing that does not pass tests and inspections, and retest.
2. Apply additional fireproofing, per manufacturer’s written instructions, where test results indicate insufficient thickness, and retest.

D. Prepare test and inspection reports.

3.5 CLEANING, PROTECTING, AND REPAIRING

A. Cleaning: Immediately after completing spraying operations in each containable area of Project, remove material overspray and fallout from surfaces of other construction and clean exposed surfaces to remove evidence of soiling.

B. Protect fireproofing, according to advice of manufacturer and Installer, from damage resulting from construction operations or other causes, so fireproofing will be without damage or deterioration at time of Substantial Completion.

C. As installation of other construction proceeds, inspect fireproofing and repair damaged areas and fireproofing removed due to work of other trades.

D. Repair fireproofing damaged by other work before concealing it with other construction.

E. Repair fireproofing by reapplying it using same method as original installation or using manufacturer’s recommended trowel-applied product.

END OF SECTION 078100
SECTION 078123 - INTUMESCENT MASTIC FIREPROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 PREINSTALLATION MEETINGS
A. Preinstallation Conference: Conduct conference at Project site.
   1. Review products, design ratings, restrained and unrestrained conditions, thicknesses, and other performance requirements.
   2. Review and finalize construction schedule and verify sequencing and coordination requirements.
   3. Review weather predictions, ambient conditions, and proposed temporary protections for MIFRC and SFRM during and after installation.
   4. Review surface conditions and preparations.
   5. Review field quality-control testing procedures.

1.3 ACTION SUBMITTALS
A. Product Data: For each type of product.
   B. Shop Drawings: Structural framing plans indicating the following:
      1. Extent of fireproofing for each construction and fire-resistance rating.
      2. Applicable fire-resistance design designations of a qualified testing and inspecting agency acceptable to authorities having jurisdiction.
      3. Minimum fireproofing thicknesses needed to achieve required fire-resistance rating of each structural component and assembly.
      4. Treatment of fireproofing after application.

1.4 INFORMATIONAL SUBMITTALS
A. Qualification Data: For Installer.
B. Product Certificates: For each type of fireproofing.
C. Evaluation Reports: For fireproofing, from ICC-ES.

1.5 QUALITY ASSURANCE
A. Installer Qualifications: A firm or individual certified, licensed, or otherwise qualified by fireproofing manufacturer as experienced and with sufficient trained staff to install manufacturer’s products according to specified requirements.

1.6 FIELD CONDITIONS
A. Environmental Limitations: Do not apply fireproofing when ambient or substrate temperature is 50 deg F (10 deg C) or lower unless temporary protection and heat are provided to maintain temperature at or above this level for 24 hours before, during, and for 24 hours after product application.
B. Ventilation: Ventilate building spaces during and after application of fireproofing, providing complete air exchanges according to manufacturer’s written instructions. Use natural means or, if they are inadequate, forced-air circulation until fireproofing dries thoroughly.
1.7 WARRANTY

A. Special Warranty: Installer’s form in which installer agrees to repair or replace intumescent mastic fireproofing that fails in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Cracking, flaking, spalling, or eroding in excess of specified requirements; peeling; or delaminating of mastic fireproofing from substrates.
      b. Not covered under the warranty are failures due to damage by occupants and Owner’s maintenance personnel, exposure to environmental conditions other than those investigated and approved during fire-response testing, and other causes not reasonably foreseeable under conditions of normal use.
   2. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Assemblies: Provide fireproofing, including auxiliary materials, according to requirements of each fire-resistance design and manufacturer’s written instructions.

B. Source Limitations: Obtain fireproofing for each fire-resistance design from single source.

C. Fire-Resistance Design: Indicated on Drawings, tested according to ASTM E 119 or UL 263 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
   1. Steel members are to be considered unrestrained unless specifically noted otherwise.

D. Asbestos: Provide products containing no detectable asbestos.

2.2 INTUMESCENT FIRE-RESISTIVE COATINGS

A. Manufacturer’s standard, factory-mixed formulation or factory-mixed, multicomponent system consisting of intumescent base coat and topcoat, and complying with indicated fire-resistance design.
   1. Exterior Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
      a. Albi Manufacturing, Division of StanChem Inc.; Albi Clad 800 (exterior).
      b. Carboline Company, subsidiary of RPM International; Thermo-Lag: E 100 (Basis of Design Product).
      d. Isolatek International; Cafco SprayFilm-WB 4 (exterior).
   2. Interior Water-Based Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
      a. Albi Manufacturing, Division of StanChem Inc.; Albi Clad TF (interior).
      b. Carboline Company, subsidiary of RPM International; AD Firefilm III (interior).
      d. Isolatek International; Cafco SprayFilm-WB 5 (interior).
   3. Application: Designated for “exterior” and “interior general purpose” use by a qualified testing agency acceptable to authorities having jurisdiction.
   4. Thickness: As required for fire-resistance design indicated, measured according to requirements of fire-resistance design.
5. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
   a. Flame-Spread Index: 25 or less.
   b. Smoke-Developed Index: 50 or less.
6. Hardness: Not less than 40 Type D durometer, according to ASTM D 2240.
7. Finish: As selected by Architect from manufacturer’s standard finishes.
   a. Color and Gloss: As selected by Architect from manufacturer’s full range.

2.3 AUXILIARY MATERIALS
A. General: Provide auxiliary materials that are compatible with fireproofing and substrates and are approved by UL or another testing and inspecting agency acceptable to authorities having jurisdiction for use in fire-resistance designs indicated.
B. Substrate Primers: Primers approved by fireproofing manufacturer and complying with required fire-resistance design by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
C. Reinforcing Fabric: Glass- or carbon-fiber fabric of type, weight, and form required to comply with fire-resistance designs indicated; approved and provided by fireproofing manufacturer.
D. Reinforcing Mesh: Metallic mesh reinforcement of type, weight, and form required to comply with fire-resistance design indicated; approved and provided by fireproofing manufacturer. Include pins and attachment.
E. Topcoat: Suitable for application over applied fireproofing; of type recommended in writing by fireproofing manufacturer for each fire-resistance design.

PART 3 - EXECUTION
3.1 EXAMINATION
A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for substrates and other conditions affecting performance of the Work and according to each fire-resistance design. Verify compliance with the following:
   1. Substrates are free of dirt, oil, grease, release agents, rolling compounds, mill scale, loose scale, incompatible primers, paints, and encapsulants, or other foreign substances capable of impairing bond of fireproofing with substrates under conditions of normal use or fire exposure.
   2. Objects penetrating fireproofing, including clips, hangers, support sleeves, and similar items, are securely attached to substrates.
   3. Substrates receiving fireproofing are not obstructed by ducts, piping, equipment, or other suspended construction that will interfere with fireproofing application.
B. Conduct tests according to fireproofing manufacturer’s written recommendations to verify that substrates are free of substances capable of interfering with bond.
C. 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. Cover other work subject to damage from fallout or overspray of fireproofing materials during application.
B. Clean substrates of substances that could impair bond of fireproofing.
C. Prime substrates where included in fire-resistance design and where recommended in writing by fireproofing manufacturer unless compatible shop primer has been applied and is in satisfactory condition to receive fireproofing.
D. For applications visible on completion of Project, repair substrates to remove surface imperfections that could affect uniformity of texture and thickness in finished surface of fireproofing. Remove minor projections and fill voids that would telegraph through fire-resistant products after application.

3.3 APPLICATION

A. Construct fireproofing assemblies that are identical to fire-resistance design indicated and products as specified, tested, and substantiated by test reports; for thickness, primers, topcoats, finishing, and other materials and procedures affecting fireproofing work.
B. Comply with fireproofing manufacturer’s written instructions for mixing materials, application procedures, and types of equipment used to mix, convey, and apply fireproofing; as applicable to particular conditions of installation and as required to achieve fire-resistance ratings indicated.
C. Coordinate application of fireproofing with other construction to minimize need to cut or remove fireproofing.
   1. Do not begin applying fireproofing until clips, hangers, supports, sleeves, and other items penetrating fireproofing are in place.
   2. Defer installing ducts, piping, and other items that would interfere with applying fireproofing until application of fireproofing is completed.
D. Install auxiliary materials as required, as detailed, and according to fire-resistance design and fireproofing manufacturer’s written recommendations for conditions of exposure and intended use. For auxiliary materials, use attachment and anchorage devices of type recommended in writing by fireproofing manufacturer.
E. Spray-apply fireproofing to maximum extent possible. Following the spraying operation in each area, complete the coverage by trowel application or other placement method recommended in writing by fireproofing manufacturer.
F. Extend fireproofing in full thickness over entire area of each substrate to be protected.
G. Coat non-structural elements attached to rated structural members, including but not being limited to, stud framing, clips, hangers, support sleeves, and similar items, with the same thickness of material applied to the rated structural members, for a distance of 2-feet-0-inches from the point of contact to the rated structural members.
H. Install body of fireproofing in a single course unless otherwise recommended in writing by fireproofing manufacturer.
I. Provide a uniform finish complying with description indicated for each type of fireproofing material and matching finish approved for required mockups.
J. Cure fireproofing according to fireproofing manufacturer’s written recommendations.
K. Do not install enclosing or concealing construction until after fireproofing has been applied, inspected, and tested and corrections have been made to deficient applications.
L. Finishes: Where indicated, apply fireproofing to produce the following finishes:
   1. Manufacturer’s Standard Finishes: Finish according to manufacturer’s written instructions for each finish selected.
3.4 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:
   1. Test and inspect as required by the North Carolina Building Code.

B. Perform the tests and inspections of completed Work in successive stages. Do not proceed with application of fireproofing for the next area until test results for previously completed applications of fireproofing show compliance with requirements. Tested values must equal or exceed values as specified and as indicated and required for approved fire-resistance design.

C. Fireproofing will be considered defective if it does not pass tests and inspections.
   1. Remove and replace fireproofing that does not pass tests and inspections, and retest.
   2. Apply additional fireproofing, per manufacturer’s written instructions, where test results indicate insufficient thickness, and retest.

D. Prepare test and inspection reports.

3.5 CLEANING, PROTECTING, AND REPAIRING

A. Cleaning: Immediately after completing spraying operations in each containable area of Project, remove material overspray and fallout from surfaces of other construction and clean exposed surfaces to remove evidence of soiling.

B. Protect fireproofing, according to advice of manufacturer and Installer, from damage resulting from construction operations or other causes, so fireproofing will be without damage or deterioration at time of Substantial Completion.

C. As installation of other construction proceeds, inspect fireproofing and repair damaged areas and fireproofing removed due to work of other trades.

D. Repair fireproofing damaged by other work before concealing it with other construction.

E. Repair fireproofing by reapplying it using same method as original installation or using manufacturer’s recommended trowel-applied product.

END OF SECTION 078123
SECTION 078413 - PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 PREINSTALLATION MEETINGS
   A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS
   A. Product Data: For each type of product.
   B. Product Schedule: For each penetration firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing and inspecting agency.
      1. Engineering Judgments: Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular penetration firestopping system, submit illustration, with modifications marked, approved by penetration firestopping system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly. Obtain approval of authorities having jurisdiction prior to submittal.

1.4 INFORMATIONAL SUBMITTALS
   A. Qualification Data: For Installer.
   B. Product Test Reports: For each penetration firestopping system, for tests performed by a qualified testing agency.

1.5 CLOSEOUT SUBMITTALS
   A. Installer Certificates: From Installer indicating that penetration firestopping systems have been installed in compliance with requirements and manufacturer’s written instructions.

1.6 QUALITY ASSURANCE
   A. Installer Qualifications: A firm that has been approved by FM Approval according to FM Approval 4991, "Approval Standard for Firestop Contractors," or been evaluated by UL and found to comply with its "Qualified Firestop Contractor Program Requirements."
   B. Single Source Responsibilities:
      1. Obtain firestop systems for each kind of firestop and construction condition indicated from a single primary firestop systems manufacturer.
      2. Provide primers and other secondary materials that are produced by or are specifically recommended by manufacturer of firestop materials to ensure compatibility of system.
      3. Materials of different manufacture than allowed by tested and listed system shall not be intermixed in same firestop system or opening.
      4. Tested and listed firestop systems shall be used before an Engineering Judgment (EJ) or Equivalent Fire Resistance Rated Assembly (EFRRA) is installed.
   C. Preinstallation Conference: Conduct conference at Project site.
   D. Inspections of installed firestopping systems shall be in accordance with ASTM E 2174.

1.7 PROJECT CONDITIONS
   A. Inspection: Inspect sleeves and pre-made openings for compliance with assembly requirements. Do not proceed where sleeves or surroundings differ from tested or approved
assemblies.

B. Environmental Limitations: Do not install penetration firestopping system when ambient or substrate temperatures are outside limits permitted by penetration firestopping system manufacturers or when substrates are wet because of rain, frost, condensation, or other causes.

C. Install and cure penetration firestopping materials per manufacturer’s written instructions using natural means of ventilations or, where this is inadequate, forced-air circulation.

1.8 COORDINATION
A. Coordinate construction of openings and penetrating items to ensure that penetration firestopping systems can be installed according to specified firestopping system design.
B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate penetration firestopping systems. Field alterations of tested assemblies, including other sleeve materials, different penetrating items, differing annular spaces, and different sleeve lengths are not acceptable without prior approval by the authorities having jurisdiction.
C. Coordinate wall identification with Division 9 “Painting” contractor.
D. Notify Owner’s testing agency at least seven days in advance of penetration firestopping installations; confirm dates and times on day preceding each series of installations.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS
A. Fire-Test-Response Characteristics:
1. Perform penetration firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.
2. Test per testing standards referenced in "Penetration Firestopping Systems" Article. Provide rated systems complying with the following requirements:
   a. Installed penetration firestopping system, including sleeves and surrounding materials, shall be identical to that tested.
   b. Penetration firestopping systems shall bear classification marking of a qualified testing agency. Classification markings on penetration firestopping correspond to designations listed by UL in its “Fire Resistance Directory” or other agencies approved by authorities having jurisdiction.

2.2 PENETRATION FIRESTOPPING SYSTEMS
A. Penetration Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. 3M Fire Protection Products.
   b. Hilti, Inc.
   c. RectorSeal Corporation.
   d. Specified Technologies, Inc.
   e. Tremco, Inc.
B. Penetrations in Fire-Resistance-Rated Walls: Penetration firestopping systems with ratings determined per ASTM E814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.
1. **F-Rating:** Not less than the fire-resistance rating of constructions penetrated.
   
   **C. Penetrations in Horizontal Assemblies:** Penetration firestopping systems with ratings determined per ASTM E814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.
   
   1. **F-Rating:** At least one hour, but not less than the fire-resistance rating of constructions penetrated.
   
   2. **T-Rating:** At least one hour, but not less than the fire-resistance rating of constructions penetrated except for floor penetrations within the cavity of a wall.

D. **Penetrations in Smoke Barriers:** Penetration firestopping systems with ratings determined per UL 1479, based on testing at a positive pressure differential of 0.30-inch wg.

   1. **L-Rating:** Not exceeding 5.0 cfm/sq. ft. of penetration opening at and no more than 50-cfm cumulative total for any 100 sq. ft. at both ambient and elevated temperatures.

E. **Mold Resistance:** Provide penetration firestopping with mold and mildew resistance rating of 0 as determined by ASTM G21.

F. **Exposed Penetration Firestopping Systems:** Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, per ASTM E84.

G. **Accessories:** Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping system manufacturer and approved by qualified testing and inspecting agency for conditions indicated.

### 2.3 MIXING

**A. Penetration Firestopping Materials:** For those products requiring mixing before application, comply with penetration firestopping 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 the Work.

**B.** Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

**A.** Surface Cleaning: Before installing penetration firestopping systems, clean out openings immediately to comply with 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 penetration firestopping materials.

   2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with penetration firestopping materials. Remove loose particles remaining from cleaning operation.

   3. Remove laitance and form-release agents from concrete.

**B.** Prime substrates where recommended in writing by 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 penetration firestopping from contacting adjoining surfaces that will remain exposed on completion of the Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove stains. Remove tape as soon as possible without disturbing firestopping’s seal with substrates.

3.3 INSTALLATION

A. General: Install penetration firestopping systems to comply with manufacturer’s written installation instructions and published drawings, as well as all written and graphic requirements in the test assembly documentation, for products and applications.

B. Install forming 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.
   1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not forming permanent components of firestopping.

C. Install fill materials by proven techniques to produce the following results:
   1. Fill voids and cavities formed by openings, forming materials, accessories and penetrating items to achieve required fire-resistance ratings.
   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 the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 IDENTIFICATION

A. Wall Identification: Refer to Division 9 Section “Painting.”

B. Penetration Identification: Identify each penetration firestopping system with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of penetration firestopping system edge so labels are visible to anyone seeking to remove penetrating items or firestopping systems. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:
   1. The words "Warning - Penetration Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
   2. Contractor’s name, address, and phone number.
   3. Designation of applicable testing and inspecting agency.
   4. Date of installation.
   5. Manufacturer’s name.
   6. Installer’s name.
   7. Signature line for Owner’s independent inspector.

3.5 CLEANING AND PROTECTION

A. Clean off excess fill materials adjacent to openings as the Work progresses by methods and with cleaning materials that are approved in writing by penetration firestopping 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 penetration firestopping systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, immediately cut out and remove damaged or deteriorated penetration firestopping material and install new
materials to produce systems complying with specified requirements.

END OF SECTION 078413
SECTION 078443 - JOINT FIRESTOPPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 PREINSTALLATION MEETINGS
   A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS
   A. Product Data: For each type of product.
   B. Shop Drawings: Testing agency documents such as the UL Online Certifications Directory or the UL Fire Resistance Directory. Manufacturer’s versions are not acceptable as a substitute but may be included to clarify assembly options.
   C. Product Schedule: For each joint firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing agency.
      1. Engineering Judgments: Where Project conditions require modification to a qualified testing agency’s illustration for a particular joint firestopping system condition, submit illustration, with modifications marked, approved by joint firestopping system manufacturer’s fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.

1.4 INFORMATIONAL SUBMITTALS
   A. Qualification Data: For Installer.
   B. Product Test Reports: For each joint firestopping system, for tests performed by a qualified testing agency.

1.5 CLOSEOUT SUBMITTALS
   A. Installer Certificates: From Installer indicating that joint firestopping systems have been installed in compliance with requirements and manufacturer’s written instructions.

1.6 QUALITY ASSURANCE
   A. Installer Qualifications: A firm that has been approved by FM Approvals according to FM Approvals 4991, "Approval of Firestop Contractors," or been evaluated by UL and found to comply with UL’s “Qualified Firestop Contractor Program Requirements.”
      1. Utilize same Installer as providing Work of Division 07 Section “Penetration Firestopping.”
   B. Single Source Responsibilities:
      1. Obtain firestop systems for each kind of firestop and construction condition indicated from a single primary firestop systems manufacturer.
      2. Provide primers and other secondary materials that are produced by or are specifically recommended by manufacturer of firestop materials to ensure compatibility of system.
      3. Materials of different manufacture than allowed by tested and listed system shall not be intermixed in same firestop system or opening.
      4. Tested and listed firestop systems shall be used before an Engineering Judgment (EJ) or Equivalent Fire Resistance Rated Assembly (EFRA) is installed.
1.7 PROJECT CONDITIONS
A. Environmental Limitations: Do not install joint firestopping systems when ambient or substrate temperatures are outside limits permitted by joint firestopping system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.
B. Install and cure joint firestopping systems per manufacturer’s written instructions using natural means of ventilation or, where this is inadequate, forced-air circulation.

1.8 COORDINATION
A. Coordinate construction of joints to ensure that joint firestopping systems can be installed according to specified firestopping system design.
B. Coordinate sizing of joints to accommodate joint firestopping systems.
C. Coordinate wall identification with Division 09 “Painting” contractor.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS
A. Fire-Test-Response Characteristics:
   1. Perform joint firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.
   2. Test per testing standards referenced in "Joint Firestopping Systems" Article. Provide rated systems complying with the following requirements:
      a. Joint firestopping systems shall bear classification marking of a qualified testing agency. Classification markings on penetration firestopping correspond to designations listed by UL in its “Fire Resistance Directory” or other agencies approved by authorities having jurisdiction.

2.2 JOINT FIRESTOPPING SYSTEMS
A. Joint Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of assemblies in or between which joint firestopping systems are installed. Joint firestopping systems shall accommodate building movements without impairing their ability to resist the passage of fire and hot gases.
B. Joints in or between Fire-Resistance-Rated Construction: Provide joint firestopping systems with ratings determined per ASTM E1966 or UL 2079.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. 3M Fire Protection Products.
      b. Hilti, Inc.
      c. RectorSeal Corporation.
      d. Specified Technologies, Inc.
      e. Tremco, Inc.
   2. Fire-Resistance Rating: Equal to or exceeding the fire-resistance rating of the wall, floor, or roof in or between which it is installed.
C. Joints at Exterior Curtain-Wall/Floor Intersections: Provide joint firestopping systems with rating determined per ASTM E2307.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. 3M Fire Protection Products.
      b. Hilti, Inc.
c. Johns Manville; a Berkshire Hathaway company.
d. RectorSeal Corporation.
e. Rockwool International.
f. Specified Technologies, Inc.
g. Thermafiber, Inc.; an Owens Corning company.
h. Tremco, Inc.

2. F-Rating: Equal to or exceeding the fire-resistance rating of the floor assembly.

D. Mold Resistance: Provide joint firestopping with mold and mildew resistance rating of 0 as determined by ASTM G21.

E. Exposed Joint Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E84.
   1. Sealant shall comply with the testing and product requirements of the California Department of Public Health’s "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

F. Accessories: Provide components of joint firestopping systems, including primers and forming materials, that are needed to install elastomeric fill materials and to maintain ratings required. Use only components specified by joint firestopping system manufacturer and approved by the qualified testing agency for conditions indicated.

PART 3 - EXECUTION

3.1 EXAMINATION
   A. Examine substrates and conditions, with Installer present, for compliance with requirements for joint configurations, substrates, and other conditions affecting performance of the Work.
   B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION
   A. Surface Cleaning: Before installing joint firestopping systems, clean joints immediately to comply with fire-resistive joint system manufacturer’s written instructions and the following requirements:
      1. Remove from surfaces of joint substrates foreign materials that could interfere with adhesion of elastomeric fill materials or compromise fire-resistive rating.
      2. Clean joint substrates to produce clean, sound surfaces capable of developing optimum bond with elastomeric fill materials. Remove loose particles remaining from cleaning operation.
      3. Remove laitance and form-release agents from concrete.
   B. Prime substrates where recommended in writing by joint firestopping 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 fill materials of fire-resistive joint system from contacting adjoining surfaces that will remain exposed on completion of the Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove stains. Remove tape as soon as possible without disturbing fire-resistive joint system’s seal with substrates.

3.3 INSTALLATION
   A. General: Install joint firestopping systems to comply with manufacturer’s written installation instructions and published drawings as well as all written and graphic
requirements in the test assembly documentation for products and applications indicated.

B. Install forming materials and other accessories of types required to support fill materials during their application and in 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 fire-resistive joint system.

C. Install fill materials for joint firestopping systems by proven techniques to produce the following results:
   1. Fill voids and cavities formed by joints and forming materials as required to achieve fire-resistance ratings indicated.
   2. Apply fill materials so they contact and adhere to substrates formed by joints.
   3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 IDENTIFICATION
   A. Wall Identification: Refer to Division 09 Section “Painting.”
   B. Joint Identification: Identify joint firestopping systems with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of joint edge so labels are visible to anyone seeking to remove or joint firestopping system. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:
      2. Contractor’s name, address, and phone number.
      3. Designation of applicable testing agency.
      4. Date of installation.
      5. Manufacturer’s name.
      6. Installer’s name.

3.5 CLEANING AND PROTECTION
   A. Clean off excess elastomeric fill materials adjacent to joints as the Work progresses by methods and with cleaning materials that are approved in writing by joint firestopping system manufacturers and that do not damage materials in which joints occur.
   B. Provide final protection and maintain conditions during and after installation that ensure joint firestopping systems are without damage or deterioration at time of Substantial Completion. If damage or deterioration occurs despite such protection, cut out and remove damaged or deteriorated joint firestopping systems immediately and install new materials to produce joint firestopping systems complying with specified requirements.

END OF SECTION 078443
SECTION 079200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 SUMMARY
   A. This Section includes joint sealants for the following applications, including those specified by reference to this Section:
      1. Exterior joints in the following vertical surfaces and horizontal non-traffic surfaces:
         b. Joints between APC panels and shapes and different materials.
         c. Joints between plant-precast architectural concrete units.
         d. Control and expansion joints in unit masonry.
         e. Joints between different materials listed above.
         f. Perimeter joints between materials listed above and frames of doors, windows, and louvers.
         g. Control and expansion joints in ceilings and other overhead surfaces.
         h. Other joints as indicated.
      2. Exterior joints in the following horizontal traffic surfaces:
         a. Isolation and contraction joints in cast-in-place concrete slabs.
         b. Joints between different materials listed above.
         c. Other joints as indicated.
      3. Interior joints in the following vertical surfaces and horizontal non-traffic surfaces:
         a. Control and expansion joints on exposed interior surfaces of exterior walls.
         b. Vertical joints on exposed surfaces of interior unit masonry walls and partitions.
         c. Perimeter joints between interior wall surfaces and frames of interior doors, windows, and elevator entrances.
         d. Joints between plumbing fixtures and adjoining walls, floors, and counters.
         e. Joints between dissimilar materials unless detailed otherwise.
         f. Through-penetration joints in non-rated assemblies.
         g. Joints at wall terminations at decks, caps, or obstructions.
         h. Other joints as indicated.
      4. Interior joints in the following horizontal traffic surfaces:
         b. Other joints as indicated.
      5. Security Sealant joints in horizontal and vertical surfaces as indicated below:
         a. Elastomeric type.
         b. Low-mod gel.

1.3 PERFORMANCE REQUIREMENTS
   A. Provide elastomeric joint sealants that establish and maintain watertight and airtight continuous joint seals without staining or deteriorating joint substrates.
   B. Provide joint sealants for interior applications that establish and maintain airtight and water-resistant continuous joint seals without staining or deteriorating joint substrates.
C. Provide joint sealants for interior STC-rated acoustical applications that establish and maintain airtight and water-resistant continuous joint seals without staining or deteriorating joint substrates, while maintaining indicated partition STC rating.

1.4 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 type 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. Product Certificates: For each type of joint sealant and accessory, signed by product manufacturer.
E. Qualification Data: For Installer and testing agency.
F. Preconstruction Field Test Reports: Indicate which sealants and joint preparation methods resulted in optimum adhesion to joint substrates based on preconstruction testing specified in “Quality Assurance” Article.
G. 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.
H. Field Test Report Log: For each elastomeric sealant application.
I. Product Test Reports: Based on comprehensive testing of product formulations performed by a qualified testing agency, indicating that sealants comply with requirements.
J. Warranties: Special warranties specified in this Section.
K. Joint-Sealant Schedule: Include the following information:
   1. Specification Section.
   2. Joint-sealant joint location.
   5. Joint-sealant product name.
   7. Joint-sealant primer, when required.
   8. Joint-sealant backer rod type, when required.
   10. Installer.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer’s authorized Installer who is approved or licensed for installation of elastomeric sealants required for this Project.
B. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.
C. 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 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 type 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 of current sealant products for adhesion to, and compatibility with, joint substrates and other materials matching those submitted.

D. Product Testing: Obtain test results for “Product Test Reports” Paragraph in “Submittals” Article from a qualified testing agency based on testing current sealant formulations within a 36-month period preceding the commencement of the Work.
1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated, as documented according to ASTM E 548.
2. Test elastomeric joint sealants for compliance with requirements specified by reference to ASTM C 920, and where applicable, to other standard test methods.
3. Test other joint sealants for compliance with requirements indicated by referencing standard specifications and test methods.

E. Preconstruction Field-Adhesion Testing: Before installing elastomeric 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 type of elastomeric sealant and joint substrate indicated.
   b. Each type of non-elastomeric sealant and joint substrate indicated.
3. Notify Architect seven days in advance of dates and times when test joints will be erected. Architect’s presence at testing is not required.
4. Arrange for tests to take place with joint-sealant manufacturer’s technical representative present.
      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. Provide written report whether sealant in each type of joint connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each type 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.

F. Mockups: Build mockups incorporating sealant joints, as follows, to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
1. Joints in mockups of assemblies specified in other Sections that are indicated to receive elastomeric joint sealants, which are specified by reference to 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.
   2. When joint substrates are wet.
   3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
   4. Contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.7 WARRANTY
A. Special Installer’s Warranty: Installer’s standard form in which Installer agrees to repair or replace elastomeric 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 elastomeric sealant manufacturer agrees to furnish elastomeric 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 - Silicone: 20 years from date of Substantial Completion.
   2. Warranty Period - Urethane: 5 years from date of Substantial Completion.
   3. Warranty Period - Security Sealant: 5 years from date of Substantial Completion.
C. Special warranties specified in this Article exclude deterioration or failure of elastomeric joint sealants from the following:
   1. Movement of the structure resulting in stresses on the sealant exceeding sealant manufacturer’s written specifications for sealant elongation and compression caused by structural settlement or errors attributable to design or construction.
   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 MANUFACTURERS
A. Products: Subject to compliance with requirements, provide one of the products listed in other Part 2 articles.

2.2 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 sealant manufacturer, based on testing and field experience.
B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.3 ELASTOMERIC JOINT SEALANTS
A. Elastomeric Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant specified, including those referencing ASTM C 920
classifications for type, grade, class, and uses related to exposure and joint substrates.

B. Stain-Test-Response Characteristics: Where elastomeric sealants are specified to be non-staining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.

C. Suitability for Contact with Food: Where elastomeric sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.

D. Low-Modulus Single-Component Neutral-Curing Silicone Sealant ES-1:
   1. Products:
      a. BASF; MasterSeal NP 100.
      b. GE Silicones; SilPruf SCS2000.
      c. Pecora Corporation; 864 or 890NST/890FTS for field-tint.
      e. Tremco; Spectrem 3 or Spectrem 4TS for field-tint.
   2. Type and Grade: S (single component) and NS (nonsag).
   3. Class: 50.
   4. Use Related to Exposure: NT (nontraffic).
   5. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrate, O.

E. Medium-Modulus Single-Component Neutral-Curing Silicone Sealant ES-2:
   1. Products:
      a. Dow Corning Corporation; 795.
      b. GE Silicones; SilPruf NB SCS9000.
      c. Pecora Corporation; 895.
      d. Tremco; Spectrem 2.
   2. Type and Grade: S (single component) and NS (nonsag).
   3. Class: 50.
   4. Use Related to Exposure: NT (nontraffic).
   5. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrate, O.

F. Single-Component Mildew-Resistant Silicone Sealant ES-3:
   1. Neutral-Curing Products:
      a. Pecora Corporation; 898.
      b. Tremco; Tremsil 600 White.
   2. Acid-Curing Products:
      a. Dow Corning Corporation; 786 Mildew Resistant.
      b. GE Silicones; Sanitary SCS1700.
      c. Tremco; Tremsil 200.
   3. Type and Grade: S (single component) and NS (nonsag).
   5. Use Related to Exposure: NT (nontraffic).
   6. Uses Related to Joint Substrates: G, A, and, as applicable to joint substrates indicated, O.
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a. Use O Joint Substrates: Galvanized steel and ceramic tile.

G. Non-Traffic Multicomponent Nonsag Urethane Sealant ES-4:
1. Products:
   a. BASF; MasterSeal NP 2.
   b. Pecora Corporation; Dynatrol II.
   c. Tremco; Dymeric 240 FC.
   e. Sika Corporation, Inc.; Sikaflex - 2c NS TG.
   f. Tremco; Vulkem 227.
2. Type and Grade: M (multicomponent) and NS (nonsag).
3. Class: 25 minimum.
4. Use Related to Exposure: NT (nontraffic).
5. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrate, O.

H. Multicomponent Pourable Urethane Sealant ES-5:
1. Products:
   b. Meadows, W. R., Inc.; POURTHANE.
   c. Pacific Polymers, Inc.; Elasto-Than 227 Type I (Self Leveling).
   d. Polymeric Systems Inc.; PSI-270SL.
   e. Schnee-Morehead, Inc.; Permathane SM 7201.
   f. Tremco; THC-901 or THC-900. (to suit slope) or Vulkem 245.
2. Type and Grade: M (multicomponent) and P (pourable).
4. Use Related to Exposure: T (traffic).
5. Uses Related to Joint Substrates: M, A, and, as applicable to joint substrate, O.

2.4 SOLVENT-RELEASE JOINT SEALANTS
A. Butyl-Rubber-Based Joint Sealant SRS-1: ASTM C 1311.
1. Products:
   b. Pecora Corporation; BC-158.
   c. Tremco Incorporated; Tremco Butyl Sealant.

2.5 LATEX JOINT SEALANTS
A. Latex Sealant LS-1: Comply with ASTM C 834, Type P, Grade NF.
1. Products:
   a. BASF; MasterSeal NP 520.
   b. Bostik Findley; Chem-Calk 600.
   c. Pecora Corporation; AC-20+.
   d. Schnee-Morehead, Inc.; SM 8200.
   e. Tremco; Tremflex 834.

2.6 ACOUSTICAL JOINT SEALANTS
A. Acoustical Joint Sealant AS-1: 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. Available Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
   a. Accumetric LLC; BOSS 826 Acoustical Sound Sealant.
   b. BASF; MasterSeal NP 520.
   c. GE Construction Sealants; RCS20 Acoustical.
   d. Grabber Construction Products; Acoustical Sealant GSC.
   e. Hilti CP506 Smoke and Acoustical Sealant.
   f. Pecora Corporation; AC-20 FTR or AIS-919.
   g. Specified Technologies, Inc.; Smoke N Sound Acoustical Sealant.

2.7 SECURITY SEALANTS

A. General: All indicated joints and other sealant locations, including precast concrete, masonry, and hollow metal perimeter joints that are within the detention/holding areas (I-3 Use Group areas, indicated on Drawing LS.1.0) and exposed to view shall comply with requirements for security sealants. Joints above ceilings, covered by expansion joint covers, or otherwise concealed are excluded. Provide elastomeric security sealants (“tamper-resistant”) for supervised inmate occupied areas within the perimeter security fence; and low-mod gel security sealants (“pick resistant”) for cells and other inmate-occupied areas not subject to continuous supervision, located within the secure perimeter. Low-mod gel (“pick resistant”) sealants are not for use in building joints that require movement such as control and expansion joints; provide “tamper resistant” sealant at these locations.

1. Security sealants are referenced in Division 11 and Division 28 Sections as part of the installation of security items directed by the SCSC, who has sole responsibility for provision of secure installation.

2. Provide joint backer material for elastomeric security sealant.

3. Do not use joint backer material for low-mod gel security sealant; install as a “grout” in accordance with manufacturer's recommendations.

4. In cells, provide security sealant (“pick-resistant”) at all perimeter joints of all permanent materials and objects (i.e. plaster security ceilings, floors, concrete bink bed, security hollow metal frames, air grilles, wall embed plates).

5. In cells provide security sealant (“tamper-resistant”) at all perimeter joints of removable objects (i.e. surface mounted toilet fixtures, inmate emergency intercom, security speaker and any exposed wiring devices such as cover plates of wall switches, receptacles specified in Divisions 22, 23, 26 and 27).

6. Provide security sealant (“tamper resistant”) for all exposed voids between finish materials, and between finish materials and surface mounted devices that inmates could use to hide contraband in inmate-accessible rooms inside the secure perimeter. Provide also at VCT termination at CMU walls where no base is scheduled (only painted base), and at joint between ceiling and wall.

B. Elastomeric Security Sealant (“Tamper-Resistant”): Provide one or two-part non-sag polyurethane or epoxy based elastomeric sealant for Use NT to comply with either ASTM C 920, Type S or M; Grade NS; minimum Class 12.5; and Uses NT, M, G, A, & concrete with durometer hardness of 50 or greater; or ASTM C881-90 Type I, II, IV, & V, grade 3, epoxy adhesive resin; made for abuse resistant applications.

1. Products: Provide one of the following:
   a. “MasterSeal CR 195”; BASF.
   b. “Dynaflex”; Pecora Corp.
   c. “Sikaflex 51 NS”; Sika Corp.
   e. “Vulkem 617”; Mameco.
2. Applications: Provide elastomeric security sealants ("tamper-resistant") for supervised inmate occupied areas within the secure perimeter.

C. Low-Mod Gel Security Sealant ("Pick Resistant"): Low-modulus security sealant 100% solids, moisture-insensitive, non-sag, epoxy resin product to comply with ASTM C881-90 Type I, manufactured for assault resistance.

1. Products: Provide one of the following:
   a. "Euco 452-P"; Euclid Chemical Company
   c. "Sikadur 23"; Sika Corp.

2. Applications: Provide low-mod gel security sealants ("pick resistant") for cells and other inmate-occupied areas not subject to continuous supervision, located within the secure perimeter.

2.8 JOINT-SEALANT BACKING

A. General: Provide sealant backings of material and type that are non-staining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), O (open-cell material), B (bi-cellular material with a surface skin), or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated, 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 where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.9 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

C. Masking Tape: Non-staining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.
3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer’s written instructions and the following requirements:
   1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
   2. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, 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. (work of Division 9 Section “Tiling.”)
      d. Gypsum board. (work of Division 9)
   3. Remove laitance and form-release agents from concrete.
   4. Clean nonporous 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. (work of Division 8 Section “Glazing.”)
      c. Porcelain enamel.
      d. Glazed and glass surfaces of ceramic tile. (work of Division 9 Section “Tiling.”)
      e. Perimeter metal edge moldings of acoustical panel ceilings. (work of Division 9 “Acoustical Panel Ceilings”)

B. Joint Priming: Prime joint substrates, where recommended in writing by joint-sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer’s written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant 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.
   1. Provide sealant for all joints where sealant is not specified in other Sections. Seal all joints between dissimilar materials, unless indicated otherwise.
   2. For interior partitions indicated to be full height, seal all penetrations and joints unless indicated otherwise.
   3. Provide sealant on both sides of partitions unless indicated otherwise.

B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
1. For acoustic joints, comply with ASTM C 919 – Standard Practice for Use of Sealants in Acoustical Applications.

C. Install sealant backings of type 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 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 configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.

G. Installation of Security Sealant: Install in locations indicated in accordance with manufacturer's written recommendations.  
   1. Apply pick-resistant security sealant in all spaces and cracks between similar and dissimilar materials including, but not limited to, metal frames, windows, all fixtures except vitreous china plumbing fixtures, detention furniture, embeds, secure air diffusers, lock columns and receivers.  
   2. Apply tamper resistant security sealant in any open joints located in cells, including joints at the intersections of walls to walls, walls to ceilings and walls to floors.

H. 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.

I. Joint-Sealant Application: Vertical and perimeter joints on concealed surfaces of interior unit masonry, concrete, and panel full-height walls and partitions. Refer to other Division 9 Sections for acoustical sealant included as part of assembly installations.  

J. Joint-Sealant Application: Vertical and perimeter joints on exposed and concealed surfaces of interior unit masonry, concrete, and panel acoustic STC-rated walls and partitions. Refer to other Division 9 Sections for acoustical sealant included as part of assembly installations.  
3.4 FIELD QUALITY CONTROL

A. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:
   1. Extent of Testing: Test completed elastomeric sealant joints as follows:
      a. Perform 10 tests for the first 1000 feet of joint length for each type of elastomeric sealant and joint substrate.
      b. Perform 1 test for each 1000 feet of joint length thereafter or 1 test per each floor per elevation.
   2. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab in Appendix X1 in ASTM C 1193, as appropriate for type of joint-sealant application indicated.
      a. For joints with dissimilar substrates, verify adhesion to each substrate separately; do this by extending cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
   3. Inspect joints for complete fill, for absence of voids, and for joint configuration complying with specified requirements. Record results in a field-adhesion-test log.
   4. Inspect tested joints and report on the following:
      a. Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each type of product and joint substrate. Compare these results to determine if adhesion passes sealant manufacturer’s field-adhesion hand-pull test criteria.
      b. Whether sealants filled joint cavities and are free of voids.
      c. Whether sealant dimensions and configurations meet specified requirements.
   5. Record test results in a field-adhesion-test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant fill, sealant configuration, and sealant dimensions.
   6. Repair sealants pulled from test area by applying new sealants following same procedures used originally to seal joints. Ensure that original sealant surfaces are clean and that new sealant contacts original sealant.

B. Evaluation of Field Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.5 CLEANING

A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.6 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.
3.7 JOINT-SEALANT SCHEDULE (Type M = multi-component, Type S = single-component)

   2. Joint-Sealant Color: Standard or custom (factory or field-tint) selected by Architect.

   2. Joint-Sealant Color: As selected by Architect from manufacturer's full standard range.

C. Joint-Sealant Application: Exterior vertical control and expansion joints in unit masonry.
   2. Joint-Sealant Color: Standard or custom (factory or field-tint) selected by Architect.

D. Joint-Sealant Application: Exterior vertical joints between different materials listed above.
   2. Joint-Sealant Color: Standard or custom (factory or field-tint) selected by Architect.

E. Joint-Sealant Application: Exterior perimeter joints between walls and frames of doors, windows and louvers.
   2. Joint-Sealant Color: As selected by Architect from manufacturer's full range.

F. Joint-Sealant Application: Vertical control and expansion joints on exposed interior surfaces of exterior walls.
   2. Joint Sealant, Secure Area: Elastomeric security sealant ("pick-resistant").
   3. Joint-Sealant Color: As selected by Architect from manufacturer's full range.

G. Joint-Sealant Application: Interior perimeter joints of exterior openings.
   2. Joint-Sealant Color: As selected by Architect from manufacturer's full range.

H. Joint-Sealant Application: Interior joints between plumbing fixtures and adjoining walls, floors, and counters.
   2. Joint-Sealant Color: As selected by Architect from manufacturer's full range.

I. Joint-Sealant Application: Vertical joints on exposed surfaces of interior unit masonry and concrete walls and partitions.
   2. Joint-Sealant Color: As selected by Architect from manufacturer's full range.

J. Joint-Sealant Application: Acoustical joints on concealed surfaces of interior unit masonry, concrete, and panel full-height walls and partitions.
   2. Joint-Sealant Color: As selected by Architect from manufacturer's full range.

K. Joint-Sealant Application: Acoustical joints on exposed and concealed surfaces of interior unit masonry, concrete, and panel acoustic STC-rated walls and partitions.
2. Joint-Sealant Color: As selected by Architect from manufacturer's full range.

L. Joint-Sealant Application: Perimeter joints between interior wall surfaces and frames of interior doors, windows, and elevator entrances.

M. Joint-Sealant Application: Interior control, expansion, and isolation joints in horizontal traffic surfaces of concrete slab flooring.

N. Joint-Sealant Application: Bedding joint applications.
   1. Joint Sealant: Butyl-Rubber-Based Solvent-Release Joint Sealant SRS-1

END OF SECTION 079200
SECTION 081113 - STEEL DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 DEFINITIONS
   A. Minimum Thickness: Minimum thickness of base metal without coatings according to SDI A250.8.
   B. Standard Steel Door and Frame Work: Steel door and frame work fabricated according to ANSI/SDI A250.8.
   C. Undercut: Clearance between bottom of door and top of finish floor or threshold below the door.

1.3 COORDINATION
   A. Coordinate anchorage installation for steel 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.
   B. Coordinate requirements for installation of door hardware, electrified door hardware, and access control and security systems.

1.4 TESTING AND PERFORMANCE
   A. Sound control assemblies to be identical to those tested at an independent acoustical laboratory qualified under the National Voluntary Laboratory Accreditation Program (NVLAP) by the National Institute for Science and Technology (NIST) in accordance with ASTM E1408 and ASTM E413.

1.5 ACTION SUBMITTALS
   A. Product Data: For each type of product.
      1. Include construction details, material descriptions, core descriptions, fire-resistance ratings, and finishes.
   B. Shop Drawings: Include the following:
      1. Elevations of each door type.
      2. Details of doors, including vertical- and horizontal-edge details and metal thicknesses.
      3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
      4. Locations of reinforcement and preparations for hardware.
      5. Details of each different wall opening condition.
      6. Details of electrical raceway and preparation for electrified hardware, access control systems, and security systems.
      7. Details of anchorages, joints, field splices, and connections.
      8. Details of accessories.
      9. Details of moldings, removable stops, and glazing.

1.6 INFORMATIONAL SUBMITTALS
   A. Product Test Reports: For each type of steel door and frame assembly, for tests performed by a qualified testing agency.
1.7 DELIVERY, STORAGE, AND HANDLING
   A. Deliver steel doors and frames palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use non-vented plastic.
      1. Provide additional protection to prevent damage to factory-finished units.
   B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
   C. Store steel doors and frames vertically under cover at Project site with heads up. Place in stacks of five units maximum, spaced by blocking. Place on minimum 4-inch-high wood blocking. Provide minimum 1/4-inch space between each stacked door to permit air circulation. Do not store in a manner that traps excess humidity.

1.8 COORDINATION
   A. Coordinate installation of anchorages for sound control 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.

PART 2 - PRODUCTS

2.1 MANUFACTURERS
   A. Source Limitations: Obtain steel door and frame work from single source from single manufacturer.
   B. 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. Ceco Door Products; an Assa Abloy Group company.
      2. Curries Company; an Assa Abloy Group company.
      3. Fleming Door Products Ltd.; an Assa Abloy Group company.
      4. MPI Group, LLC. (Metal Products, Inc.)
      5. Pioneer Industries, Inc.
      6. Steelcraft; an Ingersoll-Rand company.
      7. Windsor Republic Doors.

2.2 PERFORMANCE REQUIREMENTS
   A. Fire-Rated Assemblies: Complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.
      1. Per NFPA 80, fire exit doors shall be labeled “Fire Door to Be Equipped with Fire Exit Hardware,’’ and shall be reinforced and constructed to maintain the rating of the specific listed and labeled fire exit devices mounted on them.
      2. For fire doors bearing the Smoke and Draft Control Door "S" marking, provide UL Classified Category H gasketing materials.
      3. Within the secure perimeter of the jail, U.L. fire resistance labels shall be riveted to the door and frame assemblies.
   B. Fire-Rated, Borrowed-Lite Assemblies: Complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 257 or UL 9. Label each individual glazed lite.
2.3 STANDARD STEEL DOORS AND FRAMES, GENERAL

A. Construct steel doors and frames to comply with standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.

B. General: Provide doors and frames of design indicated, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces unless otherwise indicated. Comply with ANSI/SDI A250.8.

1. Core Construction: Manufacturer’s standard polystyrene, polyurethane, polyisocyanurate, mineral-board, or vertical steel stiffener core. Kraft paper honeycomb core is not acceptable.

2. Fire-Rated Core: Manufacturer’s standard, as required to provide fire-protection ratings indicated.


4. Top and Bottom Edges: Closed with flush or inverted 0.042-inch-thick, end closures or channels of same material as face sheets.


6. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.

7. Fabricate concealed stiffeners and hardware reinforcement from either cold- or hot-rolled steel sheet.

2.4 INTERIOR STANDARD STEEL DOORS AND FRAMES

A. Interior Doors: Face sheets fabricated from either cold-rolled steel sheet or metallic-coated sheet, unless otherwise indicated. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:

1. Level 2 and Physical Performance Level B (Heavy Duty), Model 1 (Full Flush).

B. Interior Frames: Fabricated from cold-rolled steel sheet or metallic-coated sheet. Comply with ANSI/SDI A250.8 and with details indicated for frame type and profile.

1. Fabricate frames with mitered or coped corners.

2. Fabricate frames as face welded unless otherwise indicated.

3. Frames for Level 2 Steel Doors: 0.053-inch-thick steel sheet.

4. Frames for Wood Doors: 0.053-inch-thick steel sheet.

5. Frames for Borrowed Lights: 0.053-inch-thick steel sheet.

2.5 EXTERIOR STANDARD STEEL DOORS AND FRAMES

A. Exterior Doors: Face sheets fabricated from metallic-coated steel sheet. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:

1. Level 3 and Physical Performance Level A (Extra Heavy Duty), Model 2 (Seamless).


1. Fabricate frames with mitered or coped corners.

2. Fabricate frames as face welded unless otherwise indicated.

3. Frames for Level 3 Steel Doors: 0.053-inch-thick steel sheet.
2.6 METAL SOUND CONTROL DOOR ASSEMBLIES

A. Sound Control Steel Doors:

1. General: Provide 1-3/4 inch doors of type and design indicated, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces unless otherwise indicated. Comply with ANSI/SDI A250.8.

2. Design: Flush panel.
   a. Core Construction: Manufacturer's standard sound control door core construction designed and tested for the specified STC rating.
   b. Fire Door Core: As required to provide fire-protection level specified.

3. Level/Model: Level 3 and Physical Performance Level A (Extra Heavy Duty), Minimum 16 gage (0.053-inch - 1.3-mm) thick steel, Model 2 (Fully welded, seamless face and edges).

4. Vertical Edges: Vertical edges to have the face sheets joined by a continuous weld extending the full height of the door. Welds are to be ground, filled and dressed smooth. Beveled Edge, 1/8 inch in 2 inches (3 mm in 50 mm).

5. Top and Bottom Edges: Reinforce tops and bottoms of doors with a continuous steel channel not less than 16 gage (0.053-inch - 1.3-mm), extending the full width of the door and welded to the face sheet. Finish top and bottom to provide a smooth flush condition.

6. Surface Applied Hardware Reinforcements: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.

B. Sound Control Steel Frames:

1. General: Provide frames of the type and profile indicated, not less than thickness indicated; to comply with ANSI/SDI A250.8.
   a. Fabricate frames with mitered corners.
   b. Fabricate frames with "closed and tight" mitered full depth continuously welded seams, finished smooth with no visible seam unless otherwise indicated. Knock down type frames are not permitted.
   c. Minimum 14 gage (0.067-inch -1.7-mm) thick steel sheet.

2. Fire rated frames: Fabricate frames in accordance with NFPA 80, listed and labeled by a qualified testing agency, for fire-protection ratings indicated.

3. Surface Applied Hardware Reinforcements: Fabricate according to ANSI/SDI A250.6 Table 4 with reinforcement plates from same material as frames.

2.7 BORROWED LITES

A. Fabricate of cold rolled or metallic-coated steel sheet, minimum thickness of 0.053 inch.

B. Construction: Face welded, unless otherwise indicated.

C. Fabricate in one piece except where handling and shipping limitations require multiple sections. Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of metal of same or greater thickness as metal as frames.

D. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.

2.8 FRAME ANCHORS

A. Jamb Anchors:

1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042-inch-thick, with corrugated or perforated straps not less than 2
2.10 FABRICATION

A. Fire Rated Doors: Fire door and frame preparations for electric and mortised hardware shall be made by the respective door and frame manufacturers. Field modifications shall not be permitted for such hardware.

B. Weight: Weight of any door leaf without hardware shall not exceed 200 pounds unless approved by the Architect.

C. Door Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted or as required to comply with published listing of qualified testing agency.
D. Steel 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 metal of same or greater thickness 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 welding.

3. Coordinate with square steel tube removable mullion furnished as exit device accessory under Division 08 Section “Door Hardware.”

4. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.

5. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.

6. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Keep holes clear during construction.
   a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
   b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.

E. Fabricate sound control steel work 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. When shipping limitations so dictate, frames for large openings are to be fabricated in sections for splicing or splining in the field by others.

1. Tolerances: Fabricate sound control hollow metal work to tolerances indicated in ANSI/SDI A250.8.

2. Glazed Lites for Sound Control Doors: Factory cut openings in doors with applied flush trim kit to fit. Provide loose stops, seals and accessories to facilitate double glazing. Design to allow for independent installation or removal of each pane of glass. Glass, as recommended by manufacturer, is to be supplied and installed under Division 08 Section, "Glazing".

3. Astragals for Sound Control Doors: Provide overlapping astragals as required on one leaf of pairs of doors where required for specified STC rating or by NFPA 80 for fire-performance rating. Extend minimum 3/4 inch (19 mm) beyond edge of door on which astragal is mounted.

4. Continuous Hinge Reinforcement for Sound Control Doors: Provide welded continuous 12 gage strap for continuous hinges specified in hardware sets in Division 08 Section, "Door Hardware".

5. Sound Control Steel Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
   a. Welded Frames: Full depth continuously weld frame seams; grind, fill, dress, and make smooth, flush, and invisible.
      1) Welded frames are to be provided with two steel spreaders temporarily attached to the bottom of both jambs to serve as a brace during shipping and handling. Spreader bars are for bracing only and are not to be used to size the frame opening.
   b. Continuous Hinge Reinforcement: Provide welded continuous 12 gage straps for continuous hinges specified in hardware sets in Division 08 Section, "Door Hardware".
c. Electrical Knock Out Boxes for Sound Control Steel Frames: Factory weld 18 gage electrical knock out boxes to frame for electrical hardware preps; this includes but not limited to electric through wire transfer hardware, electrical raceways and wiring harnesses, door position switches, electric strikes, magnetic locks, and jamb mounted card readers as noted in door hardware sets in Division 08 Section, "Door Hardware".
   1) Provide electrical knock out boxes as required for Project.
   2) Conduit to be coordinated and installed in the field (Division 26) from middle hinge box and strike box to door position box.
   3) Electrical knock out boxes to comply with NFPA requirements and fit electrical door hardware as specified in hardware sets in Division 08 Section, "Door Hardware".
   4) Electrical knock out boxes for continuous hinges should be located in the center of the vertical dimension on the hinge jamb.

F. Hardware Preparation: Factory prepare steel doors and frames to receive templated mortised hardware, and electrical wiring; include cutouts, reinforcement, mortising, drilling, and tapping according to SDI A250.6, the Door Hardware Schedule, and templates.
   1. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8.
   2. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
   3. Comply with BHMA A156.115 for preparing steel doors and frames for hardware.

G. Glazed Lites: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints.
   1. Provide stops and moldings flush with face of door, and with square stops unless otherwise indicated. Minimum 0.032-inch-thick, fabricated from same material as face sheet in which they are installed.
   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. Provide loose stops and moldings on inside of steel doors and frames.
   4. Coordinate rabbet width between fixed and removable stops with glazing and installation types indicated.
   5. Provide stops for installation 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.

2.11 STEEL FINISHES
  A. Prime Finish: Clean, pretreat, and apply manufacturer’s standard primer.
     1. Shop Primer: Manufacturer’s standard, fast-curing, lead- and chromate-free primer complying with SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.
     2. Metallic-Coated Steel Sheet Finish: Manufacturer’s standard rust prohibitive treatment by dry passivation process (“paint grip”) or factory-applied coat of rust-inhibiting primer complying with ANSI A250.10 for acceptance criteria.
PART 3 - EXECUTION

3.1 PREPARATION

A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces. Touch up factory-applied finishes where spreaders are removed.

B. Drill and tap doors and frames to receive non-templated, mortised, and surface-mounted door hardware.

3.2 INSTALLATION

A. General: Install steel doors and frames plumb, rigid, properly aligned, and securely fastened in place. Comply with approved Shop Drawings and with manufacturer’s written instructions.

B. Steel Frames: Comply with 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 without damage to completed Work.
   a. Where frames are fabricated in sections, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces. Touch-up finishes.
   b. Install frames with removable stops located on secure side of opening.
   c. Install door silencers in frames before grouting.
   d. Remove temporary braces necessary for installation only after frames have been properly set and secured.
   e. Check plumbness, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.

2. Fire-Rated Openings: Install fire door assemblies per NFPA 80, the door and frame manufacturers’ installation instructions, and manufacturers’ listing requirements.

3. Floor Anchors: Secure with postinstalled expansion anchors.
   a. Floor anchors may be set with powder-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.

4. Solidly pack mineral-fiber insulation inside frames.

5. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout or mortar.

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 steel frames 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. Steel Doors: Factory fit and adjust steel doors accurately in frames, within clearances specified below. Adjust installed clearances to meet factory fitting requirements indicated
for fabrication. Replace doors and frames that do not meet clearance requirements.

1. Non-Fire-Rated Steel Doors: Comply with SDI A250.8 unless indicated otherwise.
   a. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch.
   b. Between Bottom of Door and Top of Bumper or Panic Threshold (not including the stop strip): Maximum 3/16 inch.

2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.

D. Sound Control Steel Frames: Install steel frames of size and profile indicated. 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. Shim as necessary to comply with installation tolerances.
      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.
   2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with post-installed expansion anchors.
   3. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with appropriate mortar.
   4. Wood or Metal Partitions: As required by the specified STC rating, and in accordance with the manufacturer's recommended instructions, coordinate installation of frames to allow for solidly filling space between frames and wood or metal partitions with light weight plaster grout.

E. Sound Control Steel Doors: Fit sound control hollow metal doors accurately in frames, within clearances specified below. Shim as necessary.
   1. Non-Fire-Rated Standard Steel Doors:
      a. Jambs and Head: 1/8 inch (3 mm) plus or minus 1/16 inch (1.6 mm).
      b. Between Edges of Pairs of Doors: 1/8 inch (3 mm) plus or minus 1/16 inch (1.6 mm).
      c. Between Bottom of Door and Top of Threshold: Standard bottom clearance as required by manufacturer.
   2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.

F. Glazing: Comply with installation requirements in Division 08 Section "Glazing" and with steel door and frame manufacturer's and sound control steel door and frame manufacturer's written instructions.
   1. 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.
   2. Secure stops with security type, countersunk flat- or oval-head machine screws for exterior doors and frames.

3.3 CLEANING AND TOUCHUP

A. 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.
B. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint according to manufacturer’s written instructions.

C. Touchup Painting: Cleaning and touchup painting of abraded areas of paint are specified in Division 09 Section “Painting.”

END OF SECTION 081113
SECTION 081416 - FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 DEFINITIONS
   A. Undercut: Clearance between bottom of door and top of finish floor or threshold below the door.
   B. Coordinate installation of anchorages for STC-rated door assemblies. Furnish setting drawings, templates, and directions for installing anchorages. Deliver sleeves, inserts, anchor bolts, and items with integral anchors to Project site in time for installation.

1.3 PREINSTALLATION MEETINGS
   A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS
   A. Product Data: For each type of door. Include details of core and edge construction and trim for openings. Include factory-finishing specifications.
   B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; and the following:
      1. Dimensions and locations of blocking.
      2. Dimensions and locations of mortises and holes for hardware.
      3. Dimensions and locations of cutouts.
      4. Undercuts.
      5. Requirements for veneer matching.
      6. Doors to be factory finished and finish requirements.
      7. Fire-protection ratings for fire-rated doors.
      8. For STC-rated doors, include details of sound control seals, door bottoms, and thresholds.
   C. Samples:
      1. Factory finishes applied to actual door face materials, approximately 8 by 10 inches, for each material and finish.
      2. Corner sections of doors, approximately 8 by 10 inches, with door faces and edges representing actual materials to be used.
         a. Provide Samples for each species of veneer and solid lumber required.
         b. Provide Samples for each color, texture, and pattern of plastic laminate required.
         c. Finish veneer-faced door Samples with same materials proposed for factory-finished doors.
      3. Frames for light openings, 6 inches long, for each material, type, and finish required.

1.5 INFORMATIONAL SUBMITTALS
   A. Sample Warranty: For special warranty.
   B. Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.
1.6 QUALITY ASSURANCE
A. Manufacturer Qualifications: A qualified manufacturer that is a certified participant in AWI's Quality Certification Program.
B. Source Limitations: Obtain flush wood doors through one source from a single manufacturer.

1.7 DELIVERY, STORAGE, AND HANDLING
A. Comply with requirements of referenced standard and manufacturer’s written instructions.
B. Package doors individually in plastic bags or cardboard cartons.
C. Except where exposed to view, mark each door on top rail with opening number used on Shop Drawings. Mark doors on bottom rail where top of door will be exposed to view.

1.8 FIELD 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 remainder of construction period.

1.9 WARRANTY
A. Special Warranty: 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.
2. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.

PART 2 - PRODUCTS

2.1 MANUFACTURERS
A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Eggers Industries.
2. Lambton Doors.
4. VT Industries, Inc.
B. Doors shall be manufactured by hot-press method, bonding faces, crossbands, and core together in a single operation with Type I glue. Doors manufactured by cold-pressing 2 or 3 ply pre-manufactured door skins to multiple cores in the same press will not be accepted.

2.2 FLUSH WOOD DOORS, GENERAL
A. Quality Standard: In addition to requirements specified, comply with AWI’s, AWMAC’s, and WI’s "Architectural Woodwork Standards."
1. Contract Documents contain selections chosen from options in quality standard and additional requirements beyond those of quality standard. Comply with those selections and requirements in addition to quality standard.
B. Fire-Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C. After 5 minutes into the NFPA 252 test, the neutral pressure level in the furnace shall be established at 40 inches or less above the sill.
   1. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a qualified testing agency that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.
   2. Cores: Provide core specified or mineral core as needed to provide fire-protection rating indicated.
   3. Edge Construction: Provide edge construction with intumescent seals concealed by outer stile. Comply with specified requirements for exposed edges. (UL Category A.)
   4. Pairs: Provide fire-retardant stiles that are listed and labeled for applications indicated without formed-steel edges and astragals. Provide stiles with concealed intumescent seals. Comply with specified requirements for exposed edges.

C. Smoke- and Draft-Control Door Assemblies: Listed and labeled for smoke and draft control, based on testing according to UL 1784.

D. Sound Rating: Where indicated, provide door assemblies with sound attenuation core and door and frame seals, identical to those of assemblies tested as sound-retardant units by an acoustical testing agency, with minimum STC rating as follows:
   1. STC Rating: Provide minimum STC ratings indicated on Door Schedule, as calculated by ASTM E413 when tested in an operable condition according to ASTM E90.

E. Particleboard-Core Doors:
   2. Blocking: Provide wood blocking in particleboard-core doors as follows: a. 5-inch top-rail blocking, in doors indicated to have closers.
   3. Provide doors with glued-wood-stave or structural-composite-lumber cores instead of particleboard cores for doors indicated to receive exit devices and surface-mounted closers.

F. Structural-Composite-Lumber-Core Doors:
      a. Screw Withdrawal, Face: 700 lbf.
      b. Screw Withdrawal, Edge: 400 lbf.

G. Mineral-Core Doors:
   1. Core: Noncombustible mineral product complying with requirements of referenced quality standard and testing and inspecting agency for fire-protection rating indicated.
   2. Blocking: Provide composite blocking with improved screw-holding capability approved for use in doors of fire-protection ratings indicated as needed to eliminate through-bolting hardware.
   3. Edge Construction: At hinge stiles, provide laminated-edge construction with improved screw-holding capability and split resistance. Comply with specified requirements for exposed edges.

2.3 VENEER-FACED DOORS FOR TRANSPARENT FINISH

A. Interior Solid-Core Doors:
   1. Grade: Custom (Grade A faces).
   2. Species: Select Select white maple.
   3. Cut: Plain sliced (flat sliced).
5. Assembly of Veneer Leaves on Door Faces: Running match.
6. Pair and Set Match: Provide for doors hung in same opening or separated only by mullions.
7. Veneers for all doors in the Work well-matched for color and grain as approved.
8. Exposed Vertical and Top Edges: Same species as faces or a compatible species - edge Type A. Same species as faces - edge Type A.
9. Core: Particleboard, except where indicated to be structural-composite-lumber or mineral-core.
11. Construction: Five plies. Stiles and rails are bonded to core, then entire unit is abrasive planed before veneering. Faces are bonded to core using a hot press.

2.4 LIGHT FRAMES
A. Wood Beads for Light Openings in Wood Doors: Provide manufacturer’s standard wood beads unless otherwise indicated.
   1. Wood Species: Same species as door faces.
   2. Profile: Flush rectangular beads.
   3. At wood-core doors with 20-minute fire-protection ratings, provide wood beads and metal glazing clips approved for such use.
B. Wood-Veneered Beads for Light Openings in Fire-Rated Doors: Manufacturer’s standard wood-veneered noncombustible beads matching veneer species of door faces and approved for use in doors of fire-protection rating indicated. Include concealed metal glazing clips where required for opening size and fire-protection rating indicated.
C. Metal Frames for Light Openings in Fire-Rated Doors: Manufacturer’s standard frame formed of 0.048-inch-thick, cold-rolled steel sheet; with baked-enamel- or powder-coated finish; and approved for use in doors of fire-protection rating indicated.

2.5 HARDWARE
A. Sound Control Door Hardware: Manufacturer's standard sound control system, including head and jamb seals, door bottoms, cam-lift hinges, and thresholds, as required by testing to achieve STC and fire rating indicated.
   1. Head and Jamb Seals: One of the following:
      a. Neoprene Compression Seals: One-piece units consisting of closed-cell sponge neoprene seal held in place by metal retainer, with retainer cover of same material as door frame; attached to door frame with concealed screws.
      b. Silicone Compression Seals: One-piece units consisting of silicone compression bulb and stabilizer flange; attached to door frame adhesively.
      c. Magnetic Seals: One-piece units consisting of closed-cell sponge neoprene seal and resiliently mounted magnet held in place by metal retainer, with retainer cover of same material as door frame; attached to door frame with concealed screws.
   2. Automatic Door Bottoms: Neoprene or silicone gasket, held in place by metal housing, that automatically drops to form seal when door is closed; mounted to bottom edge of door with screws.
      a. Mounting: Mortised or semimortised into bottom of door as required by testing to achieve STC rating indicated.
   3. Door Bottoms: Neoprene or silicone gasket held in place by metal housing; mortised into bottom edge of door.
4. Cam-Lift Hinges: Full-mortise template type that raises door 1/2 inch when door is fully open; with hardened pin; fabricated from stainless steel.

B. Other Hardware: Comply with requirements in Division 08 Section "Door Hardware."

2.6 FABRICATION

A. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.

1. Non-Fire-Rated Wood Doors:
   a. Jamb and Head: 1/8 inch plus or minus 1/16 inch.
   b. Between Edges of Pairs of Doors: 1/8 inch plus or minus 1/16 inch.
   c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch.
   d. Between Bottom of Door and Top of Bumper or Panic Threshold (not including the stop strip): Maximum 3/16 inch.
   e. Between Bottom of Door and Finish Floor (No Threshold): Maximum 3/4 inch.

2. Comply with NFPA 80 requirements for fire-rated doors.

B. 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, BHMA-156.115-W, and hardware templates.

1. Coordinate with hardware mortises in metal frames to verify dimensions and alignment before factory machining.

2. Metal Astragals: Factory machine astragals and formed-steel edges for hardware for pairs of fire-rated doors.

C. Transom and Side Panels: Fabricate matching panels with same construction, exposed surfaces, and finish as specified for associated doors. Finish bottom edges of transoms and top edges of rabbeted doors same as door stiles.

1. Fabricate door and transom panels with full-width, solid-lumber[<>] meeting rails. Provide factory-installed spring bolts for concealed attachment into jambs of metal door frames.

D. Openings: Factory cut and trim openings through doors.

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. Door Weight: Weight of any door leaf without hardware shall not exceed 200 pounds unless approved by the Architect.

2.7 FACTORY FINISHING

A. General: Comply with referenced quality standard for factory finishing. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.

1. Finish faces, all four edges, edges of cutouts, and mortises. Stains and fillers may be omitted on top and bottom edges, edges of cutouts, and mortises, unless indicated otherwise.
   a. Finish top edges of doors exposed to view from above, such as in stairwells, multi-story spaces, and low doors and gates.

B. Factory finish doors.

C. Factory finish doors that are indicated to receive transparent finish.
D. Transparent Finish:
   1. Grade: Custom.
   2. Finish: AWI’s, AWMAC’s, and WI’s "Architectural Woodwork Standards" System 5, conversion varnish or System 11, catalyzed polyurethane.
   3. Staining: As selected by Architect from manufacturer's full range.
   4. Effect: Open-grain finish.
   5. Sheen: Satin.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine doors and installed door frames, with Installer present, before hanging doors.
   1. Verify that installed frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jams.
   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 referenced quality standard, and as indicated.
   1. Install fire door assemblies per NFPA 80, the door and frame manufacturers’ installation instructions, and manufacturers’ listing requirements.
   2. Install smoke- and draft-control doors according to NFPA 105.

C. Factory-Fitted Doors: Align in frames for uniform clearance at each edge. Adjust installed clearances to meet factory fitting requirements indicated for fabrication. Replace doors that do not meet clearance requirements.

D. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

E. Sound Control Seals: Where seals have been factory prefit and preinstalled and subsequently removed for shipping, reinstall seals and adjust according to manufacturer's written instructions.

F. Cam-Lift Hinges: Install hinges according to manufacturer's written instructions.

3.3 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Testing Services: Perform testing for verification that assembly complies with STC rating requirements.
   1. Acoustical testing and inspecting agency shall select one STC-rated door at random from door assemblies that are completely installed for testing.
   2. Field tests shall be conducted according to ASTM E336, with results calculated according to ASTM E413. Acceptable field NIC values shall be within 5 dB of laboratory STC values.
   3. Inspection Report: Acoustical testing agency shall submit report in writing to Architect and Contractor within 24 hours after testing.
   4. If tested door fails, replace or rework all STC-rated door assemblies to bring them into compliance at Contractor's expense.
a. Additional testing and inspecting at Contractor's expense will be performed to determine if replaced or additional work complies with specified requirements.

C. Prepare test and inspection reports.

3.4 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 refishing.

1. Adjust gaskets, gasket retainers, and retainer covers to provide contact required to achieve STC rating.

END OF SECTION 081416
MOORE COUNTY COURTHOUSE AND RENOVATION  
CARTHAGE, NORTH CAROLINA  
Architect's Project No.: 582405

SECTION 083113 - ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 SUBMITTALS
   A. Product Data: For each type of access door and frame indicated. Include construction
details, fire ratings, materials, individual components and profiles, and finishes.
   B. Samples: For each door face material, at least 3 by 5 inches in size, in specified finish.
   C. Access Door and Frame Schedule: Provide complete access door and frame schedule,
      including types, locations, sizes, latching or locking provisions, and other data pertinent to
      installation.

1.3 QUALITY ASSURANCE
   A. Source Limitations: Obtain each type of access door(s) and frame(s) 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 listed and labeled by UL or another testing and inspecting
      agency acceptable to authorities having jurisdiction:
      1. Fire-rated door assemblies shall conform with and be installed in accordance with (1)
         NFPA 80, (2) door and frame manufacturer’s installation instructions and (3) listing
         requirements of qualified testing agency.
      2. NFPA 252 or UL 10B for vertical access doors and frames.
      3. NFPA 288 for fire-rated access door assemblies installed horizontally.

1.4 COORDINATION
   A. Verification: Determine specific locations and sizes for access doors needed to gain access
      to concealed plumbing, mechanical, or other concealed work, and indicate in the schedule
      specified in “Submittals” Article.
      1. This material specification includes access doors required for Divisions 21 (Fire
         Suppression), Division 22, (Plumbing), 23 (HVAC) and Division 26 (Electrical) work
         and any other access doors indicated on Drawings.
      2. Access panels incorporated in this type security ceiling system application are
         specified in Division 09 Section “Security Ceiling Systems – Plank.”

PART 2 - PRODUCTS

2.1 STEEL MATERIALS
   A. Steel Plates, Shapes, and Bars: ASTM A 36.
      1. ASTM A 123, for galvanizing steel and iron products.
      2. ASTM A 153, for galvanizing steel and iron hardware.
   B. Rolled-Steel Floor Plate: ASTM A 786, rolled from plate complying with ASTM A 36 or
      ASTM A 283, Grade C or D.
      1. ASTM A 123, for galvanizing steel and iron products
      2. ASTM A 153, for galvanizing steel and iron hardware.
C. Steel Sheet: Uncoated or electrolytic zinc-coated, ASTM A 591 with cold-rolled steel sheet substrate complying with ASTM A 1008, Commercial Steel (CS), exposed.

D. Metallic-Coated Steel Sheet: ASTM A 653, Commercial Steel (CS) with A60 zinc-iron-alloy (galvannealed) coating or G60 mill-phosphatized zinc coating; stretcher-leveled standard of flatness; with minimum thickness indicated representing specified thickness according to ASTM A 924.

E. Steel Finishes: Comply with NAAMM’s “Metal Finishes Manual for Architectural and Metal Products” for recommendations for applying and designating finishes.

1. Surface Preparation for Steel Sheet: Clean surfaces to comply with SSPC-SP 1, “Solvent Cleaning,” to remove dirt, oil, grease, or other contaminants that could impair paint bond. Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1, “White Metal Blast Cleaning,” or SSPC-SP 8, “Pickling.”

2. Surface Preparation for Metallic-Coated Steel Sheet: 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.


3. Factory-Primed Finish: Apply shop primer immediately after cleaning and pretreating.

2.2 ACCESS DOORS AND FRAMES FOR WALLS AND CEILINGS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Access Panel Solutions.
2. Acudor Products, Inc.
3. Babcock-Davis; A Cierra Products Co.
4. J. L. Industries, Inc.
7. Milcor Inc.
8. Nystrom, Inc.


1. Locations: Masonry and Concrete wall and ceiling surfaces as indicated.
2. Door: Minimum 0.075-inch- thick sheet metal, set flush with exposed face flange of frame.
3. Frame: Minimum 0.060-inch- thick sheet metal with 1-inch- wide, surface-mounted trim.
4. Hinges: Continuous piano.
5. Lock: Key-operated deadbolt with minimum 5-pin tumbler.
6. Finish: Primed for field painting.

C. Flush Access Doors with Concealed Flanges:

1. Assembly Description: Fabricate door to fit flush to frame. Provide frame with gypsum board beads for concealed flange installation.
2. Locations: Non-fire-rated gypsum board wall and ceiling surfaces.
3. Uncoated Steel Sheet for Door: Nominal 0.060-inch, 16 gage.
4. Frame Material: Same material, thickness, and finish as door.
5. Hinges: Manufacturer's standard.

D. Recessed Access Doors:
   1. Assembly Description: Fabricate door in the form of a pan recessed 5/8 inch for gypsum board infill. Provide frame with gypsum board bead for concealed flange installation.
   2. Locations: Where indicated.
   3. Uncoated Steel Sheet for Door: Nominal 0.060-inch, 16 gage.
   4. Frame Material: Same material, thickness, and finish as door.
   5. Hinges: Manufacturer's standard.

E. Exterior Flush Access Doors:
   2. Assembly Description: Fabricate door to be weatherproof and fit flush to frame. Provide manufacturer's standard 2-inch thick fiberglass insulation and extruded door gaskets. Provide manufacturer's standard-width frame for surface mounting, proportional to door size.
   3. Locations: Where indicated.
   4. Metallic-Coated Steel Sheet for Door: Nominal 0.064-inch, 16 gage.
   5. Frame Material: Same material, thickness, and finish as door.

   1. Locations: Fire-rated masonry walls as indicated.
   3. Door: Minimum 0.060-inch-thick sheet metal, flush construction.
   4. Frame: Minimum 0.060-inch- thick sheet metal with 1-inch- wide, surface-mounted trim.
   5. Hinges: Concealed pin type or continuous piano.
   7. Latch: Self-latching bolt operated by flush key with interior release.
   8. Finish: Primed for field painting.

G. Fire-Rated, Flush Access Doors with Concealed Flanges:
   1. Assembly Description: Fabricate door to fit flush to frame, uninsulated. Provide self-latching door with automatic closer and interior latch release. Provide manufacturer's standard-width exposed flange, proportional to door size.
   2. Locations: Fire-rated masonry walls.
   3. Fire-Resistance Rating: Not less than that of adjacent construction.
   4. Uncoated Steel Sheet for Door: Nominal 0.036-inch, 20 gage.
   5. Frame Material: Same material, thickness, and finish as door.
   1. Locations: Concrete Ceiling surfaces as indicated.
   2. Door: Minimum 0.135-inch-thick sheet metal, flush construction.
   4. Hinges: Heavy-duty steel welded to door and frame.
   5. Lock: Heavy-duty, detention deadbolt. Key-operated deadbolt with minimum 5-pin tumbler.
   6. Finish: Primed for field painting.

I. Hardware:
   1. Latch: Cam latch operated by screwdriver, unless indicated otherwise.

2.3 FABRICATION
A. General: Provide access door and frame 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. 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: Nominal 1 to 1-1/2 inches wide around perimeter of frame.
   2. For concealed flanges with drywall bead, provide edge trim for gypsum board securely attached to perimeter of frames.
   3. Provide mounting holes in frames for attachment of units to metal or wood framing.
   4. Provide mounting holes in frame for attachment of 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.
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. Detention work: Provide security type mogul key cylinder of same manufacturer of approved security door hardware. Coordinate with master keying. Key all locks alike.

PART 3 - EXECUTION

3.1 EXAMINATION
A. Examine substrates 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. Comply with manufacturer’s written instructions for installing access doors and frames.
   1. For fire-rated doors, Comply with NFPA 80 and listing requirements.
B. Set frames accurately in position and attach securely to supports with plane of face panels aligned with adjacent finish surfaces.
C. Install doors flush with adjacent finish surfaces or recessed to receive finish material.

3.3 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 083113
SECTION 083323 - OVERHEAD COILING DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 ACTION SUBMITTALS
   A. Product Data: For each type and size of overhead coiling door and accessory.
      1. Include construction details, material descriptions, dimensions of individual components, profiles for slats, and finishes. Include data for weatherstripping, astragals, and gaskets. Include data for door position switches.
      2. Include rated capacities, operating characteristics, electrical characteristics, and furnished accessories.
   B. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer’s product data.
      1. Include plans, elevations, sections, and mounting details.
      2. Include details of equipment assemblies, and indicate dimensions, required clearances, method of field assembly, components, and location and size of each field connection.
      3. Include points of attachment and their corresponding static and dynamic loads imposed on structure.
      4. For exterior components, include details of provisions for assembly expansion and contraction and for excluding and draining moisture to the exterior.
      5. Show locations of controls, locking devices, and other accessories.
      6. Include diagrams for power, signal, door position switches, and control wiring.
   C. Samples for Initial Selection: Manufacturer’s finish charts showing full range of colors and textures available for units with factory-applied finishes.
      1. Include similar Samples of accessories involving color selection.
   D. Samples for Verification: For each type of exposed finish on the following components, in manufacturer’s standard sizes:
      1. Curtain slats.

1.3 INFORMATIONAL SUBMITTALS
   A. Qualification Data: For Installer.
   B. Security System Component Certification: Provide certification from Security Control Systems Contractor (SCSC, Division 28) that door position switch device and mounting are acceptable.
   C. Sample Warranty: For special warranty.

1.4 CLOSEOUT SUBMITTALS
   A. Maintenance Data: For overhead coiling doors 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 for both installation and maintenance of units required for this Project.
      1. Maintenance Proximity: Not more than two hours’ normal travel time from Installer’s place of business to Project site.
B. Fire-Rated Door Assemblies: Complying with NFPA 80; listed and labeled by 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.

C. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board’s ADA-ABA Accessibility Guidelines and ICC A117.1.

1.6 WARRANTY
A. Special Warranty: Manufacturer agrees to repair or replace components of doors that fail in materials or workmanship within specified warranty period.
   1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS
A. Source Limitations: Obtain overhead coiling doors through one source from a single manufacturer.
   1. Obtain operators and controls from overhead coiling-door manufacturer.

2.2 PERFORMANCE REQUIREMENTS
A. Structural Performance, Exterior Doors: Exterior overhead coiling doors shall withstand the wind loads, the effects of gravity loads, and loads and stresses within limits and under conditions indicated according to SEI/ASCE 7 and as follows:
   1. Design Wind Load: As indicated on Drawings.
   2. Testing: According to ASTM E330, or to DASMA 108 for garage doors and complying with acceptance criteria of DASMA 108.
   3. Deflection Limits: Design overhead coiling doors to withstand design wind load without evidencing permanent deformation or disengagement of door components.
   4. Operability under Wind Load: Design overhead coiling doors to remain operable under design wind load, acting inward and outward.

B. Seismic Performance: Overhead coiling doors shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
   1. Seismic Design Category and Seismic Component Importance Factor: As indicated on Structural Drawings.

C. Operation Cycles: Provide overhead coiling door components and operators capable of operating for not less than number of cycles indicated for each door. One operation cycle is complete when a door is opened from the closed position to the fully open position and returned to the closed position.

2.3 DOOR ASSEMBLY
A. Service Doors at Vehicle Sallyport and Secure Basement Entrance: 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. ACME Rolling Doors.
      b. Alpine Overhead Doors, Inc.
      c. Alumatec Pacific Products.
      d. Amarr; Entrematic Group.
e. ASTA Door Corporation.
f. C.H.I. Overhead Doors, Inc.
g. City-Gates.
h. Clopay Building Products.
i. CornellCookson, Inc.
j. Dynamic Closures.
k. Lawrence Roll-Up Doors, Inc.
l. McKeon Rolling Steel Door Company, Inc.
m. Metro Door.
n. Overhead Door Corporation.
o. Raynor Garage Doors.
p. Southwestern Rolling Steel Door Co.
q. Wayne-Dalton Corp, a division of Overhead Door Corp.

2. Operation Cycles: Door components and operators capable of operating for not less than 100,000. One operation cycle is complete when a door is opened from the closed position to the fully open position and returned to the closed position.
   a. Include tamperproof cycle counter.

3. Door Curtain Material: Aluminum.

4. Door Curtain Slats: Flat profile slats of manufacturer’s standard center-to-center height.

5. Insulated-Slat Interior Facing: Metal.

6. Bottom Bar: Two angles, each not less than 1-1/2 by 1-1/2 by 1/8-inch-thick; fabricated from aluminum extrusions and finished to match door.

7. Curtain Jamb Guides: Aluminum with exposed finish matching curtain slats.

8. Hood: Match curtain material and finish.
   a. Shape: Round.
   b. Mounting: Face of wall.


10. Electric Door Operator:
    a. Usage Classification: Standard duty, up to 25 cycles per hour and up to 90 cycles per day.
    b. Operator Location: Wall mounted or as indicated.
    c. Safety: Listed according to UL 325 by a qualified testing agency for commercial or industrial use.
    f. Obstruction-Detection Device: Automatic electric sensor edge on bottom bar.
       1) Sensor Edge Bulb Color: Black.
    g. Control Station(s): Interior and exterior mounted, with remote operation from existing control room.

11. Curtain Accessories: Equip door with weatherseals and push/pull handles.

12. Door Finish:
   a. Aluminum Finish: Color anodic to be selected from manufacturer's full range.

2.4 MATERIALS, GENERAL

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.
2.5 DOOR CURTAIN MATERIALS AND CONSTRUCTION

A. Door Curtains: Fabricate overhead coiling-door curtain of interlocking metal 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. Aluminum Door Curtain Slats: ASTM B 209 sheet or ASTM B 221 extrusions, alloy and temper standard with manufacturer for type of use and finish indicated; thickness of 0.050 inch; and as required.
   2. Insulation: Fill slats for insulated doors with manufacturer’s standard thermal insulation complying with minimum flame-spread and smoke-developed indexes of 75 and 450, respectively, according to ASTM E 84 or UL 723. Enclose insulation completely within slat faces.
   3. Metal Interior Curtain-Slat Facing: Match metal of exterior curtain-slat face, with minimum aluminum thickness of 0.032 inch (0.80 mm).

B. Curtain Jamb Guides: Manufacturer’s standard angles or channels and angles of same material and finish as curtain slats unless otherwise indicated, with sufficient depth and strength to retain curtain, to allow curtain to operate smoothly, and to withstand loading. Slot bolt holes for guide adjustment. Provide removable stops on guides to prevent overtravel of curtain, and a continuous bar for holding windlocks.
   1. Coordinate curtain jamb conditions & angle requirements with the work of Division 28 Security sections, and Security Control Systems Contractor (SCSC) for security door position switch and interlocking requirements indicated on “SE” Series Drawings.

2.6 HOODS

A. General: Form sheet metal hood to 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. Form closed ends for surface-mounted hoods and fascia for any portion of between-jamb mounting that projects beyond wall face. Equip hood with intermediate support brackets as required to prevent sagging.
   1. Aluminum: 0.040-inch-thick aluminum sheet complying with ASTM B 209, of alloy and temper recommended by manufacturer and finisher for type of use and finish indicated.

2.7 CURTAIN ACCESSORIES

A. Weatherseals for Exterior Doors: Equip each exterior door with weather-stripping gaskets fitted to entire exterior perimeter of door for a weather-resistant installation unless otherwise indicated.
   1. At door head, use 1/8-inch-thick, replaceable, continuous-sheet baffle secured to inside of hood or field-installed on the header.
   2. At door jambs, use replaceable, adjustable, continuous, flexible, 1/8-inch-thick seals of flexible vinyl, rubber, or neoprene.
   3. At door bottom bar, use replaceable, adjustable, continuous, compressible gasket of extruded flexible rubber or neoprene as a durable gasket seal.

B. Overhead Door Magnetic Position Switch: Surface-mounted door position switch with switch contacts housed in a sealed case. Fasten with security screws. Coordinate mounting location and wiring requirements with Security Control Systems Contractor (SCSC), per Division 28 Security sections.
1. Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
   a. Interlogix, a unit of United Technologies Corporation; “2200 Series” Overhead Door Magnetic Contacts.
   b. Schlage, an Allegion Company; “674-OH” Overhead Door Status Switch.

2.8 COUNTERBALANCE MECHANISM
A. General: Counterbalance doors by means of manufacturer’s standard mechanism with an adjustable-tension, steel helical torsion spring mounted around a steel shaft and contained in a spring barrel connected to top of curtain with barrel rings. Use grease-sealed bearings or self-lubricating graphite bearings for rotating members.
B. Counterbalance Barrel: Fabricate spring barrel of manufacturer’s standard hot-formed, structural-quality, 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. Counterbalance Spring: One or more oil-tempered, heat-treated steel helical torsion springs. Size springs to counterbalance weight of curtain, with uniform adjustment accessible from outside barrel. Secure ends of springs to barrel and shaft with cast-steel barrel plugs.
D. Torsion Rod for Counterbalance Shaft: Fabricate of manufacturer’s standard cold-rolled steel, sized to hold fixed spring ends and carry torsional load.
E. Brackets: Manufacturer’s standard mounting brackets of either cast iron or cold-rolled steel plate.

2.9 ELECTRIC DOOR OPERATORS
A. Interface with the security control system's remote control of the door electric operator. Coordinate specific need with the Security Control Subcontractor (SCSC).
B. 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, control stations, control devices, integral gearing for locking door, and accessories required for proper operation.
1. Basis-of-Design Product: Subject to compliance with requirements, provide Cornell/Cookson “SG” Operator or comparable product by, or approved by, coiling door manufacturer.
2. Comply with NFPA 70.
3. 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.
C. Usage Classification: Electric operator and components capable of operating for not less than number of cycles per hour indicated for each door.
D. Door Operator Location(s): Operator location indicated for each door.
1. Wall Mounted: Operator is mounted to the inside front wall on the left or right side of door and connected to door drive shaft with drive chain and sprockets. Side room is required for this type of mounting. Wall-mounted operator can also be mounted above or below shaft; if above shaft, headroom is required.
E. Motors: Reversible-type motor with controller (disconnect switch) for motor exposure indicated for each door assembly.
1. Electrical Characteristics:
b. Volts: 115V
c. Hertz: 60.

2. Motor Size: 1/2 HP, unless noted otherwise

3. Operating Controls, Controllers, Disconnect Switches, Wiring Devices, and Wiring: Manufacturer’s standard unless otherwise indicated.

4. Coordinate wiring requirements and electrical characteristics of motors and other electrical devices with building electrical system and each location where installed.

F. 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.

G. Obstruction-Detection Devices: External entrapment protection consisting of indicated 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. Pneumatic Sensor Edge: Automatic safety sensor edge, located within astragal or weather stripping mounted to bottom bar. Contact with sensor activates device.

H. Control Station: Three-button control station in fixed location with momentary-contact push-button controls labeled "Open" and "Stop" and sustained- or constant-pressure push-button control labeled "Close."

1. Interior-Mounted Units: Full-guarded, surface-mounted, heavy-duty type, with general-purpose NEMA ICS 6, Type 1 enclosure.
2. Exterior-Mounted Units: Full-guarded, standard-duty, surface-mounted, weatherproof type, NEMA ICS 6, Type 4 enclosure, key operated.


J. Emergency Operation Disconnect Device: Equip operator with hand-operated disconnect mechanism for automatically engaging manual operator and releasing brake 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.

1. Provide for chain to be padlocked to a secure, permanent wall loop when not in use. Provide 1/2-inch eyelet with expansion anchor mounted to masonry or welded to structural steel section, or an alternate acceptable device as work of this section. Coordinate with Owner.

K. Motor Removal: Design operator so motor may be removed without disturbing limit-switch adjustment and without affecting emergency manual operation.

2.10 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM/NOMMA 500 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.

2.11 ALUMINUM FINISHES

A. Color Anodic Finish: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm or thicker.
PART 3 - EXECUTION

3.1 EXAMINATION
   A. Examine substrates areas and conditions, with Installer present, for compliance with
      requirements for substrate construction and other conditions affecting performance of the
      Work.
   B. Examine locations of electrical connections.
   C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION
   A. Install overhead coiling doors and operating equipment complete with necessary hardware,
      anchors, inserts, hangers, and equipment supports; according to manufacturer’s written
      instructions and as specified.
   B. Install overhead coiling doors, hoods, controls, and operators at the mounting locations
      indicated for each door.
   C. Accessibility: Install overhead coiling doors, switches, and controls along accessible routes
      in compliance with the accessibility standard.
   D. Power-Operated Doors: Install according to UL 325.

3.3 STARTUP SERVICE
   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 safety devices. Replace damaged and malfunctioning
         controls and equipment.

3.4 ADJUSTING
   A. Adjust hardware and moving parts to function smoothly so that doors operate easily, free of
      warp, twist, or distortion.
      1. Adjust exterior doors and components to be weather resistant.
   B. Lubricate bearings and sliding parts as recommended by manufacturer.
   C. Adjust seals to provide tight fit around entire perimeter.

3.5 MAINTENANCE SERVICE
   A. Initial Maintenance Service: Beginning at Substantial Completion, maintenance service
      shall include 12 months’ full maintenance by skilled employees of coiling-door Installer. Include
      quarterly preventive maintenance, repair or replacement of worn or defective
      components, lubrication, cleaning, and adjusting as required for proper door operation. Parts
      and supplies shall be manufacturer’s authorized replacement parts and supplies.
      1. Perform maintenance, including emergency callback service, during normal working
         hours.

3.6 DEMONSTRATION
   A. Engage a factory-authorized service representative to train Owner’s maintenance personnel
      to adjust, operate, and maintain overhead coiling doors.

END OF SECTION 083323
SECTION 084000 - ALUMINUM ENTRANCES, STOREFRONT AND CURTAIN WALL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:
A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 ACTION SUBMITTALS
A. Product Data: Submit manufacturer’s product specifications, technical product data, standard details, and installation recommendations for types of aluminum entrance, storefront, operable sashes and curtain wall required. Include information on fabrication methods, finishing, door hardware, and accessories.
1. Submit product data for extruded silicone engineered transition assembly (“ETA”).

B. Shop Drawings: For aluminum-framed systems. Include plans, elevations, sections, details, and attachments to other work.
1. Include details of provisions for system expansion and contraction and for draining moisture occurring within the system to the exterior.
2. Include decorative formed metal and accessories including interior and exterior mullion covers, exterior window sill, and filler panels and closures to adjacent construction.
3. Show connection to and continuity with adjacent thermal, weather, air, and vapor barriers, including engineered transition assembly (“ETA”). Detail installation of ETA, including corners.
4. For entrances, include hardware schedule and indicate operating hardware types, quantities, and locations. Coordinate with Division 08 Section “Door Hardware.”
5. Include details of conduit and preparations for power, signal, and control systems.
6. Indicate anchorage of aluminum-framed systems to surrounding construction to transfer loads to structure.
7. Include design calculations.
8. Shop drawings must be produced by or approved by the applicable aluminum entrance, storefront, and curtain wall manufacturer.

C. Samples for Initial Selection: For units with factory-applied color finishes, manufacturer’s printed color selection data.

D. Color Samples for Verification: For each type of exposed finish required, in manufacturer’s standard sizes.

E. Delegated-Design Submittal: For aluminum-framed entrances and storefronts and glazed aluminum curtain walls 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. Detail fabrication and assembly of aluminum-framed systems.
2. Indicate anchorage of aluminum-framed systems to surrounding construction to transfer wind loading to structure.
3. Include design calculations.

F. Certification: Provide certified test results showing that systems have been tested by a recognized testing laboratory or agency and comply with performance characteristics.

1.3 INFORMATIONAL SUBMITTALS
A. Qualification Data: For Installer and professional engineer.
B. Energy Performance Certificates: For aluminum-framed entrances and storefronts, glazed aluminum curtain walls, accessories, and components, from manufacturer.
   1. Basis for Certification: NFRC-certified energy performance values for each aluminum-framed entrance and storefront, and for each glazed aluminum curtain wall.

C. Product Test Reports: Certified test results showing that systems have been tested by a recognized testing laboratory or agency and comply with performance characteristics.

D. Source quality-control reports.

E. Sample Warranties: For special warranties.

1.4 QUALITY ASSURANCE:

A. Source Limitations: Obtain aluminum windows and aluminum storefront, curtain wall and entrances through one source from a single manufacturer.

B. Installer’s Qualifications: Firm with a record of successful installations of storefront, curtain wall, and entrances similar in scope to this project, capable of assuming engineering responsibility, and employs installers and supervisors who are trained and approved by manufacturer.
   1. Engineering Responsibility: Preparation of data for aluminum-framed systems including Shop Drawings based on testing and engineering analysis of manufacturer’s standard units in assemblies similar to those indicated for this Project and submission of reports of tests performed on manufacturer’s standard assemblies.

C. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.
   1. Do not change intended aesthetic effects, as judged solely by Architect, except with Architect’s approval. If changes are proposed, submit comprehensive explanatory data to Architect for review.


1.5 MOCKUPS

A. Integrated Exterior Mockup: Attend preinstallation conference and provide aluminum storefront and curtain wall work for integrated exterior mockup as specified in Division 01 Section “Quality Requirements.”

1.6 PROJECT CONDITIONS

A. Field Measurements: Check openings by field measurement before fabrication to ensure proper fitting of work; show field measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delay in the work. Coordinate fabrication tolerances to ensure proper fit. Coordinate and allow for sealant joints and steel lintels.

1.7 WARRANTY

A. General: Warranties indicated in this Section shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties under requirements of the Contract Documents.
B. Special Assembly Warranty: Manufacturer agrees to repair or replace components of glazed aluminum entrance, storefront, and curtain wall 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, excessive deflection.  
      b. Noise or vibration created by wind and thermal and structural movements.  
      c. Deterioration of metals and other materials beyond normal weathering.  
      d. Water penetration through fixed glazing and framing areas.  
      e. Failure of operating components.  
      2. Warranty Period: Two years from date of Substantial Completion.

C. Special Finish Warranty: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of factory-applied finishes within specified warranty period.  
   1. 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. Warranty Period: 10 years from date of Substantial Completion.
1. Deflection Normal to Wall Plane: Limited to 1/175 of clear span for spans up to 13 feet 6 inches, and to 1/240 of clear span plus 1/4 inch, for spans greater than 13 feet 6 inches or an amount that restricts edge deflection of individual glazing lites to 3/4 inch, whichever is less.

2. Deflection Parallel to Glazing Plane: Limited to smaller of 1/360 of clear span or 1/8 inch.

E. Structural: Test according to ASTM E 330 as follows:
   1. When tested at positive and negative wind-load design pressures, systems do not evidence deflection exceeding specified limits.
   2. When tested at 150 percent of positive and negative wind-load design pressures, systems, including anchorage, do not evidence material failures, structural distress, and permanent deformation of main framing members exceeding 0.2 percent of span.
   3. Test Durations: As required by design wind velocity but not less than 10 seconds.

F. Air Infiltration: Test according to ASTM E 283 for infiltration as follows:
   1. Fixed Framing and Glass Area:
      a. Maximum air leakage of 0.06 cfm/sq. ft. at a static-air-pressure differential of 6.24 lbf/sq. ft.

G. Water Penetration under Static Pressure: Test according to ASTM E 331 as follows:
   1. No evidence of water penetration through fixed glazing and framing areas when tested according to a minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not less than 8 lbf/sq. ft. for storefront and 12 lbf/sq. ft. for curtainwall.

H. Seismic Performance: Glazed aluminum curtain walls shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

I. Energy Performance, Storefront: Certify and label energy performance according to NFRC as follows:
   1. Thermal Transmittance (U-factor): Fixed glazing and framing areas shall have U-factor of not more than 0.32 Btu/sq. ft. x h x deg F as determined according to NFRC 100.
   2. Solar Heat Gain Coefficient: Fixed glazing and framing areas shall have a solar heat gain coefficient of no greater than 0.25 as determined according to NFRC 200.
   3. Condensation Resistance: Fixed glazing and framing areas shall have a condensation resistance factor of no less than 56 for framing according to testing per AAMA 1503.

J. Energy Performance, Curtain Wall: Certify and label energy performance according to NFRC as follows:
   1. Thermal Transmittance (U-factor): Fixed glazing and framing areas shall have U-factor of not more than 0.32 Btu/sq. ft. x h x deg F as determined according to NFRC 100.
   2. Solar Heat Gain Coefficient: Fixed glazing and framing areas shall have a solar heat gain coefficient of no greater than 0.25 as determined according to NFRC 200.
   3. Condensation Resistance: Fixed glazing and framing areas shall have a condensation resistance factor of no less than 56 for framing according to testing per AAMA 1503.

K. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes:
   1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

L. Door Weight: Weight of any door leaf without hardware shall not exceed 200 pounds unless approved by the Architect.
2.2 MANUFACTURERS:
   A. Available Products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:
      1. Exterior Storefront: 2 x 6 inch thermally-broken front-set framing:
         a. EFCO "System 960."
         c. Oldcastle "HP-175."
         d. YKK AP "YES 600."
      2. Interior Storefront: 2 x 4.5 inch center-set framing:
         a. EFCO “402.”
         b. Kawneer “451.”
         c. Oldcastle “FG 3000.”
         d. YKK AP “YES 45 F1.”
      3. Entrances: Standard 1.75 inch, wide stile:
         a. EFCO “D500.”
         b. Kawneer “500.”
         c. Oldcastle “500.”
         d. YKK AP “50D.”
      4. Curtain Wall: 2.5 inch:
         a. EFCO “5600.”
         b. Kawneer “1600 System 1.”
         c. Oldcastle “CW-250.”
         d. YKK AP “YCW 750.”

2.3 STOREFRONT AND CURTAIN WALL FRAMING, GENERAL
   A. Brackets and Reinforcements: Manufacturer’s standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.
   B. Materials:
      1. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
         a. Sheet and Plate: ASTM B 209.
         b. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
      2. Steel Reinforcement: Manufacturer’s standard zinc-rich, corrosion-resistant primer complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM, and prepare surfaces according to applicable SSPC standard.
         a. Structural Shapes, Plates, and Bars: ASTM A 36.
         b. Cold-Rolled Sheet and Strip: ASTM A 1008.
   C. Concealed Flashing: Provide 26 gage minimum dead-soft stainless steel, or 0.026-inch minimum extruded aluminum of alloy and type selected by manufacturer for compatibility with other components.
D. Fasteners: Provide fasteners of aluminum, nonmagnetic stainless steel, or other materials warranted by manufacturer to be noncorrosive and compatible with aluminum components, hardware, anchors and other components.
   1. Reinforcement: Where fasteners screw-anchor into aluminum less than 0.125-inch thick, reinforce the interior with aluminum or nonmagnetic stainless steel to receive screw threads, or provide standard noncorrosive pressed-in splined grommet nuts.
   2. Exposed Fasteners: Except where unavoidable for application for hardware, do not use exposed fasteners. For the application of hardware, provide fasteners that match the finish of member or hardware being fastened. Provide Phillips flat-head machine screws for exposed fasteners.

E. Masonry Inserts: Fabricated from cast-iron, malleable iron, or ASTM A 386 hot-dip galvanized steel.

2.4 EXTERIOR STOREFRONT FRAMING
A. Framing Members: Manufacturer’s extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.
   2. Glazing System: Retained mechanically with gaskets on four sides.
   5. Fabrication Method: Field-fabricated stick system.

B. Backer Plates: Manufacturer’s standard, continuous backer plates for framing members, if not integral, where framing abuts adjacent construction.

2.5 INTERIOR STOREFRONT FRAMING
A. Framing Members: Manufacturer’s extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.
   2. Glazing System: Retained mechanically with gaskets on four sides.
   5. Fabrication Method: Field-fabricated stick system.

B. Backer Plates: Manufacturer’s standard, continuous backer plates for framing members, if not integral, where framing abuts adjacent construction.

2.6 CURTAIN WALL FRAMING
A. Framing Members: Manufacturer’s extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.
   2. Glazing System: Retained mechanically with gaskets on four sides.
   5. Fabrication Method: Factory-assemble components to greatest extent possible. Disassemble components only as necessary for shipment and installation.

B. Pressure Caps: Manufacturer’s standard aluminum components that mechanically retain glazing.
   1. Include snap-on aluminum trim that conceals fasteners.
2.7 INSULATED SPANDREL PANELS (GL7)
A. Insulated Spandrel Panels: Laminated, metal-faced flat panels with no deviations in plane exceeding 0.8 percent of panel dimension in width or length.
   1. Overall Panel Thickness: As indicated.
   2. Exterior Skin: Aluminum.
      a. Thickness: Manufacturer’s standard for finish and texture indicated.
      b. Finish: Match aluminum framing.
      c. Texture: Smooth.
      d. Backing Sheet: 1/8-inch-thick, tempered hardboard.
   3. Interior Skin: Aluminum.
      a. Thickness: Manufacturer’s standard for finish and texture indicated.
      b. Finish: Match aluminum framing.
      c. Texture: Smooth.
      d. Backing Sheet: 1/8-inch-thick, tempered hardboard.
   4. Thermal Insulation Core: Manufacturer’s standard rigid, closed-cell, polyisocyanurate board.
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: 25 or less.
   2. Smoke-Developed Index: 450 or less.

2.8 ENTRANCE DOOR SYSTEMS
A. Entrance Doors: Manufacturer’s standard glazed entrance 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: Wide stile; 5-inch nominal width, with 7-inch top and 12-inch bottom rails unless indicated otherwise.
   3. Glazing Stops and Gaskets: Beveled or square, snap-on, extruded-aluminum stops and preformed gaskets.

2.9 ENTRANCE DOOR HARDWARE
A. Entrance Door Hardware: Hardware not specified in this Section is specified in Division 08 Section "Door Hardware."

2.10 GLAZING
A. Glazing and Glazing Sealants: Comply with Division 08 Section "Glazing."

2.11 ACCESSORIES
A. Anchors: Three-way adjustable anchors with minimum adjustment of 1 inch that accommodate fabrication and installation tolerances in material and finish compatible with adjoining materials and recommended by manufacturer.
   1. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A 123 or ASTM A 153 requirements.
B. Concealed Flashing: Manufacturer’s standard corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials or dead-soft, 0.018-inch-thick stainless steel, ASTM A 240 of type recommended by manufacturer.
C. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for 30-mil thickness per coat.

2.12 ENGINEERED TRANSITION ASSEMBLIES (ETA)

A. Engineered Transition Assembly: Air barrier perimeter transition for aluminum entrances, storefront, and curtain wall systems. Assembly comprised of the following components:

1. Silicone Rubber Sheet: Extruded, translucent cured silicone.
   a. Air Infiltration, ASTM E 283: Less than 0.01 cf/m when tested with proposed sealant.
   b. Hardness, ASTM D 2240: 40 minimum.
   c. Tensile Strength, ASTM D 412: 800 psi minimum.
   d. Elongation, ASTM D 412: 400% minimum (340% for premolded corners).
   e. Tear Strength, ASTM D 624, Die B: 90 ppi minimum.
   f. Corners: Pre-molded or job-formed and lapped. Mitered abutting corners are not acceptable.
   g. Surface: Textured or ribbed on sealant side(s) to maximize adhesion and shear strength at sealant.

2. Silicone Sealants: ASTM C 920, single-component, neutral-curing silicone; Type S, Grade NS, approved by silicone rubber sheet manufacturer for use with silicone rubber sheet and with substrates.

3. Available Products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:
   a. Dow Corning; “Silicone Transition Strip” and “758 Silicone Weatherbarrier.”
   b. Elbex; “Elbex HS.”
   c. Momentive Performance (GE); “UltraSpan” US1101 and GE “SilPruf.”
   d. Pecora; “XL-Span” and “AVB Silicone.”
   e. Tremco; “Proglaze” ETA and “Spectrem 1 Silicone.”

2.13 FABRICATION

A. 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.

B. Reinforcing: Install reinforcing as required for performance requirements, sag resistance and rigidity.

C. Metal Protection: Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying manufacturer’s recommended sealant or tape. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

D. Fabricate components that, when assembled, have the following characteristics:
   1. Profiles that are sharp, straight, and free of defects or deformations.
   2. Accurately fitted joints with ends coped or mitered.
   3. Physical and thermal isolation of glazing from framing members.
   4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
   5. Provisions for field replacement of glazing.
   6. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
7. Components curved to indicated radii.

E. Fabricate components to resist water penetration.

F. Framing, General: Fabricate framing in profiles indicated for flush glazing (without projecting stops). Provide subframes and reinforcing of types indicated or, if not indicated, as required for a complete system.
   1. Provide heavy-duty extrusion sections or steel-reinforced sections for project applications which exceed the structural capacity of standard framing member extrusions. Provide framing members sized to withstand windloads for applications indicated as substantiated by manufacturer’s windload charts.
   2. Glass is specified in Division 08 Section “Glazing.”
   3. Subframes: Provide subframes with anchors for window units, not less than 0.062-inch-thick extruded aluminum. Miter or cope corners, and weld and dress smooth with concealed mechanical joint fasteners. Match color and finish of primary framing members.
   4. Built-up Corner Closures and Sill Base: Provide aluminum closure pieces of profiles and dimensions indicated, finished to match other exposed components. Provide outside-corner profiles of not less than 0.062-inch-thick extruded aluminum and base sill closure pieces of not less than 0.080-inch-thick extruded or sheet aluminum.
   5. Sills: Provide extruded aluminum sills of profile and dimension to suit substrate construction and direct water from assembly, minimum 0.062-inch-thickness. Match storefront finish.

G. Curtain-Wall Framing: Factory-assemble components to greatest extent possible.

H. Entrances: Reinforce as required to support imposed loads. Factory-assemble door and frame units and factory install hardware to greatest extent possible. Reinforce doors and frames as required for hardware indicated. Cut, drill, and tap for factory-installed hardware before finishing components.
   1. Exterior Door Weatherstripping: Provide compression weather stripping at fixed stops. At other locations, provide sliding weather stripping retained in adjustable strip mortised into door edge.
   2. Reinforce doors and frames to receive non-tempered, mortised and surface-mounted door hardware.
   3. Coordinate locations of conduit and wiring boxes for electrical and control connections with Division 26 and 28 Sections.

I. Continuity: Maintain accurate relation of planes and angles, with hairline fit of contacting members.

J. Fasteners: Conceal fasteners.

2.14 ALUMINUM FINISHES

A. High-Performance Organic Finish: Two-coat fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers’ written instructions.
   1. Color and Gloss: As selected by Architect from manufacturer’s full range.
PART 3 - EXECUTION

3.1 EXAMINATION
   A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
   B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION
   A. General:
      1. Comply with manufacturer’s written instructions.
      2. Do not install damaged components.
      3. Fit joints to produce hairline joints free of burrs and distortion.
      4. Rigidly secure nonmovement joints.
      5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
      6. Where welding is required, weld components in concealed locations to minimize distortion or discoloration of finish. Protect glazing surfaces from welding.
      7. Seal joints watertight unless otherwise indicated.
   B. Metal Protection:
      1. Where aluminum is in contact with dissimilar metals, protect against galvanic action by painting contact surfaces with primer, applying sealant or tape, or installing nonconductive spacers as recommended by manufacturer for this purpose.
      2. Where aluminum is in 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 glazed aluminum curtain wall to exterior.
   D. Set continuous sill members and flashing in full sealant bed as specified in Division 07 Section “Joint Sealants” to produce weathertight installation.
      1. Install sill flashing extrusion with sealed end dams for storefront framing. Provide silicone splice material and sealant at extrusion joints and penetrations. Do not obstruct weep holes.
      2. Install continuous flashing with end dams and sill member for curtain wall in accordance with manufacturer’s instructions to maintain drainage path. Coordinate the installation of perimeter sealant at sill framing member with installation of snap-on covers to maintain open weep holes.
   E. Coordinate installation of aluminum framing with air barrier to maintain continuity of air and vapor barrier between adjacent wall construction and aluminum framing. Incorporate engineered transition assembly (ETA).
   F. Install components plumb and true in alignment with established lines and grades.
   G. Anchorage: After system components are positioned, fix connections to building structure.
      1. Provide separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
   H. Install glazing as specified in Division 08 Section "Glazing."
3.3 ERECTION TOLERANCES

A. Erection Tolerances: Install glazed aluminum curtain walls to comply with the following maximum tolerances:
   1. **Plumb:** 1/8 inch in 10 feet; 1/4 inch in 40 feet.
   2. **Level:** 1/8 inch in 20 feet; 1/4 inch in 40 feet.
   3. **Alignment:**
      a. Where surfaces abut in line or are separated by reveal or protruding element up to 1/2 inch wide, limit offset from true alignment to 1/16 inch.
      b. Where surfaces meet at corners, limit offset from true alignment to 1/32 inch.
   4. **Diagonal Measurements:** Limit difference between diagonal measurements to 1/8 inch.

3.4 PROTECTION

A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, which ensure installed storefront, entrance and curtain wall system work is without damage or deterioration at the time of Substantial Completion.

A. END OF SECTION 084000
SECTION 085653 – SECURITY WINDOWS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 SUMMARY
   A. Section Includes:
      1. Fixed security windows.
      3. Recessed “scoop” deal tray.

1.3 COORDINATION
   A. Coordinate installation of anchorages for security windows. 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 adjacent construction. Deliver such items to Project site in time for installation.

1.4 PREINSTALLATION MEETINGS
   A. Preinstallation Conference: Conduct conference at Project site.

1.5 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 window units.
      2. Security glazing product data.
      3. Deal tray.
   B. Shop Drawings: For security windows.
      1. Include plans, elevations, sections, and attachments to other work.
      2. Full-size section details of framing members, including internal armoring, reinforcement, and stiffeners.
      3. Hardware for security window units.
   C. Samples: For each type of exposed finish required, prepared on Samples of size indicated below:
      1. Framing: 12-inch-long sections of frame members.

1.6 INFORMATIONAL SUBMITTALS
   A. Qualification Data: For qualified Installer.
B. Welding certificates.

C. Product Test Reports: For each type of security window and accessory indicated as ballistics resistant, for current tests performed by a qualified testing agency.

D. Examination reports documenting inspections of substrates, areas, and conditions.

E. Anchor inspection reports documenting inspections of built-in and cast-in anchors.

F. Field quality-control reports documenting inspections of installed products.
   1. Field quality-control certification signed by Contractor.

G. Sample Warranty: For special warranty.

1.7 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to the following:

1.8 DELIVERY, STORAGE, AND HANDLING

A. Pack security windows in wood crates for shipment. Crate glazing separate from frames unless factory glazed.

B. Label security window packaging with drawing designation.

C. Store crated security windows on raised blocks to prevent moisture damage.

1.9 FIELD CONDITIONS

A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.10 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace security windows that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Structural failures including deflections exceeding 1/4 inch.
      b. Failure of welds.
      c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.
   2. Warranty Period: Three (3) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Attack Resistance: Provide units identical to those tested for compliance with requirements indicated, and as follows:
   1. Ballistics Resistance: Listed and labeled as Level 3 when tested according to UL 752.
2.2 SECURITY WINDOWS

A. Provide fixed security windows.

1. Basis-of-Design Product: Subject to compliance with requirements, provide product by one of the following:
   a. Creative Industries
   b. Action Bullet Resistant Corp.
   c. Armortex.
   d. Laurence, C. R. Co. Inc.
   e. National Bullet Proof, Inc.
   f. Protective Structures, Ltd.
   g. SABIC Innovative Plastics IP BV; Insulgard Security Products.
   h. United States Bullet Proofing, Inc.

B. Configurations: As indicated on the Drawings.

C. Framing: Fabricate perimeter framing, mullions, and glazing stops from aluminum as follows:

1. Profile: Manufacturer's standard, with minimum face dimension indicated.
   a. Minimum Face Dimension: As indicated on Drawings.

2. Depth: Manufacturer's standard.

D. Head and Jamb Framing: Designed for gasket glazing.

E. Glazing Meeting Edges: Polished glazing.

F. Glazing and Glazing Materials:

1. Security Glazing: Provide 1-1/4-inch thickness polycarbonate security glazing conforming to UL 752 Level 3

2. Preglazed Fabrication: Preglaze window units at factory.

G. Materials:

1. Stainless-Steel Sheet, Strip, Plate, and Flat Bars: ASTM A 666 or ASTM A 240, austenitic stainless steel, Type 304.

2. Aluminum Extrusions: ASTM B 221. Provide alloy and temper recommended by manufacturer for strength, corrosion resistance, and application of required finish, but not less than 22,000-psi ultimate tensile strength.


2.3 FABRICATION

A. General: Fabricate security windows to provide a complete system for assembly of components and anchorage of window units.

B. Framing: Miter or cope corners the full depth of framing; weld and dress smooth.

1. Fabricate framing with manufacturer's standard, internal opaque armoring in thicknesses required for security windows to comply with ballistics-resistance performance indicated.

C. Glazing Stops: Finish glazing stops to match security window framing.

D. Welding: Weld components to comply with referenced AWS standard. To greatest extent possible, weld before finishing and in concealed locations to minimize distortion or...
discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by
descaling or grinding.

E. Metal Protection: Separate dissimilar metals to protect against galvanic action by painting
contact surfaces with primer or by applying sealant or tape recommended by manufacturer for
this purpose.

F. Preglazed Fabrication: Preglaze window units at factory, where required for applications
indicated. Comply with requirements in Division 11 Section “Security Glass and Glazing.”

2.4 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM/NOMMA 500 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 and installed to minimize contrast.

2.5 ALUMINUM FINISHES

A. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

2.6 STAINLESS-STEEL FINISHES

A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.

B. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.
   1. Run grain of directional finishes with long dimension of each piece.
   2. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign
      matter and leave surfaces chemically clean.
   3. Directional Satin Finish: No. 4.

2.7 ACCESSORIES

A. Recessed Deal Trays: Formed from stainless steel; fabricated in curved shape with exposed
flanges for recessed installation into horizontal surface.
   1. Clear Opening Size: 16 inches wide by 10 inches deep by 1-1/2 inches high, unless
      indicated otherwise.
   2. Furnish deal trays for incorporation in designated countertops.

B. Speaking Aperture: Fabricate from security glazing, designed to allow passage of speech at
normal speaking volume without distortion.
   1. Shape: Circular.
   2. Ballistics Resistance: Same as security window.
   3. Listed and labeled as bullet resisting according to UL 752.

C. Compression-Type Glazing Strips and Weather Stripping: Unless otherwise indicated, provide
compressible stripping for glazing and weather stripping, such as molded EPDM or neoprene
gaskets complying with ASTM D 2000, Designations 2BC415 to 3BC620; molded PVC gaskets
complying with ASTM D 2287; or molded, expanded EPDM or neoprene gaskets complying with ASTM C 509, Grade 4.

D. Miscellaneous Glazing Materials: Provide material, size, and shape complying with requirements of glass manufacturers and with a proven record of compatibility with surfaces contacted in installation.
   1. Cleaners, Primers, and Sealers: Type recommended by sealant or gasket manufacturer.
   2. Setting Blocks: Elastomeric material with a Type A Shore durometer hardness of 85, plus or minus 5.
   3. Spacers: Elastomeric blocks or continuous extrusions with a Type A Shore durometer hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
   4. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

E. Anchors, Clips, and Window Accessories: Stainless steel; hot-dip, zinc-coated steel or iron, complying with ASTM B 633; provide sufficient strength to withstand design pressures indicated.

F. Sealants: For sealants required within fabricated security windows, provide type recommended by manufacturer for joint size and movement. Sealant shall remain permanently elastic, non-shrinking, and non-migrating.

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 security windows.

B. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of security windows.

C. Inspect built-in and cast-in anchor installations, before installing security windows, to verify that anchor installations comply with requirements. Prepare inspection reports.
   1. Remove and replace anchors where inspections indicate that they do not comply with specified requirements. Reinspect after repairs or replacements are made.
   2. Perform additional inspections to determine compliance of replaced and additional work. Prepare anchor inspection reports.

D. For glazing materials whose orientation is critical for performance, verify installation orientation.

E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Coordination: Furnish layouts for cast-in-place anchors, clips, and other security window anchors whose installation is specified in other Sections.
3.3 INSTALLATION

A. Fastening to In-Place Construction: Provide anchorage devices and fasteners for securing security windows to in-place construction. Include threaded fasteners for inserts, security fasteners, and other connectors.
   1. Install an attached or integral flange to secure side of security windows extending over rough-in opening gap so that gap has same ballistics-resistance performance as security window.

B. Fasteners: Install security windows using fasteners recommended by manufacturer with head style appropriate for installation requirements, strength, and finish of adjacent materials. Provide stainless-steel fasteners in stainless-steel materials.

C. Sealants: Comply with requirements in Division 7 Section “Joint Sealants” for installing sealants, fillers, and gaskets.
   1. Set continuous sill members and flashing in a full sealant bed to provide weathertight construction unless otherwise indicated.
   2. Seal frame perimeter with sealant to provide weathertight construction unless otherwise indicated.

D. Metal Protection: Where dissimilar metals will contact each other, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended in writing by manufacturer for this purpose.

3.4 FIELD QUALITY CONTROL

A. Inspect installed products to verify compliance with requirements. Prepare inspection reports and indicate compliance with and deviations from the Contract Documents.

B. Perform additional inspections to determine compliance of replaced and additional work. Prepare inspection reports.

C. Prepare field quality-control certification that states installed products and their installation comply with requirements in the Contract Documents.

3.5 CLEANING AND PROTECTION

A. Clean surfaces promptly after installation of security windows. Take care to avoid damaging the finish. Remove excess glazing and sealant compounds, dirt, and other substances.

B. Clean glass of preglazed security windows promptly after installation.

C. Provide temporary protection to ensure that security windows are without damage at time of Substantial Completion.

3.6 DEMONSTRATION

A. Train Owner’s maintenance personnel to maintain security windows.

END OF SECTION 085653
SECTION 087100 - DOOR HARDWARE

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Commercial door hardware.
2. Cylinders for doors specified in other Sections.
3. Electrified door hardware.

1.2 SUBMITTALS

A. Product Data: For each product indicated.
B. Shop Drawings: Include details of electrified door hardware and wiring diagrams.
C. Samples: Samples of products included in submittals shall be supplied upon request for review.
D. Door Hardware Schedule: Organized into door hardware sets indicating type, style, function, size, label, hand, manufacturer, fasteners, location, degree of opening, and finish of each door hardware item. Include description of each electrified door hardware function, wiring diagrams and sequence of operation.
E. Keying Schedule: Detail Owner's final keying instructions for locks in the form of a schematic.

1.3 QUALITY ASSURANCE

A. Supplier Qualifications:

1. Person who is or employs a qualified DHI Architectural Hardware Consultant.
2. Shall have supplied jobs of similar size and value.
3. Shall have been in the business of supplying finish hardware for a minimum of five years.
B. Source Limitations: Obtain electrified door hardware from same manufacturer as mechanical door hardware, unless otherwise indicated. Manufacturers that are listed to perform electrical modifications, by a testing and inspecting agency acceptable to authorities having jurisdiction, are acceptable.
C. Keying Conference: Conduct conference at Project site. Incorporate keying conference decisions into final keying schedule. Submit schematic to manufacturer at time of order.
D. Pre-installation Conference: Conduct conference at Project site.
E. Keys: All keys shall be labeled and copy of finalized schematic delivered to owner by registered mail.

F. Templates: Obtain and distribute templates for doors, frames, finish hardware and other work specified to be factory prepared for installing door hardware.

G. Standards: Comply with BHMA A156 series standards, Grade 1.

H. Certified Products: Provide door hardware that is listed in BHMA directory of certified products.

1.4 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within warranty period.

1. Warranty Period for Locks: Five years from date of Substantial Completion.

2. Warranty Period for Manual Closers: 10 years from date of Substantial Completion. Closer body shall carry a life of the building warranty.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Product: Subject to compliance with code and function requirements, provide the product named for each door hardware item indicated in Door Hardware Sets.

2.2 DOOR HARDWARE

A. Scheduled Door Hardware: Provide door hardware according to Door Hardware Sets at the end of Part 3. Manufacturers' names are abbreviated.

B. Shall comply with all code requirements.

2.3 HINGES

A. Hinges:

1. Manufacturers:

   a. Butt Hinges:
      1) Baldwin Hardware Corporation (BH).
      2) Bommer Industries, Inc. (BI).
      3) Hager Companies (HAG).
      4) Lawrence Brothers, Inc. (LB).
5) McKinney Products Company (MK).

b. Continuous Pin and Barrel Hinge:

1) Gallery Hinge Co. (GAL)
2) Hagar Companies (HAG).
3) Markar Products, Inc. (MAR).

2. Butt hinges shall comply with ANSI 156.1, Grade 1.

3. Continuous Hinges shall comply with ANSI 156.26; geared type hinges are not acceptable.

4. General: Except for hinges to be installed entirely (both leaves) into wood doors and frames, provide only template-produced units.

5. Anit friction butt hinges shall be used on any door with a closer or overhead stop. Heavy weight hinges shall be used in accordance with manufacture’s recommendations for door weight.

6. Shall be full mortised unless indicated in hardware sets.

7. Number of Hinges:

a. Butt Hinges: Two hinges for every door up to 60”. One additional hinge for every additional 30” of door height.

b. Continuous: One hinge per door.

8. Hinge Size:

a. Butt Hinges: Shall meet manufactures requirements for size based on door weight and width. Doors greater than 37” in width shall have 5” tall hinges.

b. Continuous: Shall be the exact size height of the door.

9. Hinge Base Metal: Unless otherwise indicated, provide the following:

a. Exterior Hinges: Stainless steel, with stainless-steel pin; unless specified otherwise.

b. Interior Hinges: Steel, with steel pin.

c. Hinges for Fire-Rated Assemblies: Steel, with steel pin.

10. Wire Through/Transfer Hinges: Provide hinges with sufficient number of wire and sufficient wire gauge for the proper operation of product supplied. If the product’s electric requirement dictate the use of an auxiliary power transfer method provide a non-transfer hinge and an auxiliary power transfer that conceals all wires and cabling, so they are not visible when the door is closed. Wire ends to be supplied with molex type connectors
11. Non-removable Pins: Provide set screw in hinge barrel that prevents removal of pin while door is closed; for outswinging exterior doors and outswinging corridor doors with locks.

12. Screws: Phillips flat-head screws; screw heads finished to match surface of hinges.

2.4 MECHANICAL LOCKS AND LATCHES

A. Manufacturers:
   2. Sargent Manufacturing Company (SA).
   3. Schlage; an Allegion Company (SLG)

B. Lockset shall meet ANSI A156.13, Grade 1.

C. Lockset Design: As scheduled.

D. Dummy Trim: Lever, trim and finish shall match lockset design.

E. Latch bolts shall have a mechanical anti-friction latches.

F. Lock Throw: Comply with labeled fire door requirements.

G. Backset: 2-3/4 inches, unless otherwise indicated.

2.5 BOLTS

A. Fire-Rated Doors: Comply with labeled fire door requirements.

B. Flush Bolts: BHMA Grade 1, designed for mortising into door edge.
   1. Manufacturers:
      a. Ives, H. B.; an Allegion Company (IVS).
      b. Rockwood Manufacturing Company (RO).
      c. Trimco, Inc. (TR).

2.6 EXIT DEVICES

A. Manufacturers:
   1. Corbin Russwin Architectural Hardware Inc. (RU).
   2. Sargent Manufacturing Company; An Assa Abloy Company (SGT).
   3. Von Duprin; an Ingersoll-Rand Company (VD).
B. Panic Exit Devices: Shall be listed and labeled for panic protection, based on testing according to UL 305.

C. Fire Exit Devices: Shall complying with NFPA 80, listed and labeled for fire and panic protection, based on testing according to UL 305 and NFPA 252.

D. Shall meet ANSI A156.3, Grade 1.

E. All exposed metal shall be in BHMA 630. Aluminum anodized finish will not be accepted.

F. Outside operating trim shall be through-bolted with concealed fasteners.

G. Operating trim shall be freewheeling with clutch mechanism allowing lever to rotate 60 degrees when locked to prevent vandalism.


I. Electrified Exit Devices:
   1. Include request to exit in hardware.
   2. Latch retraction function to be powered by 24VDC power supply. Proprietary power supplies are not acceptable.
   3. Wire ends to include Molex type connectors.

2.7 OPERATING TRIM

A. Push-Pull Design: As scheduled.

   1. Manufacturers:
      a. Baldwin Hardware Corporation (BH).
      b. HEWI, Inc. (HEW).
      c. Rockwood Manufacturing Company (RM).
      d. Trimco, Inc. (TR).

2.8 ACCESSORIES FOR PAIRS OF DOORS

A. Keyed Removable Mullions: BHMA A156.3.

   1. Manufacturers:
      a. Corbin Russwin Architectural Hardware Inc. (UR).
      c. Von Duprin (VD).

   2. Fire-Exit Removable Mullions: Complying with NFPA 80 that are listed and labeled for fire and panic protection, based on testing according to UL 305 and NFPA 252. Mullions shall be used only with exit devices for which they have been tested.
2.9 CLOSERS

A. Shall be certified ANSI A156.4 Grade 1.

B. Surface-Mounted Closers:

1. Shall have multi sized spring power adjustment for sizes 2 thru 6 or 1 thru 4 for barrier free applications.
2. Shall have full covers.
3. Stop arms:
   a. Where specified supply Unitrol (UNI) type with spring stop and back check at 65 degrees. In lieu of Unitrol type stop arm provide rigid parallel arm with an auxiliary overhead stop. Overhead stop to be an 8HD type. Provide arm bracket to coordinate overhead stop with door closer.
   b. Where specified provide Closer Plus Spring Arm (CPS). In lieu of Closer Plus Spring Arm provide Cush-N-Stop type arm.
4. Provide soffit plate for parallel arm applications using aluminum frames with blade stops or snap on stops.
5. Manufacturers:
   a. Corbin Russwin Architectural Hardware, Inc. (CR) DC-6000 Series.
   b. LCN Closers; an Ingersoll-Rand Company (LCN) 4040XP Series.
   c. Norton Door Controls, Inc. (NOR) 7500 Series.

C. Size of Units: Multi-sized, adjustable to meet field conditions and requirements for opening force.

2.10 PROTECTIVE TRIM UNITS

A. Protective Trim Units: Sized 2 inches less than door width on push side and 1 inch less than door width on pull side, by height scheduled or indicated. Plates to be applied ½” from bottom of door to bottom of plate and centered on the door.

1. Shall be beveled on four sides.
   a. Fasten to door using fasteners provided by manufacturer.
   b. Manufacturers:
      1) Baldwin Hardware Corporation (BH).
      2) Ives, H. B. (IVS).
      3) Rockwood Manufacturing Company (RM).
      4) Trimco, Inc. (TR).

2.11 STOPS AND HOLDERS

A. Stops and Holders:
1. All doors shall have a doorstop that effectively protects any and all doors, walls and finish hardware that comes into contact with the operation of the function of the door. Wall stops are the preferred method.

2. Provide sufficient blocking and reinforcement for secure installation and operation of all stops and holders.

3. Overhead stops shall be provided where noted in hardware sets or if wall stop cannot stop and protect the doors, walls or finish hardware from damage.

4. Oversized floor stops are only permitted for exterior doors.

5. Closer stop arms are only permitted if specified in hardware set.

6. Manufacturers:
   a. Baldwin Hardware Corporation (BH).
   b. Glynn-Johnson; an Ingersoll-Rand Company (GJ).
   c. Ives, H. B. (IVS).
   d. Rixson-Firemark, Inc. (RIX).
   e. Sargent Manufacturing Company (SA).
   f. Rockwood (RO)
   g. Trimco, Inc. (TR).

B. Silencers for Door Frames: Neoprene or rubber; fabricated for drilled-in application to frame.

2.12 DOOR GASKETING AND THRESHOLDS

A. Door Gasketing: Provide continuous weather-strip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated or scheduled. Provide non-corrosive fasteners for exterior applications and elsewhere as indicated.

1. Manufacturers:
   a. Gasketing:
      1) Pemko Manufacturing Co., Inc. (PEM).
      2) Reese Enterprises, Inc. (RE).
      3) Sealeze Corporation (SEL).
   b. Door Bottoms:
      1) Pemko Manufacturing Co., Inc. (PEM).
      2) Reese Enterprises, Inc. (RE).
      3) Sealeze Corporation (SEL).
      4) Ultra Industries; a Macklanburg-Duncan Company (ULT).

2. Air Leakage: Not to exceed 0.50 cfm per foot of crack length for gasketing other than for smoke control, as tested according to ASTM E 283.

3. Smoke-Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled, based on testing according to UL 1784.
4. Fire-Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled, based on testing according to UL 10C or NFPA 252.

5. Sound-Rated Gasketing: Assemblies that are listed and labeled, based on testing according to ASTM E1408.


B. Thresholds: Of type scheduled or indicated.

1. Manufacturers:
   a. Pemko Manufacturing Co., Inc. (PEM).
   b. Reese Enterprises, Inc. (RE).
   c. Rixson-Firemark, Inc. (RIX).
   d. Ultra Industries; a Macklanburg-Duncan Company (ULT).

2.13 MISCELLANEOUS DOOR HARDWARE

A. Boxed Power Supplies: Modular unit in NEMA ICS 6, Type 4 enclosure; filtered and regulated; and listed and labeled for use with fire alarm systems.

B. Wiring Harness: Provide wiring harnesses to connect hardware items as well as to extend above the opening for termination. Harnesses are to be color coded to match hardware to ensure simple troubleshooting. Wire ends to include Molex type connectors of same type as on hardware items.

2.14 CYLINDERS, KEYING, AND STRIKES

A. Cylinders: Tumbler type, constructed from brass or bronze, stainless steel, or nickel silver.
   1. Number of Pins: Match owner’s existing Medeco key system.
   2. Permanent Cores: Manufacturer's standard; finish face to match lockset. Provide two cylinders per lock, 10 master keys and 200 key blanks.
      a. Replace construction cylinders with permanent cores, as directed by Owner.

B. Keying System: Factory-registered keying system; grand master key system.

1. Keys: Provide nickel-silver keys permanently inscribed with a visual key control number and "DO NOT DUPLICATE" notation. In addition to one extra blank key for each lock, provide three change keys and five master keys.

C. Key Control System: Include key-holding hooks, labels, key tags with self-locking key holders, envelopes, and markers. Contain system in wall-mounted type metal cabinet with baked-enamel finish. Include cross-index system set up by key control manufacturer, with card index.

1. Manufacturers:
b. Major Metalfab Co. (MM).
c. Sargent Manufacturing Company (SA).
d. Sunroc Corporation (SUN).

D. Strikes: Manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set.

2.15 FABRICATION

A. Base Metals: Furnish metals of a quality equal to or greater than that of specified door hardware units and BHMA A156.18 for finishes. Do not furnish manufacturer's standard materials if different from specified standard.

B. Fasteners: Phillips flat-head screws with finished heads to match surface of door hardware, unless otherwise indicated. Provide steel machine or wood screws or steel through bolts for fire-rated applications.

C. Spacers or Sex Bolts: For through bolting of hollow metal doors.

D. Fasteners for Wood Doors: Comply with requirements of DHI WDHS.2, "Recommended Fasteners for Wood Doors."

E. Finishes: Comply with BHMA A156.18.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Examine doors and frames for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.

B. Steel Door and Frame Preparation: Comply with DHI A115 series. Drill and tap doors and frames for surface-applied hardware according to SDI 107.

C. Wood Door Preparation: Comply with DHI A115-W series.

D. Hardware Installation: Shall be in accordance to manufactures instructions.

E. Mounting Heights: Comply with the following requirements, unless otherwise indicated:


   2. Custom Steel Doors and Frames: DHI's "Recommended Locations for Builders' Hardware for Custom Steel Doors and Frames."

F. Miscellaneous Accessories: Shall be provided as necessary for the proper and secure attachment of all hardware to doors and frames.

G. Adjust and reinforce attachment substrates as necessary for proper installation and operation. Drill and tap units that are not factory prepared for fasteners. Space fasteners and anchors according to industry standards.

1. Boxed Power Supplies: Locate power supplies as indicated or, if not indicated, above accessible ceilings. Verify location with Architect.
   a. Configuration: Provide one power supply for each door. It is acceptable to provide the number of power supplies required to adequately supply doors with electrified door hardware.

2. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."

H. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with accessibility requirements.

1. Door Closers Adjustments:
   a. Adjust sweep period so that from an open position of 70 degrees, the door will take at least three seconds to move to a point 3 inches from the latch, measured to the leading edge of the door.
   b. Adjust back-check to slow the door opening at about 75 degrees, when door is forcibly opened beyond its pre-adjusted limits.

3.2 FIELD QUALITY CONTROL

A. Inspections: Owner will engage a qualified independent Architectural Hardware Consultant to perform inspections and to prepare inspection reports.

3.3 DOOR HARDWARE SETS

1. MK - McKinney
2. MR - Markar
3. RF - Rixson
4. RO - Rockwood
5. RU - Corbin Russwin
6. NO - Norton
7. PE - Pemko
8. OT - Other
### MOORE COUNTY NEW COURTHOUSE AND RENOVATION
#### CARTHAGE, NORTH CAROLINA
Architect’s Project No: 582405

9. SU - Securitron

**Hardware Sets**

**Set: 1.0**

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<th>Model Number</th>
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<tr>
<td>Electrified Inter Pivot</td>
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<td>Intermediate Pivot</td>
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<td>1 Exit Device</td>
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<tr>
<td>1 Cylinder</td>
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<td>1 Weatherstrip</td>
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<td>1 Door Position Switch</td>
<td>DPS-M-BK</td>
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<td>1 Wall Switch</td>
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<td>1 Power Supply</td>
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Notes: DOOR NORMALLY CLOSED AND LATCHED. PRESENTATION OF VALID CARD SHUNTS DPS, RETRACTS LATCH, SIGNALS AUTO OPERATOR, AND ALLOWS INGRESS. AFTER INGRESS THE DOOR RETURNS TO THE CLOSED AND LATCHED POSITION. FREE EGRESS AT ALL TIMES.

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**Set: 4.0**

| Hinge                            | TA2314                                          | US32D| MK   |      |
| Storeroom Lock                   | ML2057 LWA LC                                   | 630  | RU   |      |
| Cylinder                         | TO MATCH OWNERS EXISTING STANDARD                | 630  | RU   |      |
| Surface Closer                   | CPS7500                                          | 689  | NO   |      |
| Kick Plate                       | K1050 8" high HVBEV CSK                          | US32D| RO   |      |
| Threshold                        | 2005AT                                          | PE   |      |      |
| Weatherstrip                     | 303AS                                           | PE   |      |      |
| Door Stop                        | 3452CNB                                         | PE   |      |      |
| Storeroom Lock                   | ML2057 LWA LC                                   | 630  | RU   |      |
| Cylinder                         | TO MATCH OWNERS EXISTING STANDARD                | 630  | RU   |      |
| Kick Plate                       | K1050 8" high HVBEV CSK                          | US32D| RO   |      |
| Door Stop                        | 7500                                            | 689  | NO   |      |
| Weatherstrip                     | 303AS                                           | PE   |      |      |
| Door Stop                        | 3452CNB                                         | PE   |      |      |
| Storeroom Lock                   | ML2057 LWA LC                                   | 630  | RU   |      |
| Cylinder                         | TO MATCH OWNERS EXISTING STANDARD                | 630  | RU   |      |
| Kick Plate                       | K1050 8" high HVBEV CSK                          | US32D| RO   |      |
| Door Stop                        | 7500                                            | 689  | NO   |      |
| Weatherstrip                     | 303AS                                           | PE   |      |      |
| Door Stop                        | 3452CNB                                         | PE   |      |      |
| Storeroom Lock                   | ML2057 LWA LC                                   | 630  | RU   |      |
| Cylinder                         | TO MATCH OWNERS EXISTING STANDARD                | 630  | RU   |      |
| Kick Plate                       | K1050 8" high HVBEV CSK                          | US32D| RO   |      |
| Door Stop                        | 7500                                            | 689  | NO   |      |
| Weatherstrip                     | 303AS                                           | PE   |      |      |
| Door Stop                        | 3452CNB                                         | PE   |      |      |
| Storeroom Lock                   | ML2057 LWA LC                                   | 630  | RU   |      |
| Cylinder                         | TO MATCH OWNERS EXISTING STANDARD                | 630  | RU   |      |
| Kick Plate                       | K1050 8" high HVBEV CSK                          | US32D| RO   |      |
| Door Stop                        | 7500                                            | 689  | NO   |      |
| Weatherstrip                     | 303AS                                           | PE   |      |      |
| Door Stop                        | 3452CNB                                         | PE   |      |      |

**Set: 5.0**

| Hinge                            | TA2314                                          | US32D| MK   |      |
| Storeroom Lock                   | ML2057 LWA LC                                   | 630  | RU   |      |
| Cylinder                         | TO MATCH OWNERS EXISTING STANDARD                | 630  | RU   |      |
| Surface Closer                   | CPS7500                                          | 689  | NO   |      |
| Kick Plate                       | K1050 8" high HVBEV CSK                          | US32D| RO   |      |
| Threshold                        | 2005AT                                          | PE   |      |      |
| Weatherstrip                     | 303AS                                           | PE   |      |      |
| Door Stop                        | 3452CNB                                         | PE   |      |      |
| Storeroom Lock                   | ML2057 LWA LC                                   | 630  | RU   |      |
| Cylinder                         | TO MATCH OWNERS EXISTING STANDARD                | 630  | RU   |      |
| Kick Plate                       | K1050 8" high HVBEV CSK                          | US32D| RO   |      |
| Door Stop                        | 7500                                            | 689  | NO   |      |
| Weatherstrip                     | 303AS                                           | PE   |      |      |
| Door Stop                        | 3452CNB                                         | PE   |      |      |
| Storeroom Lock                   | ML2057 LWA LC                                   | 630  | RU   |      |
| Cylinder                         | TO MATCH OWNERS EXISTING STANDARD                | 630  | RU   |      |
| Kick Plate                       | K1050 8" high HVBEV CSK                          | US32D| RO   |      |
| Door Stop                        | 7500                                            | 689  | NO   |      |
| Weatherstrip                     | 303AS                                           | PE   |      |      |
| Door Stop                        | 3452CNB                                         | PE   |      |      |

**Set: 6.0**

| Hinge                            | TA2714                                          | US26D| MK   |      |
| Storeroom Lock                   | ML2057 LWA LC                                   | 630  | RU   |      |
| Cylinder                         | TO MATCH OWNERS EXISTING STANDARD                | 630  | RU   |      |
| Kick Plate                       | K1050 8" high HVBEV CSK                          | US32D| RO   |      |
| Door Stop                        | 7500                                            | 689  | NO   |      |
| Weatherstrip                     | 303AS                                           | PE   |      |      |
| Door Stop                        | 3452CNB                                         | PE   |      |      |

DOOR HARDWARE 087100 - 12
**MOORE COUNTY NEW COURTHOUSE AND RENOVATION**  
CARthage, NORTH carOLina  
Architect’s project No: 582405

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Notes: DOOR TO BE CLOSED AND LOCKED AT ALL TIMES. PRESENTATION OF A VALID CARD SHUNTS DPS AND SIGNALS ELECTRIC LATCH RETRACTION ALLOWING INGRESS. EGRESS AT ALL TIMES. DOOR TO BE TIED INTO BUILDINGS FIRE ALARM SYSTEM.

**Set: 7.0**

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DOOR HARDWARE 087100 - 13
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Notes: DOOR NORMALLY CLOSED AND LATCHED. PRESENTATION OF VALID CARD SHUNTS DPS, UNLOCKS OUTSIDE LEVER, AND ALLOWS INGRESS. AFTER INGRESS THE DOOR RETURNS TO THE CLOSED AND LATCHED POSITION. FREE EGRESS AT ALL TIMES.
**MOORE COUNTY NEW COURTHOUSE AND RENOVATION**  
**CARTHAGE, NORTH CAROLINA**  
*Architect’s Project No: 582405*

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Notes: DOOR NORMALLY CLOSED AND LATCHED. PRESENTATION OF VALID CARD SHUNTS DPS, UNLOCKS OUTSIDE LEVER, AND ALLOWS INGRESS. AFTER INGRESS THE DOOR RETURNS TO THE CLOSED AND LATCHED POSITION. UNAUTHORIZED EGRESS WILL SIGNAL DELAYED EGRESS.

**Set: 12.1**

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MOORE COUNTY NEW COURTHOUSE AND RENOVATION
CARTHAGE, NORTH CAROLINA
Architect’s Project No: 582405

1 ElectroLynx Harness QC-C000P x LAR MK
1 Wiring Diagram WD-SYSPK RU
1 Card Reader FURNISHED IN OTHER SECTION OT
1 Door Position Switch DPS-M-BK SU
1 Power Supply AQD4 SU

Notes: DOOR NORMALLY CLOSED AND LATCHED. PRESENTATION OF VALID CARD SHUNTS DPS, UNLOCKS OUTSIDE LEVER, AND ALLOWS INGRESS. AFTER INGRESS THE DOOR RETURNS TO THE CLOSED AND LATCHED POSITION. FREE EGRESS AT ALL TIMES.

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Notes: DOOR NORMALLY CLOSED AND LATCHED. PRESENTATION OF VALID CARD SHUNTS DPS, UNLOCKS OUTSIDE LEVER, AND ALLOWS INGRESS. AFTER INGRESS THE DOOR RETURNS TO THE CLOSED AND LATCHED POSITION. FREE EGRESS AT ALL TIMES.

Set: 13.0

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Set: 14.0
### MOORE COUNTY NEW COURTHOUSE AND RENOVATION
**CARTHAGE, NORTH CAROLINA**
Architect’s Project No: 582405

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**Notes:** DOOR TO BE CLOSED AND LOCKED AT ALL TIMES. PRESENTATION OF A VALID CARD SHUNTS DPS AND UNLOCKS OUTSIDE LEVER ALLOWING INGRESS. EGRESS AT ALL TIMES BY INSIDE LEVER.

**Set: 16.0**

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Notes: DOOR TO BE CLOSED AND LOCKED AT ALL TIMES. PRESENTATION OF A VALID CARD SHUNTS DPS AND UNLOCKS OUTSIDE LEVER ALLOWING INGRESS. EGRESS AT ALL TIMES BY INSIDE LEVER.

**Set: 17.0**

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Notes: DOOR TO BE CLOSED AND LOCKED AT ALL TIMES. PRESENTATION OF A VALID CARD SHUNTS DPS AND UNLOCKS OUTSIDE LEVER ALLOWING INGRESS. EGRESS AT ALL TIMES BY INSIDE LEVER.
### MOORE COUNTY NEW COURTHOUSE AND RENOVATION
#### CARTHAGE, NORTH CAROLINA
**Architect’s Project No: 582405**

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**Notes:** DOOR TO BE CLOSED AND LOCKED AT ALL TIMES. PRESENTATION OF A VALID CARD SHUNTS DPS AND UNLOCKS LEVER ALLOWING INGRESS/EGRESS.

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### Set: 19.0

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**Notes:** DOOR TO BE CLOSED AND LOCKED AT ALL TIMES. PRESENTATION OF A VALID CARD SHUNTS DPS AND UNLOCKS LEVER ALLOWING INGRESS/EGRESS.
Set: 20.0

Hinge		TA2714	US26D	MK
Electric Hinge	TA2714 x QC	US26D	MK
1 Electric Hinge	ML20932-SEC LWA	630	RU
1 Electrified Lock	TO MATCH OWNERS EXISTING	630	RU
1 Cylinder	STANDARD	
1 Surface Closer	CPS7500	689	NO
1 Kick Plate	K1050 8" high HVBEV CSK	US32D	RO
1 Set Door Seals/Silencers	S88D/608 AS REQUIRED	PE
1 Electrified Lock	QC-C1500P (@ JAMB)	MK
1 ElectroLynx Harness	QC-C000P x LAR	MK
1 Wiring Diagram	WD-SYSPK	RU
2 Card Reader	FURNISHED IN OTHER SECTION	OT
1 Door Position Switch	DPS-M-BK	SU
1 Power Supply	AQL4	SU

Notes: DOOR TO BE CLOSED AND LOCKED AT ALL TIMES. PRESENTATION OF A VALID CARD SHUNTS DPS AND UNLOCKS LEVER ALLOWING INGRESS/EGRESS.

Set: 21.0

Hinge		TA2714	US26D	MK
Electric Hinge	TA2714 x QC	US26D	MK
1 Electric Hinge	ML20906-SEC LWA M92 LC	630	RU
1 Electrified Lock	TO MATCH OWNERS EXISTING	630	RU
1 Cylinder	STANDARD	
1 Surface Closer	CPS7500	689	NO
1 Kick Plate	K1050 8" high HVBEV CSK	US32D	RO
1 Set Door Seals/Silencers	S88D/608 AS REQUIRED	PE
1 ElectroLynx Harness	QC-C1500P (@ JAMB)	MK
1 ElectroLynx Harness	QC-C000P x LAR	MK
1 Wiring Diagram	WD-SYSPK	RU
1 Card Reader	FURNISHED IN OTHER SECTION	OT
1 Door Position Switch	DPS-M-BK	SU
1 Power Supply	AQL4	SU

Notes: DOOR TO BE CLOSED AND LOCKED AT ALL TIMES. PRESENTATION OF A VALID CARD SHUNTS DPS AND UNLOCKS OUTSIDE LEVER ALLOWING INGRESS/EGRESS AT ALL TIMES BY INSIDE LEVER.

Set: 22.0

DOOR HARDWARE 087100 - 20
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Notes: DOOR TO BE CLOSED AND LOCKED AT ALL TIMES. PRESENTATION OF A VALID CARD SHUNTS DPS AND UNLOCKS OUTSIDE LEVER ALLOWING INGRESS. EGRESS AT ALL TIMES BY INSIDE LEVER.

**Set: 23.0**

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Notes: DOOR TO BE CLOSED AND LOCKED AT ALL TIMES. PRESENTATION OF A VALID CARD SHUNTS DPS AND UNLOCKS OUTSIDE LEVER ALLOWING INGRESS. EGRESS AT ALL TIMES BY INSIDE LEVER.

### Set: 24.0

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Notes: OPERATION: DOOR TO BE CLOSED AND LOCKED AT ALL TIMES. DIGITAL KEYPAD ENTRY UNLOCKS OUTSIDE LEVER ALLOWING INGRESS. EGRESS AT ALL TIMES BY INSIDE LEVER.

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DOOR HARDWARE

087100 - 23
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<td>Door Stop</td>
<td>406/441CU</td>
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<td>Classroom Lock</td>
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<td>Cylinder</td>
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<td>Surface Closer</td>
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<td>Cylinder</td>
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<td>RU</td>
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<td>Surface Closer</td>
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<td>1 Cylinder</td>
<td>TO MATCH OWNERS EXISTING STANDARD</td>
<td>630 RU</td>
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<tr>
<td>1 Surface Closer</td>
<td>PR7500</td>
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<tr>
<td>1 Kick Plate</td>
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<td>US32D</td>
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<tr>
<td>1 Door Stop</td>
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<td>1 Cylinder</td>
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<tr>
<td>1 Surface Closer</td>
<td>PR7500</td>
<td>689 NO</td>
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<tr>
<td>1 Kick Plate</td>
<td>K1050 8&quot; high HVBEV CSK</td>
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<td>1 Door Stop</td>
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<td>1 Cylinder</td>
<td>TO MATCH OWNERS EXISTING STANDARD</td>
<td>630 RU</td>
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<tr>
<td>1 Surface Closer</td>
<td>CPS7500</td>
<td>689 NO</td>
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<td>1 Kick Plate</td>
<td>K1050 8&quot; high HVBEV CSK</td>
<td>US32D</td>
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<td>US26D</td>
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<td>1 Dust Proof Strike</td>
<td>570</td>
<td>US26D</td>
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<td>Item</td>
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<td>1 Cylinder</td>
<td>TO MATCH OWNERS EXISTING STANDARD</td>
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<tr>
<td>1 Coordinator</td>
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<td>2 Surface Closer</td>
<td>CPS7500</td>
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<td>2 Kick Plate</td>
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<td>1 Door Position Switch</td>
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<td>US26D RO</td>
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<td>1 Dust Proof Strike</td>
<td>570</td>
<td>US26D RO</td>
<td>RO</td>
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<tr>
<td>1 Storeroom Lock</td>
<td>ML2057 LWA LC</td>
<td>630 RU</td>
<td>SU</td>
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<td>1 Cylinder</td>
<td>TO MATCH OWNERS EXISTING STANDARD</td>
<td>630 RU</td>
<td>SU</td>
</tr>
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<td>1 Coordinator</td>
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<td>US28 RO</td>
<td>RO</td>
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<td>2 Surface Closer</td>
<td>CPS7500</td>
<td>689 NO</td>
<td>NO</td>
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<tr>
<td>2 Kick Plate</td>
<td>K1050 8&quot; high HVBEV CSK</td>
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**Set: 48.0**

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<td>1 Set Combo Flush Bolts</td>
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<td>US26D RO</td>
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<td>1 Dust Proof Strike</td>
<td>570</td>
<td>US26D RO</td>
<td>RO</td>
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<tr>
<td>1 Storeroom Lock</td>
<td>ML2057 LWA LC</td>
<td>630 RU</td>
<td>SU</td>
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<td>1 Cylinder</td>
<td>TO MATCH OWNERS EXISTING STANDARD</td>
<td>630 RU</td>
<td>SU</td>
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<td>1 Coordinator</td>
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<td>2 Overhead Stop</td>
<td>10-X36</td>
<td>630 RF</td>
<td>RF</td>
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<tr>
<td>2 Surface Closer</td>
<td>7500</td>
<td>689 NO</td>
<td>NO</td>
</tr>
<tr>
<td>2 Kick Plate</td>
<td>K1050 8&quot; high HVBEV CSK</td>
<td>US32D RO</td>
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<td>1 Set Door Seals/Silencers</td>
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**Set: 49.0**

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**DOOR HARDWARE**

087100 - 28
MOORE COUNTY NEW COURTHOUSE AND RENOVATION  
CARTHAGE, NORTH CAROLINA  
Architect’s Project No: 582405

1 Push Plate  70C  US32D  RO
1 Foot Pull  FP1230  US32D  RO
1 Pull Plate  BF 111x70C  US32D  RO
1 Surface Closer  7500  689  NO
1 Kick Plate  K1050 8” high HVBEV CSK  US32D  RO
1 Door Stop  482  US26D  RO
3 Silencer  608  RO

Set: 50.0

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<tr>
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<td>RM3310-18 Mtg-Type 16</td>
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<td>Surface Closer</td>
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<td>CPS7500</td>
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<tr>
<td>Kick Plate</td>
<td>1</td>
<td>K1050 8” high HVBEV CSK</td>
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<tr>
<td>Door Stop</td>
<td>1</td>
<td>406/441CU</td>
</tr>
<tr>
<td>Set Door Seals/Silencers</td>
<td>1</td>
<td>S88D/608 AS REQUIRED</td>
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<td>Auto Door Bottom</td>
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<td>411ARL (MORTISE)</td>
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<td>Kick Plate</td>
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<td>K1050 8” high HVBEV CSK</td>
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<td>Set Door Seals</td>
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<td>S88D</td>
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Set: 53.0

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END OF SECTION 087100
SECTION 088000 - GLAZING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 SUMMARY OF GLAZING TYPES

A. Glass types: (IGU = Insulating Glass Units)
   1. Glass 1 = 1/4-inch tempered clear (safety) glazing (interior UNO)
   2. Glass 2 = 1-inch IGU - tinted ext. + low-e coating/clear int.(ext storefront UNO)
   3. Glass 3 = 1-inch IGU spandrel glass - HS clear ext./ HS clear ceramic coated int.(as indicated)
   4. Glass 4 = 1/2-inch laminated security glazing (as indicated)
   5. Glass 5 = 1-inch tinted IGU laminated security glazing (as indicated)
   6. Glass 6 = 1/4-inch clear 20-minute fire-protection-rated glazing (interior as indicated)
   7. Glass 7 = 1-inch prefinished insulating metal panels (Refer to Division 08 Section "Aluminum Storefront and Curtainwall")
   8. Glass 8 = 1/4-inch one-way mirror glass (interior as indicated)
   9. Glass 9 = 1-inch IGU diffusing/translucent core (exterior curtain wall and storefront as indicated)

1.3 DEFINITIONS

A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.
B. Glass Thicknesses: Indicated by thickness designations in millimeters per ASTM C 1036.
D. Interspace: Space between lites of an insulating-glass unit.

1.4 COORDINATION

A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

1.5 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 temporary protection requirements for glazing during and after installation.

1.6 ACTION SUBMITTALS

A. Product Data: For each type of product.
B. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.
C. Delegated-Design Submittal: For glass indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
1.7 INFORMATIONAL SUBMITTALS
A. Qualification Data: For manufacturers of insulating-glass units with sputter-coated, low-E coatings, glass testing agency, and sealant testing agency.
B. Product Certificates: For glass and glazing products, from manufacturer.
C. Product Test Reports: For coated glass, insulating glass, and fire-resistive glazing, glazing gaskets and glazing sealants, for tests performed by a qualified testing agency.
   1. For glazing sealants, provide test reports based on testing current sealant formulations within previous 36-month period.
D. Preconstruction adhesion and compatibility test report.
E. Sample Warranties: For special warranties.

1.8 QUALITY ASSURANCE
A. Manufacturer Qualifications for Insulating-Glass Units with Sputter-Coated, Low-E Coatings: A qualified insulating-glass manufacturer who is approved by coated-glass manufacturer.
B. Glass Testing Agency Qualifications: A qualified independent testing agency accredited according to the NFRC CAP 1 Certification Agency Program.
C. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.
D. Laminator Qualifications: Laminators trained by the interlayer manufacturer in best practices.
E. Mockups: Build mockups to demonstrate aesthetic effects and to set quality standards for materials and execution.
   1. Integrated Mockup Unit: Install glazing in integrated mockups specified in Division 1 Section “Quality Requirements,” and as indicated on Drawings, to match glazing systems required for Project, including glazing methods.
   2. Spandrel Glazing and Back Pan Mockup: Provide glazing, backpan, and insulation work for spandrel glazing and back pan mockup as specified in Division 8 Section “Aluminum Entrances, Storefront, and Curtain Wall.”

1.9 PRECONSTRUCTION TESTING
A. Preconstruction Adhesion and Compatibility Testing: Test each glass product, tape sealant, gasket, glazing accessory, and glass-framing member for adhesion to and compatibility with elastomeric glazing sealants.
   1. Testing is not required if data are submitted based on previous testing of current sealant products and glazing materials matching those submitted.
   2. Use ASTM C 1087 to determine whether priming and other specific joint-preparation techniques are required to obtain rapid, optimum adhesion of glazing sealants to glass, tape sealants, gaskets, and glazing channel substrates.
   3. Test no fewer than eight Samples of each type of material, including joint substrates, shims, sealant backings, secondary seals, and miscellaneous materials.
   4. Schedule enough time for testing and analyzing results to prevent delaying the Work.
   5. For materials failing tests, submit sealant manufacturer’s written instructions for corrective measures including the use of specially formulated primers.

1.10 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.

1.11 FIELD CONDITIONS
A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.
   1. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or are below 40 deg F.

1.12 WARRANTY
A. Manufacturer’s Special Warranty for Coated-Glass Products: Manufacturer agrees to replace coated-glass units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer’s written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.
   1. Warranty Period: Ten (10) years from date of Substantial Completion.
B. Manufacturer’s Special Warranty for Laminated Glass: Manufacturer agrees to replace laminated-glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to 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. Warranty Period: Five (5) years from date of Substantial Completion.
C. Manufacturer’s Special Warranty for Insulating Glass: Manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer’s written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.
   1. Warranty Period: Ten (10) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS
A. Source Limitations for Glass: Obtain from single source from single manufacturer for each glass type.
B. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.

2.2 PERFORMANCE REQUIREMENTS
A. General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.
B. Delegated Design: Engage a qualified professional engineer, as defined in Division 01 Section "Quality Requirements," to design glazing. Design glass, including comprehensive engineering analysis, using the structural performance criteria indicated below.
C. 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 thickness designations indicated for various size openings, but not less than thicknesses and in strengths 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.
      c. 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: 60 seconds or less.
      d. 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 (25 mm), whichever is less.
      e. Minimum Glass Thickness for Exterior Lites: Not less than 6.0 mm.
      f. Thickness of Tinted and Heat-Absorbing Glass: Provide the same thickness for each tint color indicated throughout Project.

D. Windborne-Debris-Impact Resistance: Exterior glazing shall comply with basic-protection testing requirements in ASTM E 1996 for Wind Zone I when tested according to ASTM E 1886. Test specimens shall be no smaller in width and length than glazing indicated for use on Project and shall be installed in same manner as glazing indicated for use on Project.
   1. Large-Missile Test: For glazing located within 30 feet of grade.
   2. Small-Missile Test: For glazing located more than 30 feet above grade.

E. Glazing for Fire-Rated Door and Window 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-protection ratings indicated, based on testing according to NFPA 252 for doors and NFPA 257 for windows (sidelights).
   1. Where hollow metal fire door frame types with clear fire-rated glass occur, the frames, glazing, and fire doors shall be a complete tested assembly.

G. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR 1201, Category II.
   1. Where glazing units, including Kind FT glass and laminated glass, are indicated for glazing lites more than 9 sq. ft. in exposed surface area of one side, provide glazing products that comply with Category II materials. For lites 9 sq. ft. or less in exposed surface area of one side, provide glazing products that comply with Category I or II materials, except for hazardous locations where Category II materials are indicated or required per 16 CFR 1201 or regulations of authorities having jurisdiction.

H. 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 mm 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 and 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 as Btu/sq. ft. x h x deg F (W/sq. m x K).
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.

I. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.
   1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.3 GLASS PRODUCTS, GENERAL

A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.

B. Safety Glazing Labeling: Where safety glazing is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction or manufacturer. Label shall indicate manufacturer’s name, type of glass, thickness, and safety glazing standard with which glass complies.

C. Fire-Protection-Rated Glazing Labeling: Permanently mark fire-protection-rated glazing with certification label of a testing agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer’s name; test standard; whether glazing is permitted to be used in doors or openings; if permitted in openings, whether or not glazing has passed the hose-stream test; whether or not glazing meets 450 deg F temperature-rise limitation; and the fire-resistance rating in minutes.

D. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.

E. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass that complies with performance requirements and is not less than the thickness indicated.
   1. Minimum Glass Thickness for Exterior Lites: 6 mm.

F. Strength: Where float glass is indicated, provide annealed float glass, heat-strengthened float glass, or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where heat-strengthened float glass is indicated, provide heat-strengthened float glass or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where fully tempered float glass is indicated, provide fully tempered float glass.

2.4 GLASS PRODUCTS

A. Heat-Treated Float Glass: ASTM C 1048; Type I; Quality-Q3; Class I (clear) unless otherwise indicated; of kind and condition indicated.
1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.

2. For uncoated glass, comply with requirements for Condition A.

3. For coated vision glass, comply with requirements for Condition C (other uncoated glass).

B. Ceramic-Coated Spandrel Glass: ASTM C 1048, Type I, Condition B, Quality-Q3, and complying with other requirements specified.

1. Ceramic Coating Color: As selected by Architect from manufacturer's full range.

2.5 LAMINATED GLASS

A. Laminated Glass: ASTM C 1172, and complying with testing requirements in 16 CFR 1201 for Category II materials, and with other requirements specified. Use materials that have a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation. Fabricate laminated glass to produce glass free of foreign substances and air or glass pockets.

1. Interlayer: Ionoplast structural material.
   a. Product: Kuraray America Inc.; “SentryGlas” or comparable ionoplast interlayer submitted as a properly formatted substitution request.
   b. Thickness: 0.060 inch.
   c. Color: Clear.
   d. Interlayer Physical Properties:
      1) Young’s Modulus: 43 kpsi, when tested in accordance with ASTM D5026.
      2) Tensile Strength: 5.0 kpsi, when tested in accordance with ASTM D638.
      3) Elongation: 400%, when tested in accordance with ASTM D638.
      4) Flex Modulus: 50 kpsi, when tested in accordance with ASTM D790.
      5) Heat Deflection Temperature at 0.46 MPa: 110 deg F, when tested in accordance with ASTM D648.

2.6 INSULATING GLASS

A. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E 2190.

1. Warm Edge Technology Spacer: Thermoset silicone spacer incorporating integral 3A desiccant, a triple seal design consisting of a pre-applied acrylic adhesive for glass bonding, a captive polyisobutylene primary air seal and a two-part structural silicone secondary air seal, color black. Available high performance “warm edge” spacer products include, but are not limited to, the following:
   a. JE Berkowitz, LP; “JEB 3Seal Warm Edge Spacer.”
   b. Quanex Building Products; “Super Spacer Tri-Seal.”
   c. Technoform Group; “TGI-Spacer.”

B. High Performance, Insulating-Glass Units with Translucent Core: Factory-assembled units consisting of sealed lites of glass. The translucent core units shall be “Okalux Plus” by OKALUX North America, basis-of-design standard. Equivalent “Solera” products by Advanced Glazings Limited are acceptable.

2.7 FIRE-PROTECTION-RATED GLAZING

A. Fire-Protection-Rated Glazing, General: Listed and labeled by a testing agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 252 for door assemblies and NFPA 257 for window assemblies.
B. Film-Faced Ceramic Glazing: Clear, ceramic flat glass; 3/16-inch nominal thickness, weighing 2.5 lb/sq. ft.; faced on one surface with a clear glazing film; complying with testing requirements in 16 CFR 1201 for Category II materials.
   1. Fire-Protection Rating: As indicated for the assembly in which glazing material is installed, and permanently labeled by a testing and inspecting agency acceptable to authorities having jurisdiction.
   2. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
      a. Nippon Electric Glass Co., Ltd. (dist by Technical Glass Products); FireLite NT.
      b. Schott North America, Inc. (Distributed by SaftiFirst); Pyran Platinum F.
      c. Vetrotech Saint-Gobain; Keralite F.

2.8 GLAZING GASKETS
A. 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. EPDM complying with ASTM C 864.
   4. Thermoplastic polyolefin rubber complying with ASTM C 1115.
B. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned EPDM, neoprene, silicone or thermoplastic polyolefin rubber gaskets complying with ASTM C 509, Type II, black; of profile and hardness required to maintain watertight seal.
   1. Application: Use where soft compression gaskets will be compressed by inserting dense compression gaskets on opposite side of glazing or pressure applied by means of pressure-glazing stops on opposite side of glazing.

2.9 GLAZING SEALANTS
A. General:
   1. Compatibility: Compatible with one another and with other materials they contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
   2. Suitability: Comply with sealant and glass manufacturers’ written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
   3. Sealant shall comply with the testing and product requirements of the California Department of Public Health’s "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
   4. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer’s full range.
B. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 50, Use NT.
   1. 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 Corp.; Omniseal 50.
      b. Dow Corning Corporation; 795.
      c. GE Construction Sealants; SilPruf NB SCS9000.
2.11 MISCELLANEOUS GLAZING MATERIALS
A. General: Provide products of material, size, and shape complying with referenced glazing standard, with requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
D. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).
F. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.
G. Perimeter Insulation for Fire-Resistive Glazing: Product that is approved by testing agency that listed and labeled fire-resistant glazing product with which it is used for application and fire-protection rating indicated.

2.12 FABRICATION OF GLAZING UNITS
A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

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.
B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that leave visible marks in the completed Work.

3.3 GLAZING, GENERAL
A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
B. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass includes glass with edge damage or other imperfections that, when installed, could weaken glass, impair performance, or impair appearance.
C. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.
D. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
F. Provide spacers for glass lites where length plus width is larger than 50 inches.
   1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
   2. Provide 1/8-inch minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.
G. 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.
H. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.
I. Set glass lites with proper orientation so that coatings face exterior or interior as specified.
J. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.
K. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.
3.4 TAPE GLAZING
A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.
B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
C. Cover vertical framing joints by applying tapes to heads and sills first, then to jambs. Cover horizontal framing joints by applying tapes to jambs, then to heads and sills.
D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
E. Do not remove release paper from tape until right before each glazing unit is installed.
F. Apply heel bead of elastomeric sealant for glazing at exterior exposure steel doors and frames.
G. Center glass lites in openings on setting blocks, and press firmly against tape 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.
H. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.5 GASKET GLAZING (DRY)
A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.
B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
D. Installation with Pressure-GLazing Stops: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
E. Install gaskets so they protrude past face of glazing stops.

3.6 CLEANING AND PROTECTION
A. Immediately after installation remove nonpermanent labels and clean surfaces.
B. Protect glass from contact with contaminating substances resulting from construction operations. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains.
   1. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer. Remove and replace glass that cannot be cleaned without damage to coatings.
C. Remove and replace glass that is damaged during construction period.
D. Wash glass on both exposed surfaces not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

3.7 MONOLITHIC GLASS TYPES
A. Glass Type (GL-1): Clear heat-strengthened fully tempered (Kind FT) float glass.
   1. Minimum Thickness: 6 mm.
   2. Safety glazing required.
B. One-Way Mirror Glass (GL-8): Glass coated with a durable silver colored metallic oxide coating on reflecting surface by manufacturer’s standard pyrolytic deposition process for “one-way” mirror product (also known as “two-way mirror”). The coating shall afford total obstruction of wrong-way thru-vision when light ratios are at least eight to one (8:1) while allowing full view from the observer side. Applied film products are not acceptable.
   1. Glass Type: Tinted float glass.
   2. Tint Color: Gray.
   3. Minimum Glass Thickness: 6 mm.

3.8 LAMINATED GLASS TYPES
A. Glass Type (GL-4): Clear laminated glass with two plies of fully tempered float glass, for a Category II Safety rating.
   1. Total Thickness: Nominal 1/2-inch, unless otherwise required for application and size indicated.
   2. Minimum Thickness of Each Glass Ply: Nominal 1/4-inch (6 mm).
   3. Interlayer Thickness: Minimum 0.060 inch.
   4. Safety glazing required.

3.9 FIRE-PROTECTION-RATED GLAZING TYPES
A. Glass Type (GL-6): Fire-rated glazing of hourly rating indicated; film-faced ceramic glazing.
   1. Provide safety glazing labeling.

3.10 INSULATING GLASS TYPES
A. Glass Type (GL-2): Low-E-coated, tinted insulating glass.
   1. Available Gray Tinted Products:
      a. AGC; Energy Select 25 Pure Grey.
      b. Guardian; SN 68 Gray.
      c. Viracon; #VE3-2M.
      d. Vitro; Solarban 60 (2) Solargray.
   2. Overall Unit Thickness: 1 inch (25 mm).
   3. Minimum Thickness of Each Glass Lite: 6 mm.
   4. Outdoor Lite: Tinted fully tempered float glass as required to comply with requirements for safety glazing.
      a. Tint Color: Gray.
      b. Low-E Coating: Sputtered on second surface.
   5. Interspace Content: Air.
   6. Indoor Lite: Clear fully tempered float glass as required to comply with requirements for safety glazing.
   7. Winter Nighttime U-Factor: 0.30 maximum.
a. Assume U-Factor improvement of 0.02 for warm-edge-technology spacer for a final design U-factor of 0.28.

8. Visible Light Transmittance: 34 percent minimum.
10. Safety glazing required.

B. Glass Type (GL-3): Ceramic-coated, low-E, insulating spandrel glass.
   1. Coating Color: As selected by Architect from manufacturer’s full range.
   2. Construction: Units that comply with requirements specified for insulating-glass units designated Glazing Type GL-2 except for indoor lite.
   3. Indoor Lite: Heat-strengthened or fully tempered float glass as required to comply with requirements for safety glazing.
      a. Minimum Thickness of Glass Lite: 6 mm.
   4. Opaque Coating Location: Fourth surface.

C. Glass Type (GL-9): Insulating glass with translucent core.
   1. Overall Unit Thickness: 1 inch.
   2. Thickness of Each Glass Lite: 1/4-inch.
   3. Outdoor Lite: Fully tempered clear float glass.
   4. Interspace Content: Argon.
   5. Translucent Core: Factory-assembled units consisting of sealed lites of glass with a capillary slab and diffusing cloth layer. The translucent core units shall be “Okalux Plus” by OKALUX North America.
      a. Visible Transmittance: 40% minimum.
      b. U-Value: U-0.25 maximum (argon fill).
      c. Solar Heat Gain Coefficient: 0.27 maximum.
   6. Indoor Lite: Fully tempered clear float glass with “SunGuard SN 68 Gray” side #2.

D. Provide safety glazing label.

3.11 INSULATING-LAMINATED-GLASS TYPES

A. Glass Type (GL-5): Low-E-coated, tinted, insulating laminated glass.
   1. Overall Unit Thickness: 1 inch (25 mm).
   2. Minimum Thickness of Outdoor Lite: 6 mm.
   3. Units that comply with requirements specified for insulating-glass units designated Glazing Type GL-2 except for indoor lite.
   4. Outdoor Lite: Tinted fully tempered float glass as required to comply with requirements for safety glazing.
      a. Low-E Coating: Sputtered on second surface.
      b. Tint Color: Gray.
   5. Interspace Content: Air.
   6. Indoor Lite: Clear laminated glass with two plies of heat-strengthened float glass.
      a. Minimum Thickness of Each Glass Ply: 3 mm.
      b. Interlayer Thickness: 0.060 inch (1.52 mm).
   7. Safety glazing required.

END OF SECTION 088000
SECTION 088300 - MIRRORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 DEFINITIONS
A. Deterioration of Mirrors: Defects developed from normal use that are attributable to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning mirrors contrary to mirror manufacturer’s written instructions. Defects include discoloration, black spots, and clouding of the silver film.

1.3 PERFORMANCE REQUIREMENTS
A. Provide mirrors that will not fail under normal usage. Failure includes glass breakage and deterioration attributable to defective manufacture, fabrication, and installation.

1.4 SUBMITTALS
A. Product Data: For the following:
   1. Mirrors. Include description of materials and process used to produce each type of silvered flat glass mirror specified that indicates sources of glass, glass coating components, edge sealer, and quality-control provisions.
   2. Mirror mastic.
   3. Mirror hardware.
B. Shop Drawings: Include mirror elevations, edge details, mirror hardware, and attachments to other work.
C. Product Certificates: For each type of mirror and mirror mastic, signed by product manufacturer.
D. Qualification Data: For Installer.
E. Mirror Mastic Compatibility Test Reports: From mirror manufacturer indicating that mirror mastic was tested for compatibility and adhesion with mirror backing and substrates on which mirrors are installed.
F. Warranty: Special warranty specified in this Section.

1.5 QUALITY ASSURANCE
A. Installer Qualifications: An experienced installer who has completed mirror glazing similar in material, design, and extent to that indicated for this Project; whose work has resulted in mirror installations with a record of successful in-service performance.
B. Source Limitations for Mirrors: Obtain mirrors from one source for each type of mirror indicated.
C. Source Limitations for Mirror Glazing Accessories: Obtain mirror glazing accessories from one source for each type of accessory indicated.
D. Glazing Publications: Comply with the following published recommendations:
   1. GANA’s “Glazing Manual” unless more stringent requirements are indicated. Refer to this publication for definitions of glass and glazing terms not otherwise defined in this Section or in referenced standards.
   2. GANA Mirror Division’s “Mirrors, Handle with Extreme Care: Tips for the Professional on the Care and Handling of Mirrors.”
E. Safety Glazing Products: For film-backed mirrors, provide products complying with testing requirements in 16 CFR 1201 for Category II materials.

F. Preconstruction Mirror Mastic Compatibility Test: Submit mirror mastic products to mirror manufacturer for testing to determine compatibility of mastic with mirror backing and substrates on which mirrors are installed.

1.6 DELIVERY, STORAGE, AND HANDLING
A. Protect mirrors according to mirror manufacturer’s written instructions and as needed to prevent damage to mirrors from condensation, temperature changes, direct exposure to sun, or other causes.

B. Comply with mirror manufacturer’s written instructions for shipping, storing, and handling mirrors as needed to prevent deterioration of silvering, damage to edges, and abrasion of glass surfaces and applied coatings. Store indoors, protected from moisture including condensation.

1.7 PROJECT CONDITIONS
A. Environmental Limitations: Do not install mirrors until ambient temperature and humidity conditions are maintained at levels indicated for final occupancy.

1.8 WARRANTY
A. Special Warranty: Manufacturer’s standard form, made out to Owner and signed by mirror manufacturer agreeing to replace mirrors 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: Five years from date of manufacture.

PART 2 - PRODUCTS

2.1 MANUFACTURERS
A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering mirrors that may be incorporated into the Work include, but are not limited to, the following:

1. Arch Aluminum & Glass Co., Inc.
2. Gardner Glass Products.
3. Gilded Mirrors, Inc.
4. Guardian Industries Corp.
5. Independent Mirror Industries, Inc.
7. Messer Industries, Inc.
8. Stroupe Mirror Co., Inc.
10. Virginia Mirror Company, Inc.
11. VVP America, Inc.; Binswanger Mirror Products.
12. Walker Glass Co., Ltd.

2.2 SILVERED FLAT GLASS MIRROR MATERIALS
A. Clear Glass Mirrors: ASTM C 1503, Mirror Select Quality.

1. Nominal Thickness: 6.0 mm.
2.3 MISCELLANEOUS MATERIALS
A. Setting Blocks: Elastomeric material with a Type A Shore durometer hardness of 85, plus or minus 5.
B. Edge Sealer: Coating compatible with glass coating and approved by mirror manufacturer for use in protecting against silver deterioration at mirrored glass edges.
C. Mirror Mastic: An adhesive setting compound, produced specifically for setting mirrors and certified by both mirror manufacturer and mastic manufacturer as compatible with glass coating and substrates on which mirrors will be installed.  
1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. Gunther Mirror Mastics.
   b. Palmer Products Corporation.
   c. OSI Sealants, Inc.

2.4 MIRROR HARDWARE
A. Top and Bottom Aluminum J-Channels: Aluminum extrusions with a return deep enough to produce a glazing channel to accommodate mirrors of thickness indicated and in lengths required to cover bottom and top edges of each mirror in a single piece.
   1. Bottom Trim: J-channels formed with front leg and back leg not less than 3/8 and 7/8 inch in height, respectively, and a thickness of not less than 0.04 inch.
   2. Top Trim: J-channels formed with front leg and back leg not less than 5/8 and 1 inch in height, respectively, and a thickness of not less than 0.04 inch.
   3. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
      a. Bottom Trim:
         2) Brunner Enterprises Inc.; Mirror Lower “J” Channel.
         3) New York Metal; 851 Mirror Molding.
      b. Top Trim:
         2) Brunner Enterprises Inc.; Mirror Upper “J” Channel.
         3) New York Metal; 951 Mirror Molding.
B. Fasteners: Fabricated of same basic metal and alloy as fastened metal and matching it in finished color and texture where fasteners are exposed.
C. Anchors and Inserts: Provide devices as required for mirror hardware installation. Provide toothed or lead-shield expansion-bolt devices for drilled-in-place anchors. Provide galvanized anchors and inserts for applications on inside face of exterior walls and where indicated.

2.5 FABRICATION
A. Mirror Sizes: To suit Project conditions, cut mirrors to final sizes and shapes.
B. Cutouts: Fabricate cutouts for notches and holes in mirrors without marring visible surfaces. Locate and size cutouts so they fit closely around penetrations in mirrors.
C. Mirror Edge Treatment: Flat polished edge.  
   1. Seal edges of mirrors after edge treatment to prevent chemical or atmospheric penetration of glass coating.
2. Require mirror manufacturer to perform edge treatment and sealing in factory immediately after cutting to final sizes.

D. Film-Backed Safety Mirrors: Apply film backing with pressure-sensitive adhesive coating over mirror backing paint as recommended in writing by film-backing manufacturer to produce a surface free of bubbles, blisters, and other imperfections. Use adhesives and film backing compatible with mirror backing paint as certified by mirror manufacturer.
   1. Provide film compatible with mounting mastic or a perforation pattern in (non-compatible) film backing to permit mastic application to mirror backing paint. Provide either installation method acceptable to manufacturer of mounting mastic.

PART 3 - EXECUTION

3.1 EXAMINATION
   A. Examine substrates, over which mirrors are to be mounted, with Installer present, for compliance with installation tolerances, substrate preparation, and other conditions affecting performance.
      1. Verify compatibility with and suitability of substrates, including compatibility of mirror mastic with existing finishes or primers.
      2. Proceed with mirror installation only after unsatisfactory conditions have been corrected and surfaces are dry.

3.2 PREPARATION
   A. Comply with mastic manufacturer’s written installation instructions for preparation of substrates, including coating surfaces with mastic manufacturer’s special bond coating where applicable.

3.3 INSTALLATION
   A. General: Install mirrors to comply with mirror manufacturer’s written instructions and with referenced GANA publications. Mount mirrors accurately in place in a manner that avoids distorting reflected images.
   B. Provide a minimum air space of 1/8 inch between back of mirrors and mounting surface for air circulation between back of mirrors and face of mounting surface.
   C. For wall-mounted mirrors, install mirrors with mastic and mirror hardware.
      1. Attach mirror hardware securely to mounting surfaces with mechanical fasteners installed with anchors or inserts as applicable. Install fasteners so heads do not impose point loads on backs of mirrors.
      2. For mirror hardware in the form of continuous J-channels at bottom, provide setting blocks 1/8 inch thick by 4 inches long at quarter points. To prevent trapping water, provide, between setting blocks, 2 slotted weeps not less than 1/4 inch wide by 3/8 inch long.
      3. For mirror hardware in the form of a continuous J-channel at bottom and continuous top trim at top, fasten J-channel directly to wall and attach top trim to continuous cleat fastened directly to wall.
      4. Where indicated, install mirror hardware in the form of J-channels that are fabricated in single lengths to fit and cover top and bottom edges of mirrors.
      5. Install mastic as follows:
         a. Apply barrier coat to mirror backing where approved in writing by manufacturers of mirrors and backing material.
         b. Apply mastic to comply with mastic manufacturer’s written instructions for coverage and to allow air circulation between back of mirrors and face of
mounting surface.

3.4 CLEANING AND PROTECTION

A. Protect mirrors from breakage and contaminating substances resulting from construction operations.

B. Do not permit edges of mirrors to be exposed to standing water.

C. Maintain environmental conditions that will prevent mirrors from being exposed to moisture from condensation or other sources for continuous periods of time.

END OF SECTION 088300
SECTION 089000 - LOUVERS AND VENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 DEFINITIONS
A. Louver Terminology: Definitions of terms for metal louvers contained in AMCA 501 apply to this Section unless otherwise defined in this Section or in referenced standards.
B. Horizontal Louver: Louver with horizontal blades; i.e., the axes of the blades are horizontal.
C. Drainable-Blade Louver: Louver with blades having gutters that collect water and drain it to channels in jambs and mullions, which carry it to bottom of unit and away from opening.

1.3 PERFORMANCE REQUIREMENTS
A. Structural Performance: Louvers shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated without permanent deformation of louver components, noise or metal fatigue caused by louver blade rattle or flutter, or permanent damage to fasteners and anchors. Wind pressures shall be considered to act normal to the face of the building.
   1. Wind Loads: Determine loads based on pressures as indicated on Drawings.
B. Seismic Performance: Louvers, including attachments to other construction, shall withstand the effects of earthquake motions determined according to SEI/ASCE 7.
   1. Design earthquake spectral response acceleration, short period (Sds) for Project is indicated on Structural Drawings.
   2. Component Importance Factor is indicated on Structural Drawings.
C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes, without buckling, opening of joints, overstressing of components, failure of connections, or other detrimental effects.
   1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
D. Louver Performance Ratings: Provide louvers complying with requirements specified, as demonstrated by testing manufacturer’s stock units identical to those provided, except for length and width according to AMCA 500-L.

1.4 ACTION SUBMITTALS
A. Product Data: For each type of product indicated.
   1. For louvers specified to bear AMCA seal, include printed catalog pages showing specified models with appropriate AMCA Certified Ratings Seals.
B. Shop Drawings: For louvers and accessories. Include plans, elevations, sections, details, and attachments to other work. Show frame profiles and blade profiles, angles, and spacing.
   1. Show weep paths, gaskets, flashing, sealant, and other means of preventing water intrusion.
   2. Show mullion profiles and locations.
C. Samples: For each type of metal finish required.

1.5 QUALITY ASSURANCE
A. Source Limitations: Obtain louvers and vents from single source from a single manufacturer where indicated to be of same type, design, or factory-applied color finish.
B. Welding: Qualify procedures and personnel according to the following:

1.6 PROJECT CONDITIONS
A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 MATERIALS
A. Aluminum Extrusions: ASTM B 221, Alloy 6063-T5, T-52, or T6.
B. Aluminum Sheet: ASTM B 209, Alloy 3003 or 5005 with temper as required for forming, or as otherwise recommended by metal producer for required finish.
C. Fasteners: Use types and sizes to suit unit installation conditions.
   1. Use tamper-resistant screws for exposed fasteners unless otherwise indicated.
   2. For fastening aluminum, use aluminum or 300 series stainless-steel fasteners.
   3. For color-finished louvers, use fasteners with heads that match color of louvers.
D. Postinstalled Fasteners for Concrete and Masonry: Torque-controlled expansion anchors, made from stainless-steel components, with capability to sustain, without failure, a load equal to 4 times the loads imposed, for concrete, or 6 times the load imposed, for masonry, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.
E. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

2.2 FABRICATION, GENERAL
A. Assemble louvers in factory to minimize field splicing and assembly. Disassemble units as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.
B. Maintain equal louver blade spacing to produce uniform appearance.
C. Fabricate frames, including integral sills, to fit in openings of sizes indicated, with allowances made for fabrication and installation tolerances, adjoining material tolerances, and perimeter sealant joints.
   1. Frame Type: Channel unless otherwise indicated.
D. Include supports, anchorages, and accessories required for complete assembly.
E. Provide subsills made of same material as louvers or extended sills for recessed louvers.
F. Join frame members to each other and to fixed louver blades with fillet welds concealed from view unless otherwise indicated or size of louver assembly makes bolted connections between frame members necessary.

2.3 FIXED, EXTRUDED-ALUMINUM LOUVERS
A. Horizontal Drainable-Blade Louver:
   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. Airolite Company, LLC (The).
      b. All-Lite Architectural Products.
      c. Construction Specialties, Inc.
      d. Greenheck Fan Corporation.
2.4 LOUVER SCREENS
   A. General: Provide screen at each exterior louver.
      1. Screen Location for Fixed Louvers: Interior face.
      2. Screening Type: Bird screening except where insect screening is indicated.
   B. Louver Screen Frames: Fabricate with mitered corners to louver sizes indicated.
      1. Metal: Same kind and form of metal as indicated for louver to which screens are attached. Reinforce extruded-aluminum screen frames at corners with clips.
      2. Finish: Mill finish unless otherwise indicated.
      3. Frame Type for Insect Screen: Rewirable frames with a driven spline or insert.
      4. Frame Type for Bird Screen: Non-rewirable, U-shaped frames.
   D. Louver Screening for Aluminum Louvers:
      1. Bird Screening: Aluminum, 1/2-inch-square mesh, 0.063-inch wire.

2.5 BLANK-OFF PANELS
   A. Insulated, Blank-Off Panels: Laminated panels consisting of insulating core surfaced on back and front with metal sheets and attached to back of louver.
      1. Thickness: 2 inches.
      2. Metal Facing Sheets: Aluminum sheet, not less than 0.032-inch nominal thickness.
      3. Insulating Core: Rigid, glass-fiber-board insulation or extruded-polystyrene foam.
      4. Edge Treatment: Trim perimeter edges of blank-off panels with louver manufacturer’s standard extruded-aluminum-channel frames, not less than 0.080-inch nominal thickness, with corners mitered and with same finish as panels.
      5. Seal perimeter joints between panel faces and louver frames with 1/8-inch by 1-inch PVC compression gasket.
      7. Attach blank-off panels with sheet metal screws or alternate method acceptable to Architect and Engineer.

2.6 FINISHES, GENERAL
   A. Comply with NAAMM’s “Metal Finishes Manual for Architectural and Metal Products” for recommendations for applying and designating finishes.

2.7 ALUMINUM FINISHES
   A. Finish louvers after assembly.
B. 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 by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION
   A. Examine substrates and openings, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.
   B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION
   A. Coordinate setting drawings, diagrams, templates, instructions, and directions for installation of anchorages that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to Project site.

3.3 INSTALLATION
   A. Locate and place louvers and vents level, plumb, and at indicated alignment with adjacent work.
   B. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weathertight connection.
   C. Form closely fitted joints with exposed connections accurately located and secured.
   D. Provide perimeter reveals and openings of uniform width for sealants and joint fillers, as indicated.
   E. Repair finishes damaged by cutting, welding, soldering, and grinding. Restore finishes so no evidence remains of corrective work. Return items that cannot be refinished in the field to the factory, make required alterations, and refinish entire unit or provide new units.
   F. Protect unpainted galvanized and nonferrous-metal surfaces that will be in contact with concrete, masonry, or dissimilar metals from corrosion and galvanic action by applying a heavy coating of bituminous paint or by separating surfaces with waterproof gaskets or nonmetallic flashing.
   G. Install concealed gaskets, flashings, joint fillers, and insulation as louver installation progresses. Comply with Division 07 Section “Joint Sealants” for sealants applied during louver installation. Comply with applicable portions of Division 07 Section “Flashings, Sheet Metal and Roofing Accessories” for flashings.

3.4 ADJUSTING AND CLEANING
   A. Test operation of operable louvers and adjust as needed to produce fully functioning units that comply with requirements.
   B. Clean exposed surfaces of louvers and vents that are not protected by temporary covering, to remove fingerprints and soil during construction period. Do not let soil accumulate during construction period.
   C. Before final inspection, clean exposed surfaces with water and a mild soap or detergent not harmful to finishes. Thoroughly rinse surfaces and dry.
   D. Restore louvers and vents damaged during installation and construction so no evidence remains of corrective work. If results of restoration are unsuccessful, as determined by
Architect, remove damaged units and replace with new units.

1. Touch up minor abrasions in finishes with air-dried coating that matches color and gloss of, and is compatible with, factory-applied finish coating.

END OF SECTION 089000
SECTION 092216 - COLD FORMED STEEL FRAMING - NON-STRUCTURAL (CFSF-NS)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 RELATED REQUIREMENTS
   A. Refer to Division 05 Section "Cold-Formed Steel Framing - Structural" for exterior and interior load-bearing and exterior non-load-bearing wall studs; floor joists; roof rafters and ceiling joists; ceiling/overhead stud framing, and roof trusses.

1.3 ACTION SUBMITTALS
   A. Product Data: For each type of product.

1.4 INFORMATIONAL SUBMITTALS
   A. Evaluation Reports: For firestop tracks, from ICC-ES.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS
   A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated, according to ASTM E 119 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 E 90 and classified according to ASTM E 413 by an independent testing agency.

2.2 FRAMING SYSTEMS
   A. Framing Members, General: Comply with ASTM C 754 for conditions indicated.
      1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal unless otherwise indicated.
      2. Protective Coating: Coating with equivalent corrosion resistance of ASTM A 653, G40, hot-dip galvanized unless otherwise indicated.

   B. Studs and Runners: ASTM C 645.
      1. Steel Studs and Runners:
         a. Minimum Base-Metal Thickness: Minimum 0.0181 inch unless indicated otherwise and as required by ASTM C 754 to meet L/240 deflection limit at a lateral pressure of 5psf. Provide 0.0296 inch for high-density board applications, such as ASTM C 1178 tile backing panels and ASTM C 1629 Abuse-Resistant Gypsum Board, and at door frames. Provide minimum 0.0296 inch for walls receiving heavy wall-hung items or loads, including but not limited to wall cabinets, wall-hung countertops, TV brackets, liquid tanks, folding and fixed seats, grab bars, handrails, exercise equipment, and shelving greater than 9 inches deep and over 3 feet in length.
         b. Depth: 3 5/8 inch unless indicated otherwise.

   C. Slip-Type Head Joints: Where indicated, provide one of the following:
      1. Single Long-Leg Runner System: ASTM C 645 top runner with 2-inch-deep flanges in thickness not less than indicated for studs, 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. Deflection Track: 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. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
      1) ClarkDietrich Building Systems; MaxTrack Slotted Deflection Track.
      2) MarinoWARE; Slotted Track.
      3) Steel Network Inc. (The); VertiClip SLD or VertiTrack VTD Series.
      4) Superior Metal Trim; Superior Flex Track System (SFT).

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. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
      a. ClarkDietrich Building Systems; Blazeframe Fire Stop Deflection Track.
      b. Fire Trak Corp.; Fire Trak System attached to studs with Fire Trak Posi Klip.
      c. MarinoWARE; FAS Track 1000 Series.
      d. Metal-Lite, Inc.; The System.
      e. Steel Network Inc. (The); VertiClip SLD or VertiTrack VTD Series.

E. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.

   1. Minimum Base-Metal Thickness: 0.0296 inch.

F. Cold-Rolled Channel Bridging: Steel, 0.053-inch minimum base-metal thickness, with minimum 1/2-inch-wide flanges.

   1. Depth: 1-1/2 inches, unless indicated otherwise.
   2. Clip Angle: Not less than 1-1/2 by 1-1/2 inches, 0.068-inch-thick, galvanized steel.


   1. Minimum Base-Metal Thickness: 0.018 inch, unless indicated otherwise.
      a. Minimum Base-Steel Thickness at Impact-Resistant Gypsum Board: 0.0296 inch, unless indicated otherwise.
   2. Depth: 7/8 inch, unless indicated otherwise.

H. Resilient Furring Channels: 1/2-inch-deep, steel sheet members designed to reduce sound transmission.

   1. Configuration: Asymmetrical for wall applications.

I. Cold-Rolled Furring Channels: 0.053-inch uncoated-steel thickness, with minimum 1/2-inch-wide flanges.

   1. Depth: 3/4 inch, unless indicated otherwise.
   2. Furring Brackets: Adjustable, corrugated-edge type of steel sheet with minimum uncoated-steel thickness of 0.033 inch.
   3. Tie Wire: ASTM A 641, Class 1 zinc coating, soft temper, 0.062-inch-diameter wire, or double strand of 0.048-inch-diameter wire.

J. Corner Angle: Angle with both face flanges of 2-1/2 inches, minimum bare metal thickness of 0.0179 inch.
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CARTHAGE, NORTH CAROLINA
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2.3 SUSPENSION SYSTEMS
A. Tie Wire: ASTM A 641, Class 1 zinc coating, soft temper, 0.062-inch-diameter wire, or double strand of 0.048-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, expansion anchor.
C. Wire Hangers: ASTM A 641, Class 1 zinc coating, soft temper, 0.16 inch in diameter.
D. Carrying Channels: Cold-rolled, commercial-steel sheet with a base-metal thickness of 0.053 inch and minimum 1/2-inch-wide flanges.
   1. Depth: 2-1/2 inches.
E. Furring Channels (Furring Members):
   1. Cold-Rolled Channels: 0.053-inch uncoated-steel thickness, with minimum 1/2-inch-wide flanges, 3/4 inch deep.
   2. Steel Studs and Runners: ASTM C 645.
      a. Minimum Base-Metal Thickness: 0.018 inch, unless indicated otherwise.
      b. Depth: As indicated on Drawings.
      a. Minimum Base-Metal Thickness: 0.018 inch, unless indicated otherwise.
F. Grid Suspension System for Gypsum Board Ceilings: ASTM C 645, direct-hung system composed of main beams and cross-furring members that interlock.
   1. Grid suspension system manufacturer’s accessory components for inside and outside corner joinery of main grid members for construction of suspended boxed soffits and bulkheads is acceptable in lieu of separate fixed stud-framed soffit and bulkhead construction.
   2. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
      a. Armstrong; Quikstix Drywall Grid System.
      b. CertainTeed; Drywall Suspension System.
      c. Rockfon; Chicago Metallic Drywall Grid System.
      d. USG; Drywall Suspension System.

2.4 AUXILIARY MATERIALS
A. General: Provide auxiliary materials that comply with referenced installation standards.
   1. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.
B. Isolation Strip at Exterior Walls: Provide one of the following:
   1. Asphalt-Saturated Organic Felt: ASTM D 226, Type I (No. 15 asphalt felt), nonperforated.
   2. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch thick, in width to suit steel stud size.
PART 3 - EXECUTION

3.1 EXAMINATION
   A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.
   B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 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.
   B. Coordination with Sprayed Fire-Resistive Materials:
      1. Before sprayed fire-resistive materials are applied, attach offset anchor plates or ceiling runners (tracks) to surfaces indicated to receive sprayed fire-resistive materials. Where offset anchor plates are required, provide continuous plates fastened to building structure not more than 24 inches o.c.
      2. After sprayed fire-resistive materials are applied, remove them only to extent necessary for installation of non-load-bearing steel framing. Do not reduce thickness of fire-resistive materials below that required for fire-resistance ratings indicated. Protect adjacent fire-resistive materials from damage.

3.3 INSTALLATION, GENERAL
   A. Installation Standard: ASTM C 754. Provide framing to meet L/240 deflection limit at a lateral pressure of 5 psf unless indicated otherwise.
      1. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.
   B. Install framing and accessories plumb, square, and true to line, with connections securely fastened.
   C. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction. Provide for such indicated construction whether in contract or not. Coordinate for such construction provided by others.
   D. Install bracing at terminations in assemblies.
   E. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.4 INSTALLING FRAMED ASSEMBLIES
   A. Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.
      1. Single-Layer Application: 16 inches o.c. unless otherwise indicated. Provide closer spacing if required by ASTM C 754 to meet L/240 deflection limit at a lateral pressure of 5psf.
      2. Multilayer Application: 16 inches o.c. unless otherwise indicated.
      3. Tile Backing Panels: 16 inches o.c. unless otherwise indicated.
B. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.

C. Install studs so flanges within framing system point in same direction. Screw attach each stud flange to the runner track.

D. Install tracks (runners) at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings except where indicated otherwise. Continue framing around ducts penetrating partitions above ceiling. Provide bracing of top track at non-full-height framing as indicated.

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.

2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.
   a. Install two studs at each jamb unless otherwise indicated.
   b. 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.
   c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.

3. 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.

4. 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.
   a. Firestop Track: Install to maintain continuity of fire-resistance-rated assembly indicated.

5. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.

6. Curved Partitions:
   a. Bend track to uniform curve and locate straight lengths so they are tangent to arcs.
   b. Begin and end each arc with a stud, and space intermediate studs equally along arcs. On straight lengths of no fewer than two studs at ends of arcs, place studs 6 inches o.c.

E. 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.
   2. Shim direct furring to produce a uniform surface.

F. Stand-Off Framing:
   1. Where metal framing is indicated directly beside a primary wall and to receive finish board on only one side, provide bracing to the primary wall at no less than 48 inches o.c. between floor and ceiling. Attach bracing to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.

G. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.
3.5 INSTALLING SUSPENSION SYSTEMS

A. Install suspension system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.
   1. Hangers: 48 inches o.c.
   2. Carrying Channels (Main Runners): 48 inches o.c.
   3. Furring Channels (Furring Members): 16 inches o.c.

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. 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.
   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. Do not attach hangers to steel roof deck.
   5. Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
   6. Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.
   7. Do not connect or suspend steel framing from ducts, pipes, or conduit.

D. Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.

E. Seismic Bracing: Sway-brace suspension systems with hangers used for support.

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.

END OF SECTION 092216
SECTION 092900 - GYPSUM BOARD

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 ACTION SUBMITTALS
   A. Product Data: For each type of product.
   B. Samples: For the following products:
      1. Trim Accessories: Full-size Sample in 12-inch- (300-mm-) long length for each trim accessory indicated.

1.3 DELIVERY, STORAGE AND HANDLING
   A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.4 FIELD 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 paper-faced gypsum panels 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

2.1 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 E 119 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 E 90 and classified according to ASTM E 413 by an independent testing agency.

2.2 GYPSUM BOARD, GENERAL
   A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.
   B. Source Limitations: Obtain gypsum board products through one source from a single manufacturer.

2.3 INTERIOR GYPSUM BOARD
   A. Gypsum Wallboard: ASTM C 1396.
      1. Thickness: 5/8 inch unless indicated otherwise.
2. Long Edges: Tapered.

B. Gypsum Board, Type X: ASTM C 1396.
   1. Thickness: 5/8 inch.
   2. Long Edges: Tapered.

C. Gypsum Ceiling Board: ASTM C 1396.
   1. Thickness: 1/2 inch (12.7 mm).
   2. Long Edges: Tapered.

D. Foil-Backed Gypsum Board: ASTM C 1396/C 1396M.
   1. Core: 1/2 inch (12.7 mm), regular type.
   2. Long Edges: Tapered.

E. Impact-Resistant Gypsum Board: Tested per ASTM C 1629/C 1629M.
   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. American Gypsum; “M-Bloc IR Type X Impact-Resistant.”
      b. CertainTeed Corp.; “Extreme Impact Type X with M2Tech.”
      c. Continental Building Products; “Protecta HIR 300.”
      e. National Gypsum Company; “Hi-Impact Brand XP Wallboard.”
      f. USG Corporation; “Sheetrock Glass-Mat Mold Tough VHI.”
   2. Core: 5/8 inch, Type X.
   4. Surface Abrasion Resistance: No greater than 0.010-inch (0.3 mm) depth when tested
      at 50 cycles per ASTM D 4977 (Level 3).
   5. Indentation-Resistance: ASTM D 5420, 0.150 inch (3.8 mm) maximum (Level 1).
   6. Soft Body Impact Resistance: Not less than 300 ft.-lbs. (408 Joules) when tested per
      ASTM E 695 (Level 3).
   7. Hard Body Impact Resistance: Not less than 100 ft.-lbs. (136 Joules) when tested per
      ASTM C 1629 A1 (Level 2).

2.4 EXTERIOR GYPSUM BOARD FOR CEILINGS AND SOFFITS

A. Glass-Mat Gypsum Sheathing Board: ASTM C 1177, with fiberglass mat laminated to both
   sides and with manufacturer’s standard edges.
   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. CertainTeed Corp.; “GlasRoc Sheathing.”
      b. Georgia-Pacific Gypsum LLC; “Dens-Glass Gold.”
      c. National Gypsum Company; “Gold Bond, eXP.”
      d. USG Corporation; “Securock Glass Mat Sheathing.”
   2. Core: 5/8 inch (15.9 mm), Type X unless indicated otherwise.

2.5 TILE BACKING PANELS

A. Cementitious Backer Units: ANSI A118.9 and ASTM C 1288 or 1325, with manufacturer’s
   standard edges.
   1. Products: Subject to compliance with requirements, available products that may be
      incorporated into the Work include, but are not limited to, the following:
      b. James Hardie Building Products, Inc.; Hardiebacker.
e. National Gypsum Company; PermaBase Cement Board.
d. Plycem USA LLC; Allura Fiber Cement Backerboard.
e. USG Corporation; Durock Cement Board.

2. Thickness: Nominal 5/8 inch (15.9 mm), unless indicated otherwise.

2.6 FIBERGLASS BALLISTIC ARMOR
A. Panel Size: Provide in maximum lengths and widths available that will minimize joints in each area and correspond with support system indicated.
B. Fiberglass Ballistic Armor: Provide lightweight ballistic armor produced to afford protection for .44 Magnum bullet with 240 grain lead, and muzzle velocity of 1470 feet per second tested in accordance with UL 752 ballistic testing for Level 3. Product shall be fiberglass-reinforced composite structural flat sheet material of nominal 1/2-inch thickness equal to “Armortex O.F.300”.
1. Available Manufacturers: Subject to compliance with requirements, manufacturers of products that may be incorporated into the Work include, but are not limited to, the following:
   a. Armortex, Div. of Safeguard Security Systems, Inc. (“OF 300” design standard)
   c. C. R. Laurence of North America.
   d. Insulgard Corporation.
   e. National Bullet Proof, Inc.

2.7 TRIM ACCESSORIES
A. Interior Trim: ASTM C 1047.
2. Shapes:
   a. Cornerbead.
   b. LC-Bead: J-shaped; exposed long flange receives joint compound.
   c. L-Bead: L-shaped; exposed long flange receives joint compound.
   d. U-Bead: J-shaped; exposed short flange does not receive joint compound.
   e. Expansion (control) joint.
   f. Curved-Edge Cornerbead: With notched or flexible flanges.
1. Material: Hot-dip galvanized steel sheet, plastic, or rolled zinc.
2. Shapes:
   a. Cornerbead.
   b. LC-Bead: J-shaped; exposed long flange receives joint compound.
   c. Expansion (Control) Joint: One-piece, rolled zinc with V-shaped slot and removable strip covering slot opening.
C. Aluminum Trim: Extruded accessories of profiles and dimensions indicated.
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. Flannery, Inc.
   b. Fry Reglet Corp.
2.9 **AUXILIARY MATERIALS**

A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer’s written recommendations.

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c. Gordon, Inc.
d. Pittcon Industries.
e. Stockton Products

2. Aluminum: Alloy and temper with not less than the strength and durability properties of ASTM B 221, Alloy 6063-T5.

3. Finish: Corrosion-resistant primer compatible with joint compound and finish materials specified.

4. Factory mask prefinished vents to protect finish.

D. Acoustic Partition Closure for Storefront or Curtain Wall: Assembly of mullion trim cap and receiver for finished closure between aluminum storefront or curtain wall system glass and partition assembly. Closure shall allow for movements of framing and glass it attaches to, and shall not allow direct metal to glass contact. Design is based on “Mull-it-Over” by Mull-it-Over Products. Subject to compliance with requirements, provide “Mull-it-Over” or similar-appearing closure system with acoustic seals between glass and partition, and concealed fasteners.

1. Noise Transmission: Tested minimum STC rating of 55 for 2-sided applications and 50 for single sided applications.


4. Thickness: Closure plate not less than 0.125-inch thick.

5. Finish: Match adjacent storefront or curtain wall.

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2.8 **JOINT TREATMENT MATERIALS**

A. General: Comply with ASTM C 475/C 475M.

B. Joint Tape:

1. Interior Gypsum Board: Paper.

2. Tile Backing Panels: As recommended by panel manufacturer.

C. Joint Compound for Interior Gypsum Board: 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, all-purpose compound.

4. Finish Coat: For third coat, use drying-type, all-purpose compound.

5. Skim Coat: For final coat of Level 5 finish, use drying-type, all-purpose compound 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.

D. Joint Compound for Exterior Applications:

1. Glass-Mat Gypsum Sheathing Board: As recommended by sheathing board manufacturer.

E. Joint Compound for Tile Backing Panels:

1. Cementitious Backer Units: As recommended by backer unit manufacturer.
B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.

C. 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. (CFSF-S specified in Division 05 Section “Cold-Formed Metal Framing - Structural.”)
   2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.

D. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.
   1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.

E. 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. Accumetric LLC; BOSS 824 Acoustical Sound Sealant.
      b. BASF; MasterSeal NP 520.
      c. GE Construction Sealants; RCS20 Acoustical.
      d. Grabber Construction Products; Acoustical Sealant GSC.
      e. Hilti; CP506 Smoke and Acoustical Sealant.
      f. Pecora Corporation; AC-20 FTR or AIS-919.
      g. Specified Technologies, Inc.; Smoke N Sound Acoustical Sealant.
      h. USG Corporation; “SHEETROCK Acoustical Sealant.”
   2. Acoustical joint sealant 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.”

F. Putty Pads:
   1. Release Lined Pads: Non-hardening endothermic material in pad form, faced on both sides with poly liner, designed to seal around penetrations and wiring devices, enhancing acoustic performance.
   2. Nominal size: 7-1/4 x 7-1/4 x 3/16 inches (184 x 184 x 4.8 mm).
   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. STI Firestop; SpecSeal Putty Pad.
      b. Hilti; Firestop Putty Pad CFS-P PA.
      c. 3M; Fire Barrier Moldable Putty Pads MPP+.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates including welded hollow-metal frames and framing, with Installer present, 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. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLYING AND FINISHING PANELS, GENERAL

A. Comply with ASTM C 840.

B. 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.

C. 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.

D. 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.

E. Install gypsum board with open horizontal joint (gap) not to exceed 1/2-inch above finished floor slab and tape & finish vertical joints to bottom edge of board to afford a smooth substrate for applied wall base.

F. Form control and expansion joints with space between edges of adjoining gypsum panels.

G. 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.

H. 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.

I. Isolate perimeter of gypsum board ceilings and soffits at surrounding non-gypsum board construction. Provide 1/4- to 1/2-inch- (6.4- to 12.7-mm-) wide spaces at these locations, and trim edges with LC-bead edge trim where edges of gypsum panels are exposed and U-bead edge trim where concealed. Seal joints between edges and surrounding non-gypsum wall surfaces with acoustical sealant.

J. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

K. STC-Rated Assemblies: 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 for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.

L. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.
M. Install putty pads on the backside of items penetrating gypsum board on STC-rated walls/partitions. Items include, but are not limited to, wiring devices, cable, conduit, and pipe. Completely cover and seal around each penetration.

3.3 APPLYING INTERIOR GYPSUM BOARD

A. Install interior gypsum board in the following locations:
   1. Wallboard Type: Vertical surfaces unless otherwise indicated.
   2. Type X: Where required for fire-resistance-rated assembly.
   3. Ceiling Type: Ceiling surfaces.
   4. Impact-Resistant Type: As indicated on Drawings.

B. Multilayer Application:
   1. On ceilings, apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to framing members and offset face-layer joints one framing member, 16 inches (400 mm) minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.
   2. 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.
   3. Fastening Methods: Fasten base layers with screws; fasten face layers with adhesive and supplementary fasteners, unless otherwise indicated or required for fire-resistance-rated assembly.

C. 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.

3.4 APPLYING EXTERIOR GYPSUM PANELS FOR CEILINGS AND SOFFITS

A. Apply panels perpendicular to supports, with end joints staggered and located over supports.
   1. Install with 1/4-inch open space where panels abut other construction or structural penetrations.
   2. Fasten with corrosion-resistant screws.

3.5 APPLYING TILE BACKING PANELS

A. Cementitious Backer Units: ANSI A108.11, at locations indicated to receive tile.

B. Where tile backing panels abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.

3.6 APPLYING FIBERGLASS BALLISTIC ARMOR PANELS

A. Fiberglass Ballistic Armor: Comply with manufacturer’s written installation instructions and install at locations indicated. Install 4-inch width batten over studs and apply armor panel with 2-inch lap over battens and panel joints to maintain continuity of armor.

3.7 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. Control Joints: Install control joints [<>] according to ASTM C 840 and in specific locations approved by Architect for visual effect, and where indicated in drawings.

C. Interior Trim: Install in the following locations:
   1. Cornerbead: Use at outside corners unless otherwise indicated.
   2. LC-Bead: Use at exposed panel edges.
   3. L-Bead: Use where indicated.
   4. U-Bead: Use where indicated.

D. Exterior Trim: Install in the following locations:
   1. Cornerbead: Use at outside corners.
   2. LC-Bead: Use at exposed panel edges.

E. Aluminum Trim: Install in locations indicated on Drawings.

3.8 FINISHING GYPSUM BOARD

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 for trim products specifically indicated as not intended to receive tape.

D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:
   1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
   2. Level 2: Panels that are substrate for tile.
   3. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated.
      a. Primer and its application to surfaces are specified in other Division 09 Sections.
   4. Level 5: Provide for curved surfaces and where indicated on Drawings.
      a. Walls perpendicular to exterior glazing within 20 feet of glazing.
      b. Walls scheduled to receive deep tone accent paint.
      c. Walls indicated to receive “marker board” coating.
      d. Walls indicated to receive wallcoverings.
      e. Primer and its application to surfaces are specified in other Division 09 Sections.

E. Glass-Mat Gypsum Sheathing Board: Finish according to manufacturer’s written instructions for use as exposed soffit board.

F. Cementitious Backer Units: Finish according to manufacturer’s written instructions.

3.9 FIELD QUALITY CONTROL

A. Above-Ceiling Observation: Before Contractor installs gypsum board ceilings, Architect will conduct an above-ceiling observation and report deficiencies in the Work observed. Do not proceed with installation of gypsum board to ceiling support framing until deficiencies have been corrected.
   1. Notify Architect seven days in advance of date and time when Project, or part of Project, will be ready for above-ceiling observation.
   2. Before notifying Architect, complete the following in areas to receive gypsum board ceilings:
      a. Installation of 80 percent of lighting fixtures, powered for operation.
b. Installation, insulation, and leak and pressure testing of water piping systems.
c. Installation of air-duct systems.
d. Installation of air devices.
e. Installation of mechanical system control-air tubing.
f. Installation of ceiling support framing.

3.10 PROTECTION

A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.

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 092900
SECTION 093000 - TILING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Provisions of the Contract and of the Contract Documents apply to this Section.

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 A108.9,
      ANSI A108.10, ANSI A108.11, ANSI A108.13, ANSI A108.14, ANSI A108.15,
      ANSI A108.16, and ANSI A108.17, which are contained in its "Specifications for
      Installation of Ceramic Tile."
   C. Module Size: Actual tile size plus joint width indicated.
   D. Face Size: Actual tile size, excluding spacer lugs.

1.3 PREINSTALLATION MEETINGS
   A. Preinstallation Conference: Conduct conference at Project site.
      1. Review requirements in ANSI A108.01 for substrates and for preparation by other
         trades.
      2. Review locations and requirements for installation of crack isolation membrane.
      3. Review alteration work conditions. Review recommended specialty bedding and
         grouting materials recommended by grout manufacturer’s technical representative for
         retrofit applications at existing conditions.

1.4 ACTION SUBMITTALS
   A. Product Data: For each type of product.
   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. Include waterproofing details at floor drains, cove base, and
      thresholds.
   C. Samples for Verification:
      1. Full-size units of each type and composition of tile and for each color and finish
         required. For ceramic mosaic tile in color blend patterns, provide full sheets of each
         color blend.
      2. Assembled samples mounted on a rigid panel, with grouted joints, for each type and
         composition of tile and for each color and finish required. Make samples at least 12
         inches square, but not fewer than four tiles. Use grout of type and in color or colors
         approved for completed Work.
      3. Full-size units of each type of trim and accessory for each color and finish required.
      4. Metal edge strips in 6-inch lengths.

1.5 INFORMATIONAL SUBMITTALS
   A. Qualification Data: For Installer.
   B. Master Grade Certificates: For each shipment, type, and composition of tile, signed by tile
      manufacturer and Installer.
   C. Product Certificates: For each type of product.
D. Product Test Reports: For tile-setting and -grouting products and certified porcelain tile.

1.6 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 3 percent of amount installed for each type, composition, color, pattern, and size indicated.
   2. Grout: Furnish quantity of grout equal to 3 percent of amount installed for each type, composition, and color indicated.

1.7 QUALITY ASSURANCE
A. Installer Qualifications:
   1. An experienced installer who has completed work similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
B. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
   1. Build mockup of each type of floor tile installation not less than 5 feet square in location approved by Architect.
   2. Build mockup of each type of wall tile installation not less than 5 feet square in location approved by Architect.
   3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 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.

1.9 FIELD 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 MANUFACTURERS
A. Source Limitations for Tile: Obtain tile of each type and color or finish tile of each type from single 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 single manufacturer and each
aggregate from single source or producer.
1. Obtain setting and grouting materials, except for unmodified Portland cement and aggregate, from single manufacturer.
2. Obtain waterproof membrane and crack isolation membrane, except for sheet products, from manufacturer of setting and grouting materials.

C. Source Limitations for Other Products: Obtain each of the following products specified in this Section from a single manufacturer:
1. Stone thresholds.
2. Waterproof membrane.
3. Crack isolation membrane.
4. Cementitious backer units.
5. Metal edge strips.
6. Metal nosing.

2.2 PRODUCTS, GENERAL
A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.
1. Provide tile complying with Standard grade requirements.
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. 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.
D. 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 showers, 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.

2.3 TILE PRODUCTS
A. Ceramic Tile Type P-TILE-A1, P-TILE-A2: Unglazed porcelain tile.
1. Basis-of-Design Product: Subject to compliance with requirements, provide Ceramic Techniques; "Cooperative Concrete" or one of the following:
   a. Crossville, Inc.; Color Blox
   b. Daltile; Haut Monde
2. Certification: Tile certified by the Porcelain Tile Certification Agency.
3. Face Size: 12 by 24 inches.
4. Face Size Variation: Rectified.
5. Thickness: 1/4 inch (6.4 mm).
6. Face: Plain with square edges.
7. Dynamic Coefficient of Friction: Not less than 0.42.
8. Tile Color, Glaze, and Pattern: As selected by Architect from manufacturer’s full range.
9. Grout Color: As selected by Architect from manufacturer’s full range.
10. Trim Units: Metal transition strips as required for adjoining materials
    a. Inside cove: Metal cove transition strip from floor to wall and at inside corners.
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b. Tile cap: Flat metal transition cap for all exposed tile edges on top of tile.
c. Edge trim: Flat metal transition for all exposed tile edges on wall surfaces.
d. Outside corner trim: Rounded metal transition strip for all outside wall corners.
e. Finishing trim: metal trim with minimal reveal for use between two tile surfaces.
f. Accessible trim: Angled metal transition strip between tile and thinner flooring materials

B. Ceramic Tile Type P-TILE-B: Factory-mounted unglazed ceramic mosaic tile.
1. Basis-of-Design Product: Subject to compliance with requirements, provide Ceramic
   Technics; Cooperative Concrete or comparable product by one of the following:
   a. Crossville Tile; "Color Blox"
   b. DalTile; "Haut Monde"
2. Composition: Porcelain.
3. Certification: Porcelain tile certified by the Porcelain Tile Certification Agency.
4. Module Size: 2 by 2 inches (50.8 by 50.8 mm).
5. Thickness: 10.5 mm.
6. Face: Plain with square edges.
7. Surface: Smooth, without abrasive admixture.
8. Dynamic Coefficient of Friction: Not less than 0.42.
9. Tile Color and Pattern: As selected by Architect from manufacturer’s full range.
10. Grout Color: As selected by Architect from manufacturer’s full range.
11. Trim Units: Metal transition strips as required for adjoining materials
   a. Inside cove: Metal cove transition strip from floor to wall and at inside corners.
   b. Tile cap: Flat metal transition cap for all exposed tile edges on top of tile.
   c. Edge trim: Flat metal transition for all exposed tile edges on wall surfaces.
   d. Outside corner trim: Rounded metal transition strip for all outside wall corners.
   e. Finishing trim: metal trim with minimal reveal for use between two tile surfaces.
   f. Accessible trim: Angled metal transition strip between tile and thinner flooring materials

C. Tile Type GT-A1, GT-A2: Factory-mounted glass mosaic tile.
1. Basis-of-Design Product: Subject to compliance with requirements, provide Ceramic
   Technics; "Glamour Glass Bella Muro" or comparable product by one of the following:
   a. DalTile; "Endeavors"
   b. Emser Tile; "Infinity"
2. Composition: Glass and Stone.
5. Surface: Smooth, without abrasive admixture.
6. Dynamic Coefficient of Friction: Not less than 0.42.
7. Tile Color and Pattern: As selected by Architect from manufacturer’s full range.
8. Grout Color: As selected by Architect from manufacturer’s full range.
9. Trim Units: Metal transition strips as required for adjoining materials
   a. Inside cove: Metal cove transition strip from floor to wall and at inside corners.
   b. Tile cap: Flat metal transition cap for all exposed tile edges on top of tile.
   c. Edge trim: Flat metal transition for all exposed tile edges on wall surfaces.
   d. Outside corner trim: Rounded metal transition strip for all outside wall corners.

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TILING
e. Finishing trim: metal trim with minimal reveal for use between two tile surfaces.

f. Accessible trim: Angled metal transition strip between tile and thinner flooring materials

2.4 WATERPROOF MEMBRANE

A. General: Manufacturer’s standard product, selected from the following, that complies with ANSI A118.10 and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.


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. Boiardi Products; a QEP company; Elastiment 344 Reinforced Waterproofing and Anti-Fracture/Crack Suppression Membrane.
   b. H.B. Fuller Construction Products Inc. / ProSpec; B-6000 Waterproof/Crack Isolation Membrane with Glass Fabric.
   c. Bostik, Inc.; Hydroment Blacktop 90210.
   d. Custom Building Products; 9240 Waterproofing and Anti-Fracture Membrane.
   e. Laticrete International, Inc.; Laticrete 9235 Waterproof Membrane.
   f. MAPEI Corporation; Mapelastic AquaDefense.
   g. Merkrete, a ParexUSA company; Hydro-Guard 2000.
   h. Summitville Tiles, Inc.; S-9000.


2.5 CRACK ISOLATION MEMBRANE

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 reinforcement and accessories recommended by manufacturer.

B. Fabric-Reinforced, Modified-Bituminous Sheet: Self-adhering, modified-bituminous sheet with fabric reinforcement facing; 0.040-inch nominal thickness.

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. Boiardi Products Corporation; a QEP company; Elastiment 344 Sound Control Sheet Membrane Waterproofing and Anti-Fracture/Crack Suppression System.
   b. Custom Building Products; Crack Buster Pro-Crack Prevention Mat Underlayment.
   c. MAPEI Corporation; Mapeguard 2.

2.6 SETTING MATERIALS

A. Modified Dry-Set Mortar (Thinset): ANSI A118.4.

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. H.B. Fuller Construction Products Inc. / TEC; TEC Full Flex TA 390/391.
   b. Laticrete International, Inc.; 252 Silver.
   c. MAPEI Corporation; Adesilex P10 Ultraflex 2 Ultraflex™ 3.
d. Summitville Tiles, Inc; S-1000 MP Thin-Set Latex Mortar.

2. Provide prepackaged, dry-mortar mix containing dry, redispersible, vinyl acetate or acrylic additive to which only water must be added at Project site.

3. Provide prepackaged, dry-mortar mix combined with acrylic resin liquid-latex additive at Project site.

4. For wall applications, provide mortar that complies with requirements for nonsagging mortar in addition to the other requirements in ANSI A118.4.

B. Medium-Bed, Modified Dry-Set Mortar: Comply with requirements in ANSI A118.4. Provide product that is approved by manufacturer for application thickness of 5/8 inch (16 mm) for large format tile applications.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. H.B. Fuller Construction Products Inc. / TEC; TEC Ultimate Large Tile Mortar.
   b. Laticrete International, Inc.; 255 MultiMax.
   c. MAPEI Corporation; Ultraflex LFT.
   d. Summitville Tiles, Inc; S-1200 MP Premium Medium Bed Mortar.

2. Basis-of-Design Product: Subject to compliance with requirements, provide Mapei “Ultraflex LFT” or comparable product by one of the following manufacturers:
   a. H.B. Fuller Construction Products Inc. / TEC.
   b. Laticrete International, Inc.
   c. Summitville Tiles, Inc.

3. Provide prepackaged, dry-mortar mix containing dry, redispersible, vinyl acetate or acrylic additive to which only water must be added at Project site.

4. Provide prepackaged, dry-mortar mix combined with acrylic resin liquid-latex additive at Project site.

2.7 GROUT MATERIALS

A. High-Performance Tile Grout: ANSI A118.7.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Custom Building Products.
   b. H.B. Fuller Construction Products Inc. / TEC.
   c. Laticrete International, Inc.
   d. MAPEI Corporation.
   e. Summitville Tiles, Inc.

2. Basis-of-Design Product: Subject to compliance with requirements, provide Mapei “Ultracolor Plus” or comparable product by one of the following:
   a. Custom Building Products.Prism Ultimate Performance Grout
   b. H.B. Fuller Construction Products Inc. / TEC.AccuColor Plus; SELF-SEALING
   c. Laticrete International, Inc.Permacolor Select; SELF-SEALING

3. Polymer Type: Ethylene vinyl acetate or acrylic additive, in dry, redispersible form, prepackaged with other dry ingredients.

4. Polymer Type: Acrylic resin in liquid-latex form for addition to prepackaged dry-grout mix.

B. Water-Cleanable Epoxy Grout: ANSI A118.3, with a VOC content of 65 g/L or less.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to the following:
2.8 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 Division 07 Section “Joint Sealants.”
   1. Use primers, backer rods, and sealant accessories recommended by sealant manufacturer.

B. Colors: Provide colors of exposed sealants to match colors of grout in tile adjoining sealed joints unless otherwise indicated.

C. One-Part, Mildew-Resistant Silicone Sealant (Walls): ASTM C 920; Type S; Grade NS; Class 25; Uses NT, G, A, and, as applicable to nonporous joint substrates indicated, O; formulated with fungicide, intended for sealing interior ceramic tile joints and other nonporous substrates that are subject to in-service exposures of high humidity and extreme temperatures.
   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. Dow Corning Corporation; Dow Corning 786.
      b. GE Silicones; a division of GE Specialty Materials; SCS1700 Sanitary.
      d. Pecora Corporation; Pecora 898
      e. Tremco Incorporated; Tremsil 200.

D. Multipart, Pourable Urethane Sealant for Use T (Floors): ASTM C 920; Type M; Grade P; Class 25; Uses T, M, A, and, as applicable to joint substrates indicated, O.
   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; MasterSeal SL 2.
      b. Pecora Corporation; NR-200 Urexpan.
      c. Sika Corporation; Sikaflex-2c SL.
      d. Tremco Incorporated; THC-901.

2.9 METAL EDGE STRIPS

A. Metal Flooring Transitions: Heavy duty aluminum edging designed for installation with tile and designed to comply with ADA requirements for accessible path of travel. Provide wherever tile abuts to any adjacent floor surface with more than 1/8-inch difference in floor level and no other transitions are indicated, such as thresholds, cover plates, or wood or resilient transitions.
   1. Available Products: For transitions to exposed concrete and flooring less than 3/16-inch thick, subject to compliance with requirements, available products that may be incorporated into the Work may include the following:
a. Schlüter “RENO-RAMP.”
b. Ceramic Tool Company (CTC) “Tranz.”
c. Blanke “DRIVE.”
d. Size: To suit tile thickness.

2. Available Products: For transitions to flooring materials 3/16-inch thick or more subject to compliance with requirements, available products that may be incorporated into the Work may include the following:
   a. Schlüter “RENO-U.”
   b. Ceramic Tool Company (CTC) “Ramp.”
   c. Blanke “Reducer Trim.”
   d. Size: To suit tile thickness.

B. Finishes and Edge Protection Profiles: Heavy duty aluminum edging designed for installation with tile. Provide at all outside corners, exposed side at casework backsplash, top of wainscot, and the wall transition where tile abuts adjacent wall surface.

1. Available Products: For transition between different wall finish materials and outside corners of tiled walls subject to compliance with requirements, available products that may be incorporated into the Work may include the following:
   a. Schlüter “Schiene”
   b. Ceramic Tool Company (CTC) “L-Angle”
   c. Blanke “T-Transition”

2. Description: Profile with square visible surface, integrated perforated anchoring leg, and integrated grout joint spacer.
   a. Product should coordinate with cove profile using connectors
   b. Corners:
      1) Provide with matching outside corners and end caps
      2) Provide with matching connectors.
   c. Height as required to coordinate with tile selection and setting system selected.

C. Metal Cove Profiles: Heavy duty aluminum cove-shaped profile with a single anchoring leg that provides an attractive, clean, and maintenance-free alternative for inside wall corners, and countertop/backsplash and floor/wall transitions.

1. Available Products: For transition from wall to floor or countertop and at inside corners, subject to compliance with requirements, available products that may be incorporated into the Work may include the following:
   a. Schlüter “DILEX-AHK”
   b. Custom Building Products “PROCOVE”
   c. Blanke “COVE”
   d. Description: Anodized aluminum profile with integrated trapezoid perforated anchoring leg, connected at a 90-degree angle by a coveshaped section with 3/8" (10 mm) radius that forms the visible surface.
      1) Product should coordinate with cove profile using connectors
   e. Corners:
      1) Provide with matching inside, outside corners and end caps
      2) Provide with matching connectors.
   f. Height as required to coordinate with tile selection and setting system selected.

2.10 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. Vapor-Retarder Membrane: Polyethylene sheeting, ASTM D 4397, 4.0 mils (0.1 mm) thick.
C. Temporary Protective Coating: Manufacturer’s standard product formulated to protect exposed surfaces of unglazed or porous tile against adherence or staining from mortar and grout; compatible with tile, mortar, and grout products. Provide the following as recommended for tile type:
   1. Sealer/Grout Release: Water-based no-sheen penetrating sealer/grout release formulated to provide maximum stain protection while allowing moisture vapor transmission. Provide product equal to Custom Building Products Aqua Mix “Sealer’s Choice 15 Gold” or approved floor sealer designed to also serve as a grout release.
   2. Grout Release: Water-based temporary liquid coating that is specially formulated and recommended for use as temporary protective coating for tile and is removed by water during cleanup of grouting. Provide product equal to Custom Building Products Aqua Mix “Grout Release” or MAPEI “UltraCare Grout Release.”
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.
E. Floor Sealer: Manufacturer’s standard product for sealing grout joints and that does not change color or appearance of grout.
   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. Custom Building Products; Aqua Mix “Sealer’s Choice Gold.” 73 Gg/L, wear up to 15 years
      b. Custom Building Products; TileLab “SurfaceGard Sealer.” 49 g/L, wear up to 20 yrs
      c. SGM, Inc; “Grout Sealer.”<25 g/L
      d. Summitville Tiles, Inc; SL-99, “Summitseal II.”
   2. Products shall comply with the requirements of the California Department of Public Health’s "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.11 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 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 the Work.
   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 adhesives, bonded mortar bed, or thinset 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. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION
A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with adhesives or thinset mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.
B. Where indicated, prepare substrates to receive waterproofing by applying a reinforced mortar bed that complies with ANSI A108.1A and is sloped 1/4 inch per foot (1:50) toward drains.
C. 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.
D. Field-Applied Protective Coating:
   1. Tile Indicted to be Sealed: Precoat tile with floor sealer that also serves as grout release, or precoat with temporary grout release recommended by sealer manufacturer.
   2. Tile not being Sealed: Where required to prevent staining or ease cleaning of tile surface, precoat tile with continuous film of protective grout release, taking care not to coat unexposed tile surfaces.

3.3 CERAMIC TILE INSTALLATION
A. Comply with TCNA’s "Handbook for Ceramic, Glass, and Stone Tile Installation" for TCNA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 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 consisting of tiles 8 by 8 inches (200 by 200 mm) or larger.
      c. Tile floors consisting 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. Extend floor tiles to center of cased openings and to center under door leafs at door openings unless indicated otherwise. Where transitions occur to another flooring material, extend or cut floor
tiles to suit transition.

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.

D. Where accent tile differs in thickness from field tile, vary setting-bed thickness so that tiles are flush.

E. Jointing Pattern: Lay tile in 33% ashlar offset unless otherwise indicated. 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: Install tile with joint widths recommended by tile manufacturer to maintain module size.

G. Lay out tile wainscots to 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. Prepare joints and apply sealants to comply with requirements in Division 07 Section “Joint Sealants.”

I. Install metal lath to comply with ANSI A108.01-3.3. As an alternative to tack welding or fastening wire lath, a notched and hardened skim coat of compatible epoxy adhesive may be used over horizontal surfaces where recommended by mortar manufacturer.

J. Metal Edge Strips: Install per manufacturer recommendations.
   1. Install metal transitions and other edges at locations indicated [______].

K. Floor Sealer: Apply floor sealer to cementitious grout joints in tile floors according to floor-sealer manufacturer’s written instructions. As soon as floor sealer has penetrated grout joints, remove excess sealer and sealer from tile faces by wiping with soft cloth.

3.4 TILE BACKING PANEL INSTALLATION

A. Install panels and treat joints according to ANSI A108.11 and manufacturer’s written instructions for type of application indicated. Use modified dry-set mortar for bonding material unless otherwise directed in manufacturer’s written instructions.

3.5 WATERPROOFING INSTALLATION

A. Install waterproofing to comply with ANSI A108.13 and manufacturer’s written instructions to produce waterproof membrane of uniform thickness that is bonded securely to substrate.
   1. Provide waterproofing at elevated floor slabs (floors above grade). Turn waterproofing a minimum of 3-inches above floor.
   2. Provide shower floor drain detail corresponding to TCNA B421 or TCNA B422 to suit drain type.
3. Provide shower receptor renovation floor drain detail corresponding to TCNA B418 or TCNA B420 to suit drain type.

B. Allow waterproofing to cure and verify by testing that it is watertight before installing tile or setting materials over it.

3.6 COMBINATION WATERPROOFING AND CRACK ISOLATION MEMBRANE INSTALLATION

A. Comply with requirements for both waterproofing membrane installation and crack isolation membrane installation.

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 that is bonded securely to substrate.

1. Partial Application: For large floor tile applications over concrete subfloor control joints, provide membrane width required, a minimum of two tiles wide, for crack suppression over slab joints in accordance with TCNA F125-Partial for partial coverage. Center membrane width over slab control joint. Provide for all concrete slab joints in entire floor area to receive tile finish. Provide two soft joints (sealant) at crack location in accordance with crack isolation membrane manufacturer’s recommendations.

2. Full Application: For applications indicated, provide crack isolation membrane for full coverage in accordance with TCNA F125-Full.

B. Allow crack isolation membrane to cure before installing tile or setting materials over it.

3.8 ADJUSTING AND CLEANING

A. Remove and replace tile that is damaged or that does not match adjoining tile. Provide new matching units, installed as specified and in a manner to eliminate evidence of replacement.

B. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.

1. Remove 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.

3.9 PROTECTION

A. 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.

B. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.

C. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

3.10 INTERIOR CERAMIC TILE INSTALLATION SCHEDULE

A. Interior Floor Installations, Concrete Subfloor:

1. Ceramic Tile Installation F125-Full: TCNA F125-Full; thinset mortar on crack isolation membrane.
a. Ceramic Tile Type: P-TILE-A.
   b. Thinset Mortar: Medium-bed, modified dry-set mortar.
   c. Grout: Water-cleanable epoxy grout.

2. Ceramic Tile Installation F125-Partial: TCNA F125-Partial; thinset mortar on crack isolation membrane.
   a. Ceramic Tile Type: P-TILE-A.
   b. Thinset Mortar: Medium-bed, modified dry-set mortar.
   c. Grout: Water-cleanable epoxy grout.

B. Interior Wall Installations, Wood or Metal Studs or Furring:


2. Ceramic Tile Installation W244: TCNA W244C or TCNA W244F; thinset mortar on cementitious backer units or fiber-cement backer board over vapor-retarder membrane.
   a. Ceramic Tile Type: GT-A2 at casework backsplashes.
   b. Thinset Mortar: Modified dry-set mortar.

END OF SECTION 093000
SECTION 095113 - ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 DEFINITIONS
   A. AC: Articulation Class.
   B. CAC: Ceiling Attenuation Class.
   C. LR: Light Reflectance coefficient.
   D. NRC: Noise Reduction Coefficient.

1.3 SUBMITTALS
   A. Product Data: For each type of product indicated.
   B. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of size indicated below.
      1. Acoustical Panel: Set of 6-inch-square Samples of each type, color, pattern, and texture.
      2. Exposed Suspension System Members, Moldings, and Trim: Set of 12-inch-long Samples of each type, finish, and color.
   C. Installation Instructions: Manufacturer’s installation instructions for the following ceiling assemblies and components:
      1. Concealed grid ceiling systems.
      2. Curved ceiling systems.
      3. Perimeter edge trim systems.
   D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each acoustical panel ceiling.
   E. Research/Evaluation Reports: For each acoustical panel ceiling and components and anchor and fastener type.
   F. Sample Warranty: For 30-year panel and grid warranty systems specified.
   G. Maintenance Data: For each panel finish provided to include in maintenance manuals.

1.4 QUALITY ASSURANCE
   A. Source Limitations:
      1. Acoustical Ceiling Panel: Obtain each type through one source from a single manufacturer.
      2. Suspension System: Obtain each type through one source from a single manufacturer.
   B. Surface-Burning Characteristics: Ceiling panels with the following surface-burning characteristics as determined by testing identical products per ASTM E 84:
      1. Flame-Spread Index: 25 or less.
      2. Smoke-Developed Index: 50 or less.
   C. Seismic Standard: Provide acoustical panel ceilings designed and installed to withstand the effects of earthquake motions, for seismic design category indicated, according to the following:
applicable requirements of ASTM E 580, “Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions.”

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 PROJECT 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.

1.7 COORDINATION
A. Coordinate layout and installation of acoustical panels and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

1.8 EXTRA MATERIALS
A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Acoustical Ceiling Panels: Full-size panels equal to 2.0 percent of quantity installed.
   2. Suspension System Components: Quantity of each exposed component equal to 2.0 percent of quantity installed.
   3. Hold-Down Clips: Equal to 2.0 percent of quantity installed.

PART 2 - PRODUCTS

2.1 ACOUSTICAL PANELS, GENERAL
A. 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 per ASTM E 795.
B. Acoustical Panel Colors and Patterns: Match appearance characteristics indicated for each product type.
C. 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.
2.2 ACOUSTICAL PANELS FOR ACOUSTICAL PANEL CEILING (ACP-A)
A. Basis of Design Product: Subject to compliance with requirements, provide Armstrong World Industries, Inc.; "Ultima" Item #1912 AHRC, or comparable product by one of the following:
   1. CertainTeed, Inc.; “Symphony m” Item #1222BF-75-1.
   2. USG Interiors, Inc.; “Mars ClimaPlus” Item #86985.
B. Classification: Panels complying with ASTM E 1264 for type, form, and pattern as follows:
   1. Type and Form: Type IV, mineral base with painted finish; Form 2, water felted.
C. Color: White.
D. LR: Not less than 0.89.
E. NRC: Not less than 0.75.
F. CAC: Not less than 35.
G. Edge/Joint Detail: Reveal sized to fit flange of 9/16-inch exposed suspension system members.
H. Thickness: 3/4 inch.
I. Modular Size: 24 by 24 inches.
J. Humidity Resistant: Minimum 15-year warranty against sag.

2.3 ACOUSTICAL PANELS FOR ACOUSTICAL PANEL CEILING (ACP-B)
A. Panels: Acoustical lay-in fiberglass panels, with washable finish.
B. Basis of Design Product: Subject to compliance with requirements, provide Armstrong World Industries, Inc.; "Optima" Item #3251, or comparable product by one of the following:
   1. CertainTeed, Inc.; “Symphony f” Item #1342-IOF-1.
   2. United States Gypsum Co.; “Halcyon ” Item #98225.
C. Classification: Panels complying with ASTM E 1264 for type, form, and pattern as follows:
   1. Type and Form: Type XII, glass-fiber base with membrane-faced overlay; Form 2, cloth.
   2. Pattern: E or G.
D. Color: White.
E. LR: Not less than 0.88.
F. NRC: Not less than 0.95.
G. Edge/Joint Detail: Reveal sized to fit flange of 9/16-inch exposed suspension system members.
H. Thickness: 1 inch.
I. Modular Size: 24 by 24 inches.
J. Humidity Resistant: Minimum 10-year warranty against sag.

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.
B. Finishes and Colors, General: Comply with NAAMM’s "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes. Provide manufacturer’s standard factory-applied finish for type of system indicated.
   1. High-Humidity Finish: Comply with ASTM C 635 requirements for “Coating Classification for Severe Environment Performance” where high-humidity finishes are indicated.
C. Attachment Devices: Size for five times the design load indicated in ASTM C 635, 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 times that imposed by ceiling construction, as determined by testing per ASTM E 488 or ASTM E 1512 as applicable, conducted by a qualified testing and inspecting agency.
      a. Type: Postinstalled expansion anchors.
      b. Corrosion Protection: Carbon-steel components zinc plated to comply with ASTM B 633, Class Fe/Zn 5 (0.005 mm) for Class SC 1 service condition.
D. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:
   1. Zinc-Coated, Carbon-Steel Wire: ASTM A 641, Class 1 zinc coating, soft temper.
   2. Size: Select wire diameter so its stress at 3 times hanger design load (ASTM C 635, Table 1, “Direct Hung”) will be less than yield stress of wire, but provide not less than 0.106-inch-diameter wire.
E. Seismic Stabilizer Bars: Manufacturer’s standard perimeter stabilizers designed to accommodate seismic forces.
F. Seismic Struts: Manufacturer’s standard compression struts designed to accommodate seismic forces.
G. Seismic Clips: Manufacturer’s standard seismic clips designed and spaced to secure acoustical panels in-place.
H. Hold-Down Clips: Where indicated, provide manufacturer’s standard hold-down clips spaced 24 inches o.c. on all cross tees.

2.5 METAL SUSPENSION SYSTEM FOR ACOUSTICAL PANEL CEILING.
A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
   1. Armstrong World Industries, Inc.; “Suprafine XL 9/16”,
   2. CertainTeed, Inc.; “9/16” Elite Narrow Stab System.”
   3. USG Interiors, Inc.; “Centricitee DXT 24 System.” (Donn)
B. Narrow-Face, Capped, Double-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet, prepainted, electrolytically zinc coated, or hot-dip galvanized according to ASTM A 653, not less than G30 coating designation, with prefinished 9/16-inch-wide metal caps on flanges. Provide main beams and 48-inch length cross-tees of same depth and support load carrying capacity required for main beams for specified structural class (intermediate duty). Provide positive locking cross-tee to main beam connection and override cross-tee ends, and a bayonet type end coupling (vs. knuckle type) for main runners.
   2. End Condition of Cross Runners: Override (stepped) type.
   3. Face Design: Flat, flush.
4. Cap Material: Steel Steel or aluminum cold-rolled sheet.

2.6 METAL EDGE MOLDINGS AND TRIM
A. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, 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 lay-in panels with reveal edge details, provide standard 7/8 by 7/8-inch size edge angle molding mounted in same plane as suspended grid. Provide cut reveal edge at cut edge of ceiling panels to match factory profile.
   4. For all lay-in panels (both square and reveal edge), provide “shadow-line” stepped edge molding that forms 3/4 by 3/4-inch reveal at wall and nominal 3/4-inch bottom flange at exposed suspension member. (In all cases, see bottom flange of exposed grid members at bottom step.)
   5. For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit penetration exactly.

2.7 PERIMETER EDGE TRIM SYSTEM
A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
   2. CertainTeed, Inc.; “Cloud Perimeter Trim.”
   3. Rockfon (Chicago Metallic); “Infinity” System.
   4. USG Interiors, Inc.; “Compasso.”
B. Clip-on fascia system compatible with suspension grid system for 4-inch fascia width.
C. Finish: Match grid system unless noted otherwise.

2.8 ACOUSTICAL SEALANT
A. Available Products: Subject to compliance with requirements, 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. Hilti; CP506 Smoke and Acoustical Sealant.
      b. Pecora Corporation; AC-20 FTR Acoustical and Insulation Sealant.
      c. USG Corporation; SHEETROCK Acoustical Sealant.
   2. Acoustical Sealant for Concealed Joints:
      a. OSI Sealants, Inc.; Pro-Series SC-175 Rubber Base Sound Sealant.
      b. Pecora Corporation; BA-98.
B. Acoustical Sealant for Exposed and Concealed Joints: Manufacturer’s standard nonsag, paintable, nonstaining latex 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.
C. Acoustical Sealant for Concealed Joints: Manufacturer’s standard nondrying, nonhardening, nonskinning, nonstaining, gumbale, synthetic-rubber sealant[<>] recommended for sealing interior concealed joints to reduce airborne sound transmission.

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.
   1. 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 wherever possible.
   1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION
A. General: Install acoustical panel ceilings to comply with ASTM C 636, and per manufacturer’s written instructions, and per seismic design requirements indicated, including ASCE 7 and ASTM E 580.
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. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, postinstalled mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
   6. 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.
   7. Do not attach hangers to steel deck tabs.
   8. Do not attach hangers to steel roof deck. Attach hangers to structural members.
   9. Space hangers not more than 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 ceiling loads within performance limits established by referenced standards and publications.

C. 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.

D. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

E. 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 indicated in finish schedule or directed by Architect.
2. For reveal-edged panels on suspension system runners, install panels with bottom of (factory- and field-cut) reveal edge in firm contact with top surface of runner flanges.
3. Install hold-down clips in areas indicated, in areas required by authorities having jurisdiction, and for fire-resistance ratings; space as recommended by panel manufacturer’s written instructions, unless otherwise indicated.

3.4 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections and prepare reports:
1. Suspended ceiling system.
2. Hangers, anchors and fasteners.

B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections and prepare test reports.

C. Tests and Inspections: Testing and inspecting of completed installations of acoustical panel ceiling hangers and anchors and fasteners shall take place in successive stages, in areas of extent and using methods as follows. Do not proceed with installations of acoustical panel ceiling hangers for the next area until test results for previously completed installations of acoustical panel ceiling hangers show compliance with requirements.
1. Extent of Each Test Area: When installation of ceiling suspension systems on each floor has reached 20 percent completion but no panels have been installed.
   a. Within each test area, testing agency will select 1 of every 10 power-actuated fasteners and post-installed anchors used to attach hangers to concrete and will test them for 200 lbf of tension; it will also select one of every 2 postinstalled anchors used to attach bracing wires to concrete and will test them for 440 lbf of tension.
   b. When testing discovers fasteners and anchors that do not comply with requirements, testing agency will test those anchors not previously tested until 20 pass consecutively and then will resume initial testing frequency.

D. Remove and replace acoustical panel ceiling hangers and anchors and fasteners that do not pass tests and inspections and retest as specified above.
3.5 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 095113
SECTION 095126 - ACOUSTICAL WOOD CEILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 DEFINITIONS
A. AC: Articulation Class.
B. CAC: Ceiling Attenuation Class.
C. LR: Light Reflectance coefficient.
D. NRC: Noise Reduction Coefficient.

1.3 SUBMITTALS
A. Product Data: For each type of product indicated.
B. Shop Drawings: Show installation layouts of wood ceiling panels; details of edge conditions, joints, panel profiles, accessories; and special details. Show locations of items which are to be coordinated with, or supported by the ceilings.
C. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of size indicated below.
   1. Wood Ceiling Panel: Set of samples 3.5-inch- by 5.5-inch-minimum of each type, color, pattern, and texture.
   2. Exposed Suspension System Members, Moldings, and Trim: Set of 8-inch- (203-mm-) long samples of each type, finish, and color.
D. Installation Instructions: Manufacturer’s installation instructions for specified ceiling assemblies and components.
E. Certifications: Manufacturer’s certifications that products comply with specified requirements, including laboratory reports showing compliance with specified tests and standards.
F. Maintenance Data: For finishes to include in maintenance manuals.

1.4 QUALITY ASSURANCE
A. Source Limitations: Obtain each type of acoustical wood ceiling panel and supporting suspension system through one source from a single manufacturer.
B. Woodworking Standards: Comply with applicable provisions of the Architectural Woodworking Institute quality standards.
C. Fire-Test-Response Characteristics: Provide acoustical wood ceilings that comply with the following requirements:
   1. Surface-Burning Characteristics: Wood ceiling panels with the following surface-burning characteristics complying with ASTM E1264 for Class A materials as determined by testing identical products per ASTM E 84:
      a. Flame-Spread Index: 25 or less.
      b. Smoke-Developed Index: 450 or less.
D. Seismic Standard: Provide acoustical wood ceilings designed and installed to withstand the effects of earthquake motions, for seismic design category indicated, according to the following:

E. Forest Certification: Provide interior architectural woodwork produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC 1.2, “Principles and Criteria.”

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver wood ceiling 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 wood ceiling panels, permit them to reach room temperature and a stabilized moisture content, for a minimum of 72 hours prior to installation.

C. Handle wood ceiling panels carefully to avoid damaging units in any way.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not install acoustical wood 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. Unless indicated otherwise, temperature shall range between 60°F minimum to 85°F maximum, and relative humidity shall not exceed 55%.

1.7 COORDINATION

A. Coordinate layout and installation of acoustical wood ceiling panels and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

1.8 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Wood Ceiling Panels: Full-size panels equal to 2.0 percent of quantity installed.

2. Suspension System Components: Quantity of each exposed component equal to 2.0 percent of quantity installed.

PART 2 - PRODUCTS

2.1 WOOD CEILING PANELS, GENERAL

A. Acoustical Wood Ceiling 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 (400 mm) away from test surface per ASTM E 795.

B. Acoustical Wood Ceiling Panel Colors and Patterns: Match appearance characteristics indicated for each product type.
2.2 WOOD CEILING PANELS – (WCP)
A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
2. 9Wood; 5100 Series “Lift & Shift.”
3. Rulon; “Aluratone 100 Acoustical Ceiling Panel” & Edge-banded Side Slot.
4. USG Interiors, Inc.; “True Wood Accessible Reveal Panels.”
B. Surface Texture: Smooth.
C. Composition: Fire retardant treated wood core with wood veneer faces.
D. Finish: Manufacturer’s standard transparent finish and stain as selected from manufacturer’s full range of available finishes.
E. Edge Detail: Self-centering reveal edge, or square edge with proprietary metal mounting system that allows removal of panel from below ceiling.
F. Edge Banding: Match face veneer.
G. Thickness: 3/4 inch.
H. Modular Size: 12 by 48 inches.
I. Reveal Width: Manufacturer’s standard, but not exceeding 1/2-inch.
J. Perforations:
   1. Pattern: “Square,” rows parallel to panel edges, with round perforations.
   2. Perforation Size: 1/4-inch (6 mm) diameter.
   3. Open Area: 4.7 to 5%.
   4. Non-Perforated Borders: Manufacturer’s standard, but not less than 1 inch (25.4 mm).
K. Acoustic Backing: Manufacturer’s standard acoustic fiberglass backing or 1-inch duct liner as required for acoustic performance.
L. NRC: Not less than 0.40.
M. Accessories: 4-inch high unperforated trim to match panel veneer.

2.3 METAL SUSPENSION SYSTEMS, GENERAL
A. Recycled Content: Provide products made from steel sheet with average recycled content such that postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 percent.
B. 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. Finishes and Colors, General: Comply with NAAMM’s "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes. Provide manufacturer’s standard factory-applied finish for type of system indicated.
D. Attachment Devices: Size for five times the design load indicated in ASTM C 635, 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 times that imposed by ceiling construction, as determined
by testing per ASTM E 488 or ASTM E 1512 as applicable, conducted by a qualified testing and inspecting agency.

a.  Type: Postinstalled expansion anchors.

b.  Corrosion Protection: Carbon-steel components zinc plated to comply with ASTM B 633, Class Fe/Zn 5 (0.005 mm) for Class SC 1 service condition.

E.  Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:

1.  Zinc-Coated, Carbon-Steel Wire: ASTM A 641, Class 1 zinc coating, soft temper.
2.  Size: Select wire diameter so its stress at 3 times hanger design load (ASTM C 635, Table 1, “Direct Hung”) will be less than yield stress of wire, but provide not less than 0.106-inch-diameter wire.

F.  Seismic Stabilizer Bars: Manufacturer’s standard perimeter stabilizers designed to accommodate seismic forces.

G.  Seismic Struts: Manufacturer’s standard compression struts designed to accommodate seismic forces.

H.  Seismic Safety Clips: Manufacturer’s standard clips or other safety device to prevent panels from falling when unintentionally disengaged from the supporting grid system while still allowing removal of panels from below. Clips shall be one of the following, not less than two per panel:

1.  Hook Type: Formed spring metal clip designed to hook over the grid at top and screw-attached to the panels.
2.  Hold-Down Type: Hold-down clips attached to the grid and designed to hold the panels in place by spring action.
3.  Safety Strap: Wire or flexible strap designed to mechanically attach to the grid and screw-attached to panels.

I.  Supplemental Clips: Metal clips designed to secure panels at edge moldings, screw-attached to panels.

2.4  METAL SUSPENSION SYSTEM FOR ACOUSTICAL WOOD CEILING

A.  Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

1.  Armstrong World Industries, Inc.; “Prelude XL”
2.  Chicago Metallic Corporation; “1200 System/211-219 Main Tec”
3.  USG Interiors, Inc.; “DX 24 System” (Donn)

B.  Wide-Face, Capped, Double-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet, prepainted, electrolytically zinc coated, or hot-dip galvanized according to ASTM A 653, not less than G30 coating designation, with prefinished 15/16-inch-wide metal caps on flanges. Provide main beams and 48-inch length cross-tees of same depth and support load carrying capacity required for main beams for specified structural class (intermediate duty). Provide positive locking cross-tee to main beam connection and override cross-tee ends, and a bayonet type end coupling (vs. knuckle type) for main runners.

1.  Structural Classification: Heavy-duty system.
2.  Face Design: Flat, flush.

C.  Accessories:

1.  Panel Support Clips: Where required as part of system, provide manufacturer’s standard noncorrosive metal clips designed to install directly onto ceiling grid tee
suspension system. Clips shall automatically space the panels at indicated reveal width.

2.5 METAL EDGE MOLDINGS AND TRIM

A. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer’s standard moldings for edges and penetrations that comply with seismic design requirements; formed from sheet metal of same material and finish as that used for flanges of suspension system runners.
1. Provide manufacturer’s standard edge moldings that fit wood panel edge details and suspension systems indicated and that match width and configuration of runners, unless otherwise indicated.
2. For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit penetration exactly.

2.6 PERIMETER EDGE TRIM SYSTEM

A. Composition: Fire retardant treated wood core with wood veneer faces, or aluminum substrate with wood veneer faces.
B. Fascia system compatible with suspension grid system for 4-inch fascia width.
C. Finish: Match wood ceiling panels.

2.7 PERIMETER EDGE TRIM SYSTEM

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
2. Chicago Metallic Corporation; “Infinity.”
3. USG Interiors, Inc.; “Compasso.”
B. Clip-on fascia system compatible with suspension grid system for 4-inch fascia width.
C. Finish: As selected by Architect from manufacturer's full range.

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.
1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Before installation, condition wood components to average prevailing humidity conditions in installation areas per Part 1 handling instructions and manufacturer’s recommendations.
B. 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 wood ceilings to comply with ASTM C 636, per manufacturer’s written instructions, and per seismic design requirements indicated, including ASCE 7 and ASTM E 580.

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 in 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. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, postinstalled mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
   6. 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.
   7. Do not attach hangers to steel deck tabs.
   8. Do not attach hangers to steel roof deck. Attach hangers to structural members.
   9. Space hangers not more than 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 ceiling loads within performance limits established by referenced standards and publications.

C. Install edge moldings and trim of type indicated at perimeter of wood ceiling area and where necessary to conceal edges of acoustical panels.
   1. 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.
   2. Do not use exposed fasteners, including pop rivets, on moldings and trim.

D. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

E. Install wood panels with undamaged edges and fit accurately to 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 indicated in finish schedule or directed by Architect.
   2. Install safety clips spaced as recommended by panel manufacturer’s written instructions, unless otherwise indicated.
3.4 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections and prepare reports:
   1. Suspended ceiling system.
   2. Hangers, anchors and fasteners.

B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections and prepare test reports.

C. Tests and Inspections: Testing and inspecting of completed installations of acoustical wood ceiling hangers and anchors and fasteners shall take place in successive stages, in areas of extent and using methods as follows. Do not proceed with installations of acoustical wood ceiling hangers for the next area until test results for previously completed installations of acoustical wood ceiling hangers show compliance with requirements.
   1. Extent of Each Test Area: When installation of ceiling suspension systems on each floor has reached 20 percent completion but no panels have been installed.
      a. Within each test area, testing agency will select 1 of every 10 power-actuated fasteners and post-installed anchors used to attach hangers to concrete and will test them for 200 lbf of tension; it will also select one of every 2 postinstalled anchors used to attach bracing wires to concrete and will test them for 440 lbf of tension.
      b. When testing discovers fasteners and anchors that do not comply with requirements, testing agency will test those anchors not previously tested until 20 pass consecutively and then will resume initial testing frequency.

D. Remove and replace acoustical wood ceiling hangers and anchors and fasteners that do not pass tests and inspections and retest as specified above.

3.5 CLEANING

A. Clean exposed surfaces of acoustical wood 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 095126
SECTION 095133 - ACOUSTICAL METAL PAN CEILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 DEFINITIONS
A. CAC: Ceiling Attenuation Class.
B. LR: Light Reflectance coefficient.
C. NRC: Noise Reduction Coefficient.

1.3 SUBMITTALS
A. Product Data: For each type of product indicated.
B. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:
   1. Ceiling suspension members.
   2. Method of attaching hangers to building structure.
      a. Furnish layouts for cast-in-place anchors, clips, and other ceiling attachment devices whose installation is specified in other Sections.
   3. Ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers, and access panels.
   4. Ceiling perimeter and penetrations through the ceiling; trim and moldings.
C. Samples for Initial Selection: For components with factory-applied color and other decorative finishes.
D. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of size indicated below.
   1. Metal Pan: Set of full-size Samples of each type, finish, color, pattern, and texture. Show pan edge profile.
   2. Exposed Suspension System Members, Moldings and Trim: Set of 12-inch-(300-mm-) long Samples of each type, finish, and color.
   3. Sound Absorber: Match size of Sample metal pan.
E. Qualification Data: For testing agency.
F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each acoustical metal pan ceiling.
G. Research/Evaluation Reports: For acoustical metal pan ceiling and components and anchor type.
H. Maintenance Data: For finishes to include in maintenance manuals.

1.4 QUALITY ASSURANCE
A. Acoustical Testing Agency Qualifications: An independent testing laboratory or an NVLAP-accredited laboratory, with the experience and capability to conduct the testing indicated, as documented according to ASTM E 548. NVLAP-accredited laboratories must document
accreditation, based on a “Certificate of Accreditation” and a “Scope of Accreditation” listing the test methods specified.

B. Source Limitations:
   1. Acoustical Ceiling Panels: Obtain each type through one source from a single manufacturer.
   2. Suspension Systems: Obtain each type through one source from a single manufacturer.

C. Source Limitations for Acoustical Metal Pan Ceilings: Obtain each set of acoustical metal pans and exposed suspension systems from one source with resources to provide products of consistent quality in appearance, physical properties, and performance.

D. Fire-Test-Response Characteristics: Provide acoustical metal pan ceilings with surface-burning characteristics complying with ASTM E 1264 for Class A materials as determined by testing identical products per ASTM E 84 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.

E. Seismic Standard: Provide acoustical metal pan ceilings designed and installed to withstand the effects of earthquake motions, for seismic design category indicated, according to the following:
   5. UBC Standard 25-2, “Metal Suspension Systems for Acoustical Tile and for Lay-in Panel Ceilings.”

F. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
   1. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

G. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section “Project Management and Coordination.”

1.5 DELIVERY, STORAGE, AND HANDLING
A. Deliver acoustical metal pans, 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.

1.6 PROJECT CONDITIONS
A. Environmental Limitations: Do not install acoustical metal pan 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.

1.7 COORDINATION
A. Coordinate layout and installation of acoustical metal pans and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

1.8 EXTRA MATERIALS
A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Acoustical Metal Pans: Full-size units equal to 3 boxes each of 10 pieces.
   2. Suspension System Components: Quantity of each grid and exposed molding and trim equal to 1 box each of 30 pieces

PART 2 - PRODUCTS

2.1 MANUFACTURERS
A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
   1. Products: Subject to compliance with requirements, provide one of the products specified.

2.2 ACOUSTICAL METAL CEILING PANS
A. Acoustical Metal Pan Standard: Provide manufacturer’s standard acoustical metal pans of configuration indicated that comply with ASTM E 1264 classifications as designated by types, 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 (400 mm) away from test surface per ASTM E 795.

B. Sheet Metal Characteristics: For metal fabrications 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, roughness, stains, or discolorations.
   1. Aluminum Sheet: Roll-formed aluminum sheet, complying with ASTM B 209 (ASTM B 209M); alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.
   2. Steel Sheet: Commercial-quality, cold-rolled, carbon-steel sheet; stretcher leveled; with protective coating complying with ASTM C 635.
      a. Painted Finishes: Electrolytic zinc-coated steel complying with ASTM A 591/A 591M, 40Z (12G) coating, surface treatment as recommended by finish manufacturer for type of use and finish indicated.
      b. Chemical/Mechanical Finishes: Uncoated steel sheet complying with ASTM A 1008/A 1008M with luster or bright finish as required by finisher for applying electroplating or other metallic-finishing processes.
   3. Stainless-Steel Sheet: Complying with ASTM A 240/A 240M, Type 304.

C. Pan Fabrication: Manufacturer’s standard units of size, profile, and edge treatment indicated, formed from metal indicated and finished to comply with requirements indicated.
   1. Lay-in Pans: Formed to set in exposed suspension grid.
2. Clip-in Pans: Designed to clip-in and be securely retained in suspension grid by formed edges or accessory clips.
3. Torsion-Spring-Hinged Pans: Designed to be securely retained in preslotted suspension grid by torsion springs.

D. Sound-Absorbent Pads: Provide width and length to completely fill concealed surface of pan, with surface-burning characteristics for flame-spread index of 25 or less and smoke-developed index of 50 or less, as determined by testing per ASTM E 84, and to comply with the following requirements:
1. Unwrapped, Glass-Fiber Insulation: Black coated, unfaced, complying with ASTM C 553, Type I, II, or III; not less than 1-lb/cu. ft. (16-kg/cu. m) density; treated to be non-dusting; and as follows:
a. Thickness: 1 inch (25 mm).
2. Spacer Grids: Provide manufacturer’s standard aluminum grid units that provide an air cushion between metal pans and insulation pads and that act to improve sound absorption.
3. Sound Attenuation Panels: Provide manufacturer’s standard aluminum nonperforated metal backing unit that acts as a sound-attenuating pan to reduce the travel of sound through ceiling plenum into adjoining rooms.
   a. Sound-Absorbent Pads: Provide secondary sound-absorbent pads, same as specified for primary pads, for placement over sound attenuation pan to reduce plenum sound.

2.3 ALUMINUM METAL PANS FOR ACOUSTICAL METAL PAN CEILING (MPC)
A. Available Products: Subject to compliance with requirements, provide one of the following:
1. Armstrong World Industries, Inc.; “MetalWorks Torsion Spring” Item #DS18524 (Basis-Of-Design).
2. Rockfon; “CurvGrid.”
3. 0.70 NRC USG Interiors, Inc.; “Curvatura.”
B. Classification: Units complying with ASTM E 1264 for Type VII, perforated aluminum facing (pan) with mineral- or glass-fiber-base backing.
   1. Pattern: Armstrong, M15 (Basis of Design) (perforated, small holes) regularly spaced, with uniform perforations of dimension, holes per square foot, and percent open area as selected from manufacturer’s full range.
C. Pan Type: Torsion-spring-hinged pan.
D. Pan Thickness: Not less than 0.040 inch (1.0 mm).
E. Pan Edge Detail: Butt edge.
F. Pan Joint Detail: Butt.
G. Pan Size: 24 by 60 inches (610 by 1525 mm).
H. Pan Shape: Curved
I. Pan Face Finish: Clear anodized.
J. NRC: Not less than 0.90.
K. CAC: Not less than 35.
2.4 METAL SUSPENSION SYSTEMS

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 ASTM C 635 requirements.

B. Suspension Systems: Provide systems complete with runners, splice sections, connector clips, hangers, molding, trim, retention clips, load-resisting struts, and other suspension components required to support ceiling units and other ceiling-supported construction.

C. Attachment Devices: Size for 5 times the design load indicated in ASTM C 635, Table 1, Direct Hung, unless otherwise indicated.
   1. Cast-in-Place and Postinstalled 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 times that imposed by ceiling construction, as determined by testing per ASTM E 488 or ASTM E 1512 as applicable, conducted by a qualified testing and inspecting agency.
      a. Type: Cast-in-place anchors.
      b. Type: Postinstalled expansion anchors.
      c. Type: Postinstalled adhesive anchors.
      d. Corrosion Protection: Carbon-steel components zinc plated to comply with ASTM B 633, Class Fe/Zn 5 (0.005 mm) for Class SC service condition (mild).
      e. 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: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hangers of type indicated, and with capability to sustain, without failure, a load equal to 10 times that imposed by ceiling construction, as determined by testing per ASTM E 1190, conducted by a qualified testing and inspecting agency.

D. Wire Hangers, Braces, and Ties: Provide wire complying with the following requirements:
   3. Size: Select wire diameter so its stress at 3 times hanger design load (ASTM C 635, Table 1, Direct Hung) will be less than yield stress of wire, but provide not less than 0.106-inch- (2.69-mm-) diameter wire.

E. Hanger Rods: Mild steel, zinc coated or protected with rust-inhibitive paint.

F. Angle Hangers: Angles with legs not less than 7/8 inch (22 mm) wide; formed with 0.04-inch- (1-mm-) thick, galvanized steel sheet complying with ASTM A 653/A 653M, G90 (Z275) coating designation; with bolted connections and 5/16-inch- (8-mm-) diameter bolts.

G. Seismic Struts: Manufacturer’s standard compression struts designed to accommodate seismic forces.

H. Seismic Clips: Manufacturer’s standard seismic clips designed and spaced to secure acoustical metal pans in place.
I. Hold-Down Clips: Manufacturer’s standard hold-down clips spaced to secure acoustical metal pans in place to molding and trim at perimeter.

J. Exposed Metal Edge Moldings and Trim: Provide exposed members as indicated or required to comply with seismic requirements of authorities having jurisdiction, to conceal edges of and penetrations through ceiling, to conceal edges of pans and runners, for fixture trim and adapters, for fasciae at changes in ceiling height, and for other conditions; of metal and finish matching acoustical metal pan ceiling units, unless otherwise indicated.
   1. For Circular Penetrations of Ceiling: Fabricate edge moldings to diameter required to fit penetration exactly.

2.5 METAL SUSPENSION SYSTEM FOR ACOUSTICAL PANEL CEILING (MPC)

A. Products: Subject to compliance with requirements, provide one of the following:
   1. Armstrong World Industries, Inc.; “Prelude XL”
   2. Chicago Metallic Corp.; “1200 HRCmax/211-1274 Main Tee”
   3. CertainTeed Ceilings, Inc.; “15/16" Classic Stab System”
   4. USG Interiors, Inc.; “DX 24 System” (Donn)

B. Wide-Face, Capped, Double-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet, prepainted, electrolytically zinc coated, or hot-dip galvanized according to ASTM A 653/A 653M, not less than G30 (Z90) coating designation, with prefinished 15/16-inch (24-mm) wide metal caps on flanges. Provide main beams and 48-inch (1220 mm) length cross-tees of same depth and support load carrying capacity required for main beams for specified structural class (intermediate duty). Provide positive locking cross-tee to main beam connection and override cross-tee ends, and a bayonet type end coupling (vs. knuckle type) for main runners.
   2. End Condition of Cross Runners: Override (stepped) type.
   3. Face Design: Flat, flush.

2.6 ACOUSTICAL SEALANT

A. Products:
   1. Acoustical Sealant for Exposed and Concealed Joints:
      a. Pecora Corp; AC-20 FTR Acoustical and Insulation Sealant.
   2. Acoustical Sealant for Concealed Joints:
      a. OSI Sealants, Inc.; Pro-Series SC-170 Rubber Base Sound Sealant.
      b. OSI Sealants, Inc.; Pro-Series SC-175 Rubber Base Sound Sealant.
      c. Pecora Corp.; BA-98.
      d. Tremco, Inc.; Tremco Acoustical Sealant.

B. Acoustical Sealant for Exposed and Concealed Joints: Manufacturer’s standard nonsag, paintable, nonstaining latex 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.

C. Acoustical Sealant for Concealed Joints: Manufacturer’s standard nondrying, nonhardening, nonskinning, nonstaining, gunnable, synthetic-rubber sealant recommended for sealing interior concealed joints to reduce airborne sound transmission.
2.7 FINISHES, GENERAL
   A. Comply with NAAMM’s “Metal Finishes Manual for Architectural and Metal Products” for
      recommendations for applying and designating finishes.
      1. High-Humidity Finish: Comply with ASTM C 635 requirements for “Coating
         Classification for Severe Environment Performance” where high-humidity finishes are
         indicated.
   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.

2.8 ALUMINUM FINISHES
   A. Finish designations prefixed by AA comply with the system established by the Aluminum
      Association for designating aluminum finishes.
   B. Mill Finish: AA-M10C10 (Mechanical Finish: as fabricated, unspecified; Chemical
      Finish: chemically cleaned).
   C. Class II, Clear Anodic Finish: AA-M12C22A31 (Mechanical Finish: nonspecular as
      fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class II,
      clear coating 0.010 mm or thicker) complying with AAMA 611.
   D. Class II, Clear Mirror-Anodized Finish: AA-M21C12A212 (Mechanical Finish: smooth
      specular; Chemical Finish: chemically cleaned; Anodic Coating: protective and decorative,
      clear film of 0.2-mil (0.0508-mm) minimum thickness).

PART 3 - EXECUTION

3.1 EXAMINATION
   A. Examine substrates, areas, and conditions, including structural framing to which acoustical
      metal pan 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
      acoustic metal pan ceilings.
   B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION
   A. Measure each ceiling area and establish layout of acoustical metal pans to balance border
      widths at opposite edges of each ceiling. Avoid using less-than-half-width pans 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, per manufacturer’s
      written instructions, and per seismic design requirements indicated, including ASCE 7 and
      ASTM E 580.
   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 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 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. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.

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 structure to which hangers are attached and 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, postinstalled mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.

7. Do not attach hangers to steel deck tabs.

8. Do not attach hangers to steel roof deck. Attach hangers to structural members.

9. Space hangers not more than 48 inches (1200 mm) o.c. along each member supported directly from hangers, unless otherwise indicated; provide hangers not more than 8 inches (200 mm) from ends of each member.

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 but without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or postinstalled anchors.

D. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical metal pans.

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 (400 mm) o.c. and not more than 3 inches (75 mm) from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet (3.2 mm in 3.66 m). 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. Cut acoustical metal pan units for accurate fit at borders and at interruptions and penetrations by other work through ceilings. Stiffen edges of cut units as required to eliminate evidence of buckling or variations in flatness exceeding referenced standards for stretcher-leveled metal sheet.
G. Install acoustical metal pans in coordination with suspension system and exposed moldings and trim.
   1. For lay-in square-edge pans, install pans with edges fully hidden from view by flanges of suspension system runners and moldings.
   2. For lay-in reveal-edge pans on suspension system runners, install pans with bottom of reveal in firm contact with top surface of runner flanges.
   3. For lay-in reveal-edge pans on suspension system members with box-shaped flanges, install pans with reveal surfaces in firm contact with suspension system surfaces and panel faces flush with bottom face of runners.
   4. For clip-in pans, position pans according to manufacturer’s written instructions.
   5. Align joints in adjacent courses to form uniform, straight joints parallel to room axis in both directions, unless otherwise indicated.
   6. Fit adjoining units to form flush, tight joints.
   7. Install directionally patterned or textured metal pans in directions indicated.
   8. Install sound-absorbent fabric layers in perforated metal pans.
   9. Install sound-absorbent pads in perforated metal pans.

H. Install sound attenuation panels in areas indicated by reflected ceiling plans or room finish schedules. Lay panels directly on ceiling system and close major openings to form complete coverage in required areas. Lay second sound-absorbent pads on sound attenuation panels.

3.4 CLEANING

A. Clean exposed surfaces of acoustical metal pan ceilings, including trim and edge moldings after removing strippable, temporary protective covering, if any. Comply with manufacturer’s written instructions for stripping of temporary protective covering, 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, including dented and bent units.

A. END OF SECTION 095133
MOORE COUNTY COURTHOUSE AND RENOVATION
CARTHAGE, NORTH CAROLINA
Architect's Project No.: 582405

SECTION 096513 - RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL
1.1 RELATED DOCUMENTS
   A. Provisions of the Contract and of the Contract Documents apply to this Section.

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 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 resilient base, resilient stair accessories, and resilient molding accessories through single source from single manufacturer.

1.4 DELIVERY, STORAGE, AND HANDLING
   A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F.

1.5 PROJECT CONDITIONS
   A. Maintain ambient temperatures within range recommended by manufacturer, but not below 70 deg F or above 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.

1.6 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. Furnish not less than 10 linear feet for every 500 linear feet or fraction thereof, of each type, color, pattern, and size of resilient product installed.

PART 2 - PRODUCTS
2.1 RESILIENT BASE (RB-A)
   A. Resilient Base:
1. Type TS (Rubber, Vulcanized Thermoset) Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to the following:
   a. Burke Flooring; a division of Burke Industries; “BurkeBase.”
   b. Flexco; “Wallflowers Premium Rubber Wall Base.”
   c. Johnsonite; a Tarkett company; “BaseWorks Thermoset Rubber Wall Base.”
   d. Mannington Commercial; “Optimum Edge.”
   e. Roppe Corporation, USA; “Pinnacle Rubber Wall Base.”

   1. Material Requirement and Manufacturing Group: Type TS (rubber, vulcanized thermoset), Group 1 (solid, homogeneous).
   2. Style: Cove (base with toe).

C. Minimum Thickness: 0.125 inch.

D. Height: 4 inches.

E. Lengths: Coils in manufacturer’s standard length.

F. Outside and Inside Corners: Job formed.

G. Colors: As selected by Architect from manufacturer’s full range of available colors.

2.2 PROFILE RESILIENT BASE (RB-B)

A. Profile Resilient Base: Decorative contour rubber base.
   1. Type TP (Rubber, Thermoplastic) Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to the following:
      a. Burke Flooring; a division of Burke Industries; “Profiles Designer Wall Base.”
      b. Flexco; “Base Sculptures.”
      c. Johnsonite; a Tarkett company; “Millwork Wall Base.”
      d. Mannington Commercial; “Sculptured Wall Base.”
      e. Roppe Corporation, USA; “Contours.”

   1. Material Requirement and Manufacturing Group: Type TP (rubber, thermoplastic), Group 1 (solid, homogeneous) or Group 2 (layered).

C. Minimum Thickness at Toe: 0.25 inch.

D. Height: 6 inches.

E. Profile: Johnsonite Millwork “Reveal” or similar profile and size from another manufacturer as approved by the Architect.

F. Lengths: Coils or straight units in manufacturer’s longest standard length.

G. Outside Corners: Miter cut or premanufactured. Manufacturer’s preformed corner blocks of matching height and suitable for profile, if available, are acceptable if approved by the Architect.

H. Inside Corners: Butt and scribed, or premanufactured. Manufacturer’s preformed corner blocks of matching height and suitable for profile, if available, are acceptable if approved by the Architect.

I. End Blocks: Preformed end blocks of matching height and suitable for profile. Provide where profile resilient base does not end at an abutting edge.

J. Colors: As selected by Architect from manufacturer’s full range of available colors.
2.3 RESILIENT STAIR ACCESSORIES (RSR, RST)

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:
   a. Burke Flooring; a division of Burke Industries. TS
   b. Flexco, Inc. TS
   c. Johnsonite; a Tarkett company. TS
   d. Nora Systems, Inc. TS
   e. Roppe Corporation, USA. TS

B. Resilient Stair Treads Standard: ASTM F 2169.
   1. Type: TS (rubber, vulcanized thermostet).
   2. Class: 2 (pattern; embossed, grooved, or ribbed).
      a. Texture: As selected by Architect from full range of available textures.
   4. Nosing Style: Square, adjustable to cover angles between 60 and 90 degrees.
   6. Thickness: 0.180 inch minimum and 1/4 inch maximum at nose and tapered to back edge.
   7. Size: Lengths and depths to fit each stair tread in one piece or, for treads exceeding maximum lengths manufactured, in equal-length units.
   8. Integral Risers: Smooth, flat; in height that fully covers substrate.

C. Colors and Color Patterns: As selected by Architect from full range of industry colors.

2.4 RESILIENT MOLDING PATTERNS

A. Resilient Molding Accessories:
   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. Burke Flooring, Division of Burke Industries.
      b. Flexco, Inc.
      c. Johnsonite; a Tarkett company.
      d. R.C.A. Rubber Company (The).
      e. Roppe Corporation, USA.
      f. VPI, LLC; Floor Products Division.

B. Where metal or wood edgings, transitions, or thresholds are not indicated, provide resilient transition for all floor finishes.
   1. Carpet edge for glue-down applications: Johnsonite EG-XX-G or EG-XX-H or equivalent to suit carpet thickness.
   2. Reducer strip for flooring 0.080 inch x 1.125 inch: Johnsonite RRS-XX-B or equivalent.
   3. Reducer strip for flooring 1/8 inch x 1.25 inch: Johnsonite RRS-XX-C/D or equivalent.
   4. Reducer strip for flooring 1/4 inch x 1.5 inch: Johnsonite CRS-XX-A or equivalent.
   5. Reducer strip for flooring 1/8 inch to .080 inch x 1.5 inch: Johnsonite SSR-XX-D or equivalent. (example: VCT to linoleum)
   6. Joiner for tile and carpet 1/4 inch carpet to 1/8 inch tile: Johnsonite CTA-XX-C or equivalent.
   7. Carpet edge for glue-down applications to suit carpet thickness:
a. Roppe #160 or #169.
b. Johnsonite EG-XX-H or EG-XX-G.
c. Flexco #183 or #184.

8. Reducer strip for resilient flooring, to suit flooring thickness:
   a. Roppe #172.
   b. Johnsonite RRS-XX-C or CRS-XX-C.
   c. Flexco #192A.

9. Joiner for tile and carpet, to suit flooring thicknesses:
   a. Roppe #177.
   b. Johnsonite CTA-XX-#.
   c. Flexco #167.

C. Material: Vinyl or Rubber.

D. Profile and Dimensions: As indicated.

E. Colors and Patterns: As selected by Architect from full range of industry colors.

2.5 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. Moisture Vapor Treatment (MVT): Where resilient flooring and accessories are installed over concrete slabs, provide the following:
   1. Subject to compliance with requirements, provide alkaline-resistant product designed to control excessive moisture vapor transmission through concrete slab, and approved by the flooring manufacturer, equivalent to one of the following:
      a. Duraamen Engineered Products, Inc.; “Perdure MVT.”
      b. Maxxon Corporation; “Maxxon MVP.”
      c. Tnemec Company, Inc.; “Epoxoprime MVT, Series 208.”
   2. Verify with flooring manufacturer that submitted product maintains compliance with all provisions of flooring manufacturer’s warranty.
   3. Low-VOC: Provide product with VOC content less than 15 g/L.
   4. Bond Strength to Concrete: Minimum 400 psi per ASTM D 4541 (100% concrete failure).
   5. Permeance: Maximum 0.1 perm per ASTM E 96, and 0.10 grains/hr/ft²/in-Hg, per ASTM F 3010.
   6. Applications: Provide MVT for all concrete slabs on-grade and lightweight concrete elevated slabs.

C. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.

D. 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 so that each test area does not exceed 1000 sq. ft. perform not less than 2 tests in each installation area and with test areas evenly spaced in installation areas.
      a. Perform anhydrous calcium chloride test, ASTM F 1869.
      b. Perform relative humidity test using in situ probes, ASTM F 2170.
   5. Moisture Vapor Treatment (MVT): After initial moisture testing is complete, prepare slab and install MVT in accordance with manufacturer’s written instructions. If moisture testing indicates measurements are within acceptable levels for flooring installation without need of moisture vapor treatment, MVT may be omitted where approved by the Architect.
      a. After installation of MVT, perform final moisture tests to verify that moisture-vapor-emission rate is at an acceptable level for flooring installation. Proceed with flooring installation only after substrates demonstrate a moisture-vapor-emission rate and relative humidity not more than maximum indicated.
         1) Moisture-Vapor-Emission Rate: Maximum 3 lbs. of water/1,000 sq. ft. (1.36 kg of water/92.9 sq. m.) in 24 hours, unless indicated otherwise by flooring manufacturer’s requirements.
         2) Relative Humidity: Maximum 75 percent relative humidity, unless indicated otherwise by flooring manufacturer’s requirements.

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 resilient products until they are same temperature as the space where they are to be installed.
   1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.

E. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

3.3 RESILIENT 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.
   2. Inside Corners: Use straight pieces of maximum lengths possible.

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.

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 and resilient floor coverings that would otherwise be exposed.

D. Center transitions in cased openings and under door leafs at door openings unless indicated otherwise.

E. Subfloor Leveling Accessory: Butt to adjacent materials and tightly adhere leveling strips to substrate throughout length of each piece.
   1. At door openings, leveling strips shall be centered under doors. At cased openings, leveling strips shall be centered in the frame.

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 mars, 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 096513
SECTION 096516.19 - RESILIENT SHEET FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 SUBMITTALS
A. Product Data: For each type of product indicated.
B. Shop Drawings: For each type of floor covering. Include floor covering layouts, locations of seams, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
   1. Show details of special patterns.
C. Samples for Verification: In manufacturer’s standard size, but not less than 6-by-9-inch sections of each different color and pattern of floor covering required.
   1. For heat-welding bead, manufacturer’s standard-size Samples, but not less than 9 inches long, of each color required.
D. Seam Samples: For seamless-installation technique indicated and for each floor covering product, color, and pattern required; with seam running lengthwise and in center of 6-by-9-inch Sample applied to a rigid backing and prepared by Installer for this Project.
E. Product Schedule: For floor coverings. Use same designations indicated on Drawings.
F. Qualification Data: For qualified Installer.
G. Maintenance Data: For each type of floor covering to include in maintenance manuals.

1.3 QUALITY ASSURANCE
A. Installer Qualifications: A qualified installer who employs workers for this Project who are competent in techniques required by manufacturer for floor covering installation and seaming method indicated.
   1. Engage an installer who employs workers for this Project who are trained or certified by floor covering 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.

1.4 DELIVERY, STORAGE, AND HANDLING
A. Store floor coverings 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 rolls upright.

1.5 PROJECT CONDITIONS
A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 85 deg F, in spaces to receive floor coverings 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 covering installation.
D. Close spaces to traffic for 48 hours after floor covering installation.
E. Install floor coverings after other finishing operations, including painting, have been completed.

1.6 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. Floor Covering: Furnish quantity not less than 10 linear feet for every 500 linear feet or fraction thereof, in roll form and in full roll width for each color, pattern, and type of floor covering installed.

PART 2 - PRODUCTS

2.1 RESILIENT SHEET FLOOR COVERING - (SV)
A. Basis of Design Products: Subject to compliance with requirements, provide Shaw Contract; "Constant Sheet" or one of the following:
   1. Mannington Commercial; "Blockprint"
   2. Tarkett; "Acczent Inspire Serenade".
B. Unbacked Vinyl Sheet Floor Covering: ASTM F 1913.
   1. Type: Heterogeneous.
   2. Thickness: As standard with manufacturer.
C. Wearing Surface: Smooth.
D. Sheet Width: As standard with manufacturer.
F. Colors and Patterns: As selected by Architect from full range of industry colors.

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. Moisture Vapor Treatment (MVT): Where resilient flooring is installed over concrete slabs, provide the following:
   1. Subject to compliance with requirements, provide alkaline-resistant product designed to control excessive moisture vapor transmission through concrete slab, and approved by the flooring manufacturer, equivalent to one of the following:
      a. Duraamen Engineered Products, Inc.; “Perdure MVT.”
      b. Maxxon Corporation; “Maxxon MVP.”
      c. Tnemec Company, Inc.; “Epoxoprime MVT, Series 208.”
   2. Verify with flooring manufacturer that submitted product maintains compliance with all provisions of flooring manufacturer’s warranty.
   3. Low-VOC: Provide product with VOC content less than 15 g/L.
   4. Bond Strength to Concrete: Minimum 400 psi per ASTM D 4541 (100% concrete failure).
   5. Permeance: Maximum 0.1 perm per ASTM E 96, and 0.10 grains/hr/ft2/in-Hg, per ASTM F 3010.
6. Applications: Provide MVT for all concrete slabs on-grade and lightweight concrete elevated slabs.

C. Adhesives: Water-resistant type recommended by manufacturer to suit floor covering and substrate conditions indicated.
   1. Use adhesives that have a VOC content of not more than 50 g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

D. Seamless-Installation Accessories:
      a. Color: As selected by Architect from manufacturer’s full range to contrast with floor covering.

E. Integral-Flash-Cove-Base Accessories:
   1. Cove Strip: 1-inch radius provided or approved by manufacturer.
   2. Cap Strip: Square metal, vinyl, or rubber cap provided or approved by manufacturer.
   3. Corners: Metal inside and outside corners and end stops provided or approved by manufacturer.

F. Floor Polish: Provide protective liquid floor polish products as recommended by manufacturer.

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 coverings.
   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 floor coverings.
   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 so that each test area does not exceed 200 sq. ft. and perform not less than 2 tests in each installation area and with test areas evenly spaced in installation areas.
         a. Perform anhydrous calcium chloride test according to ASTM F 1869.
         b. Perform relative humidity test using in situ probes according to ASTM F 2170.
      5. Moisture Vapor Treatment (MVT): After initial moisture testing is complete, prepare slab and install MVT in accordance with manufacturer’s written instructions. If moisture testing indicates measurements are within acceptable levels for flooring installation without need of moisture vapor treatment, MVT may be omitted where approved by the Architect.
a. After installation of MVT, perform final moisture tests to verify that moisture-vapor-emission rate is at an acceptable level for flooring installation. Proceed with flooring installation only after substrates demonstrate a moisture-vapor-emission rate and relative humidity not more than maximum indicated.

1) Moisture-Vapor-Emission Rate: Maximum 3 lbs. of water/1,000 sq. ft. in 24 hours, unless indicated otherwise by flooring manufacturer’s requirements.

2) Relative Humidity: Maximum 75 percent relative humidity, unless indicated otherwise by flooring manufacturer’s requirements.

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 coverings until they are same temperature as space where they are to be installed.

1. Move floor coverings 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 floor coverings immediately before installation.

3.3 FLOOR COVERING INSTALLATION

A. Comply with manufacturer’s written instructions for installing floor coverings.

B. Unroll floor coverings and allow them to stabilize before cutting and fitting.

C. Lay out floor coverings as follows:

1. Maintain uniformity of floor covering direction.

2. Minimize number of seams; place seams in inconspicuous and low-traffic areas, at least 6 inches away from parallel joints in floor covering substrates.

3. Match edges of floor coverings for color shading at seams.

4. Avoid cross seams.

D. Scribe and cut floor coverings to butt neatly and tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, and door frames.

E. Extend rubber sheet flooring into toe spaces, door reveals, closets, and similar openings. Extend rubber sheet flooring to center of cased openings and to center under door leafs at door openings unless indicated otherwise. Where transitions occur to another flooring material, extend or cut rubber sheet flooring to suit transition.

F. Extend floor coverings into toe spaces, door reveals, closets, and similar openings.

G. Maintain reference markers, holes, or openings that are in place or marked for future cutting by repeating on floor coverings as marked on substrates. Use chalk or other nonpermanent marking device.

H. Install floor coverings on covers for telephone and electrical ducts and similar items in installation areas. Maintain overall continuity of color and pattern between pieces of floor coverings installed on covers and adjoining floor covering. Tightly adhere floor covering edges to substrates that abut covers and to cover perimeters.

I. Adhere floor coverings to 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.

J. Seamless Installation:

1. Heat-Welded Seams: Comply with ASTM F 1516. Rout joints and use welding bead to permanently fuse sections into a seamless floor covering. Prepare, weld, and finish
seams to produce surfaces flush with adjoining floor covering surfaces.

2. Chemically-Bonded Seams: Bond seams with chemical-bonding compound to permanently fuse sections into a seamless floor covering. Prepare seams and apply compound to produce tightly-fitted seams without gaps, overlays, or excess bonding compound on floor covering surfaces.

   1. Install metal corners at inside and outside corners.

3.4 CLEANING AND PROTECTION

A. Comply with manufacturer’s written instructions for cleaning and protection of floor coverings.

B. Perform the following operations immediately after completing floor covering installation:
   1. Remove adhesive and other blemishes from floor covering surfaces.
   2. Sweep and vacuum floor coverings thoroughly.
   3. Damp-mop floor coverings to remove marks and soil.

C. Protect floor coverings from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

D. Floor Polish: Remove soil, visible adhesive, and surface blemishes from floor covering before applying liquid floor polish.
   1. Apply one coat(s).

E. Cover floor coverings until Substantial Completion.

END OF SECTION 096516.19
SECTION 096519 - RESILIENT TILE FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 DEFINITIONS
   A. Grain: The apparent direction of the printed or inherent design in a tile.
   B. Pattern: The color arrangement and/or geometric arrangement of multiple tiles on a surface.

1.3 ACTION SUBMITTALS
   A. Product Data: For each type of product.
   B. Samples: Full-size units of each color and pattern of floor tile required.
   C. Product Schedule: For floor tile. Use same designations indicated on Drawings.

1.4 INFORMATIONAL SUBMITTALS
   A. Qualification Data: For Installer.

1.5 CLOSEOUT SUBMITTALS
   A. Maintenance Data: For each type of floor tile to include in maintenance manuals.

1.6 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. Floor Tile: Furnish one 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 and seaming method indicated.

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 FIELD 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. After installation and 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 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: For resilient tile flooring, as determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
   1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

2.2 LUXURY VINYL TILE (VT-A)

A. Basis of Design Product: Subject to compliance with requirements, provide Mohawk; "Select Step II Wood" or one of the following:
   1. Interface; "Criterion Classic Woodgrains."
   2. J&J Flooring; "Classics."
   3. Milliken Flooring; "FlexForm 2.5mm Glue Down."
   4. Shaw Contract; "Terrain II."

B. Tile Standard: ASTM F 1700.
   2. Type: A, smooth surface and B, embossed surface.

C. Thickness: 0.120 inch (3.0 mm) or 0.125 inch (3.2 mm).

D. Size: 7 by 48 inches.

E. Wear layer thickness: minimum 20 mils.

F. Colors and Patterns: As selected by Architect from full range of industry colors.

2.3 HOMOGENEOUS SOLID VINYL FLOOR TILE (VT-B)

A. Basis of Design Products: Subject to compliance with requirements, provide American Biltrite; "Texas Granite" or one of the following:
   1. Flexco, Inc; Delane Solid Vinyl Tile.
   2. Johnsonite; A Tarkett Company; Cortina Grande.
   3. Patcraft; a division of Shaw Industries, Inc.; Admix.
   4. Tandus Centiva; A Tarkett Company; Victory.
   5. VPI Corporation; Premium Resilient Tile.

B. Tile Standard: ASTM F 1700.
   1. Class: Class I, monolithic vinyl tile.
   2. Type: A, smooth surface.

C. Thickness: 0.120 inch (3.0 mm) or 0.125 inch (3.2 mm).

D. Size: 12 by 12 inches.

E. Colors and Patterns: As selected by Architect from full range of industry colors.

2.4 RUBBER FLOOR TILE (RFT-A)

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. American Biltrite; Marathon.
   2. Burke Flooring, Div of Burke Industries Inc; Endura.
   3. Flexco; FlexTones.
   4. Johnsonite; A Tarkett Company; Rubber Tile.
   5. Roppe Corporation, USA; Raised Rubber Tile.
C. Hardness: Not less than 85 as required by ASTM F 1344, measured using Shore, Type A durometer per ASTM D 2240.
D. Wearing Surface: Molded pattern.
E. Thickness: 0.125 inch (3.2 mm).
F. Size: Manufacturer’s standard 18 by 18 inches, 20 by 20 inches, or 24 by 24 inches.
G. Colors and Patterns: As selected by Architect from full range of available colors.

2.5 STATIC-DISSIPATIVE RUBBER FLOOR TILE (RFT-B)
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. American Biltrite; Marathon.
   2. Burke Flooring, Div of Burke Industries Inc; Endura.
   3. Flexco; ESD Rubber.
   4. Johnsonite; A Tarkett Company; iQ Granit SD.
   5. Nora Rubber Flooring, Interface, Inc; Noraplan Sentica.
   6. Roppe Corporation, USA; ESD Rubber Static Control Tile.
B. Tile Standard: ASTM F 1344, Class I-B, homogeneous rubber tile, through mottled.
C. Hardness: Not less than 85 as required by ASTM F 1344, measured using Shore, Type A durometer per ASTM D 2240.
D. Wearing Surface: Smooth-Surface Floor Tile
E. Thickness: Not less than 0.08 inches
F. Size: Manufacturer’s standard 18 by 18 inches, 20 by 20 inches, or 24 by 24 inches.
G. Colors and Patterns: As selected by Architect from full range of available colors.

2.6 RESILIENT BASE AND ACCESSORIES
A. Refer to Division 9 Section “Resilient Base and Accessories.”

2.7 INSTALLATION MATERIALS
A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by floor tile manufacturer for applications indicated.
B. Moisture Vapor Treatment (MVT): Where flooring is installed over concrete slabs, provide the following:
   1. Subject to compliance with requirements, provide alkaline-resistant product designed to control excessive moisture vapor transmission through concrete slab, and approved by the flooring manufacturer, equivalent to one of the following:
      a. Duraamen Engineered Products, Inc.; “Perdue MVT.”
      b. Maxxon Corporation; “Maxxon MVP.”
      c. Tnemec Company, Inc.; “Epoxoprime MVT, Series 208.”
   2. Verify with flooring manufacturer that submitted product maintains compliance with all provisions of flooring manufacturer’s warranty.
   3. Low-VOC: Provide product with VOC content less than 15 g/L.
   4. Bond Strength to Concrete: Minimum 400 psi per ASTM D 4541 (100% concrete failure).
   5. Permeance: Maximum 0.1 perm per ASTM E 96, and 0.10 grains/hr/ft2/in-Hg, per ASTM F 3010.
6. Applications: Provide MVT for all concrete slabs on-grade and lightweight concrete elevated slabs.

C. Adhesives: Water-resistant type recommended by floor tile and adhesive manufacturers to suit floor tile and substrate conditions indicated.
   1. Adhesives shall comply with the following limits for VOC content:
      a. Vinyl Composition Tile Adhesives: 50 g/L or less.
      b. Rubber Floor Adhesives: 60 g/L or less.

D. For ESD rubber tile:
   1. Static-Control Adhesive: Provided or approved by manufacturer; type that maintains electrical continuity of floor-covering system to ground connection.
   2. Grounding Strips: Provided or approved by manufacturer; type and size that maintains electrical continuity of floor-covering system to ground connection.

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.
      1. 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.
   B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION
   A. Prepare substrates according to floor tile 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 floor tile manufacturer. Do not use solvents.
      3. Alkalinity and Adhesion Testing: Perform tests recommended by floor tile manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 9 pH.
      4. Moisture Testing: Perform tests so that each test area does not exceed 1000 sq. ft. and perform not less than 2 tests in each installation area and with test areas evenly spaced in installation areas.
         a. Perform anhydrous calcium chloride test according to ASTM F 1869.
         b. Perform relative humidity test using in situ probes according to ASTM F 2170.
      5. Moisture Vapor Treatment (MVT): After initial moisture testing is complete, prepare slab and install MVT in accordance with manufacturer’s written instructions. If moisture testing indicates measurements are within acceptable levels for flooring installation without need of moisture vapor treatment, MVT may be omitted where approved by the Architect.
         a. After installation of MVT, perform final moisture tests to verify that moisture-vapor-emission rate is at an acceptable level for flooring installation. Proceed with flooring installation only after substrates demonstrate a moisture-vapor-emission rate and relative humidity not more than maximum indicated.
1) Moisture-Vapor-Emission Rate: Maximum 3 lbs. of water/1,000 sq. ft. in 24 hours, unless indicated otherwise by flooring manufacturer’s requirements.

2) Relative Humidity: Maximum 75 percent relative humidity, unless indicated otherwise by flooring manufacturer’s requirements.

C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.

D. Do not install floor tiles until they are the same temperature as the space where they are to be installed.
   1. At least 48 hours in advance of installation, move resilient floor tile and installation materials into spaces where they will be installed.

E. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient floor tile.

3.3 FLOOR TILE INSTALLATION

A. Comply with manufacturer’s written instructions for installing floor tile.

B. ESD rubber tile: Install static-control resilient flooring according to manufacturer's written instructions and with oversight by manufacturer's representative.

C. ESD rubber tile: Embed grounding strips in static-control adhesive. Extend grounding strips beyond perimeter of static-control resilient floor-covering surfaces to ground connections.

D. 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 square with room axis, unless indicated otherwise.

E. 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 out tiles with grain running in directions as follows:
      a. Non-directional Grain Layout: Adjacent tiles shall not have grain running in the same direction (“quarter turn”) unless indicated otherwise by manufacturer.
      b. Directional Grain Layout: Install tiles with grain running in direction indicated in drawings. Where grain direction is not shown in drawings, install parallel to preponderant long walls of rooms unless indicated otherwise.

F. 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.

G. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of cased openings and to center under door leafs at door openings unless indicated otherwise. Where transitions occur to another flooring material, extend or cut floor tiles to suit transition.

H. 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 marking device.

I. 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.

J. 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.

3.4 FIELD QUALITY CONTROL

A. Testing: Engage a qualified testing agency to test electrical resistance of static-control resilient flooring for compliance with requirements.
   1. Arrange for testing after static-control adhesives have fully cured and static-control resilient flooring has stabilized to ambient conditions and after ground connections are completed.

B. Static-control resilient flooring will be considered defective if it does not pass tests and inspections.

3.5 CLEANING AND PROTECTION

A. Comply with manufacturer’s written instructions for cleaning and protecting floor tile.

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.
      a. Do not wash surfaces until after time period recommended by manufacturer.

C. Protect floor tile from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

D. Cover products installed on horizontal surfaces with undyed, untreated building paper until Substantial Completion.

E. Do not move heavy and sharp objects directly over surfaces. Place hardboard or plywood panels over flooring and under objects while they are being moved. Slide or roll objects over panels without moving panels.

END OF SECTION 096519
SECTION 096623 - RESINOUS MATRIX TERRAZZO FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 PREINSTALLATION MEETINGS
   A. Preinstallation Conference: Conduct conference at Project site.
      1. Review methods and procedures related to terrazzo including, but not limited to, the following:
         a. Inspect and discuss condition of substrate and other preparatory work performed by other trades.
         b. Review and finalize construction schedule and verify availability of materials, Installer’s personnel, equipment, and facilities needed to make progress and avoid delays.
         c. Review special terrazzo designs and patterns.
         d. Review dust-control procedures.

1.3 ACTION SUBMITTALS
   A. Product Data: For each type of product.
   B. Shop Drawings: Include terrazzo installation requirements. Include plans, elevations, sections, component details, and attachments to other work. Show layout of the following:
      1. Divider strips.
      2. Control-joint strips.
      3. Accessory strips.
      4. Abrasive strips.
      5. Stair treads, risers, and landings.
      6. Precast terrazzo jointing and edge configurations.
      7. Terrazzo patterns.
      8. Concrete Slab Control Joint Layout at Terrazzo Floor Areas: Indicate proposed locations of concrete slab-on-grade control joints (construction joints and saw-cut contraction joints) for coordination.
         a. Locate proposed concrete slab construction joints at terrazzo floor areas as indicated, but not to exceed ACI-required spacings, and aligned with nearest joint and divider locations indicated on terrazzo floor pattern drawing except as otherwise noted.
   C. Samples: For each type, material, color, and pattern of terrazzo and accessory required showing the full range of color, texture, and pattern variations expected. Label each terrazzo sample to identify manufacturer’s matrix color and aggregate types, sizes, and proportions. Prepare Samples of same thickness and from same material to be used for the Work, in size indicated below:
      1. Terrazzo: 6-inch-square Samples.
      2. Precast Terrazzo: 6-inch-square Samples.
      3. Accessories: 6-inch-long Samples of each exposed strip item required.

1.4 INFORMATIONAL SUBMITTALS
   A. Qualification Data: For Installer.
   B. Material Certificates: For each type of terrazzo material or product, from manufacturer.
C. Schedule of Values: Terrazzo Schedule of Values shall include a separate line item for flexible reinforcing membrane (crack isolation membrane).

1.5 CLOSEOUT SUBMITTALS
A. Maintenance Data: For terrazzo to include in maintenance manuals.

1.6 QUALITY ASSURANCE
A. Primary Materials Manufacturer Qualifications:
   1. Obtain primary materials from an associate member of NTMA.
B. Installer Qualifications:
   1. Engage an installer who is a contractor member of NTMA.
C. Source Limitations: Obtain primary terrazzo materials, including moisture treatment, membranes, primers, resins, and hardening agents, from single source from single manufacturer. Provide secondary materials including aggregates, divider strips, sealers and cleaners of type and from source recommended by manufacturer of primary materials.
D. Source Limitations for Aggregates: Obtain each color, grade, type, and variety of granular materials from single source with resources to provide materials of consistent quality in appearance and physical properties.
E. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
   1. Build mockups for terrazzo including accessories.
      a. Size: Minimum 100 sq. ft. of typical poured-in-place flooring and base condition for each color and pattern in locations indicated.
      b. Include base.
   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. Retain and maintain mockups during construction in undisturbed condition as a standard for judging completed work.
   4. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
F. Coordination: Epoxy terrazzo flooring manufacturer shall review and approve Contractor’s written Quality Control measures, specified in Division 03 Section “Cast-in-Place Concrete,” for concrete slab placement, finish and level for (slab-on-grade and elevated) slab areas to receive epoxy terrazzo flooring.

1.7 DELIVERY, STORAGE, AND HANDLING
A. Deliver materials to Project site in supplier’s original wrappings and containers, labeled with source’s or manufacturer’s name, material or product brand name, and lot number if any.
B. Store materials in their original, undamaged packages and containers, inside a well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.

1.8 FIELD CONDITIONS
A. Environmental Limitations: Comply with manufacturer’s written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting terrazzo installation.
B. Field Measurements: Verify actual dimensions of construction contiguous with precast terrazzo by field measurements before fabrication.

C. Provide permanent lighting or, if permanent lighting is not in place, simulate permanent lighting conditions during terrazzo installation.

D. Close spaces to traffic during terrazzo application and for not less than 24 hours after application unless manufacturer recommends a longer period.

E. Control and collect water and dust produced by grinding operations. Protect adjacent construction from detrimental effects of grinding operations.

F. Prior to and during each day of installation, the terrazzo contractor shall verify that the dew point is at least 5ºF less than the slab and air temperature.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. NTMA Standards: Comply with NTMA’s "Terrazzo Specifications and Design Guide" and with written recommendations for terrazzo type indicated unless more stringent requirements are specified.

2.2 EPOXY-RESIN TERRAZZO

A. Epoxy-Resin Terrazzo: Comply with NTMA’s "Terrazzo Specifications and Design Guide" and manufacturer’s written instructions for matrix and aggregate proportions and mixing.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. Key Resin Company; Key Epoxy Terrazzo.
   b. Master Terrazzo Technologies LLC; Morricite.
   c. Sherwin Williams Company, General Polymers; Terrazzo 1100.
   d. Terrazzo & Marble Supply Companies; Terroxy Resin Systems. (Basis of Design)

2. Thickness: 3/8 inch nominal.

3. Custom Mix Color and Pattern: A three (3) color pattern is required, as indicated on finish pattern plans, utilizing colors selected by Architect from manufacturer's full range.
   a. Mix design for TERR-E1:
      1) Epoxy - custom match to Architect's selection
      2) Aggregate:
         a) 80% Marble Chips: Sizes 0-1
         b) 20% Glass Chips: Size 1
   b. Mix Design for TERR-E2
      1) Epoxy - custom match to Architect's selection
      2) Aggregate:
         a) 80% Marble Chips: Sizes 0-1
         b) 20% Glass Chips: Size 1
   c. Mix Design for TERR-E3
      1) Epoxy - custom match to Architect's selection
      2) Aggregate:
         a) 80% Marble Chips: Sizes 0-1
         b) 10% Glass Chips: Size 1
         c) 10% Mother of Pearl Freshwater Chips: Size 1

B. Materials:
1. Flexible Reinforcing Membrane: Manufacturer’s resinous membrane for substrate-crack preparation and reflective-crack reduction.
2. Primer: Manufacturer’s product recommended for substrate and use indicated.
3. Moisture Vapor Treatment (MVT):
   a. Subject to requirements, terrazzo flooring manufacturer’s recommended product recommended for control of excessive moisture vapor transmission, alkaline-resistant, 0 VOC, and with following properties:
      1) Bond Strength to Concrete: 400 lbs. per ASTM D 4541, 100% concrete failure.
      2) Permeance: Maximum 0.30 perms per ASTM E 96.
   b. Include MVT for all slabs on-grade and lightweight concrete.
4. Epoxy-Resin Matrix: Manufacturer’s standard recommended for use indicated and in color required for mix indicated.
   a. Physical Properties without Aggregates:
      1) Hardness: 60 to 85 per ASTM D 2240, Shore D.
      2) Minimum Tensile Strength: 3000 psi per ASTM D 638 for a 2-inch specimen made using a "C" die per ASTM D 412.
      3) Minimum Compressive Strength: 10,000 psi per ASTM D 695, Specimen B cylinder.
      4) Chemical Resistance: No deleterious effects by contaminants listed below after seven-day immersion at room temperature per ASTM D 1308.
         a) Distilled water.
         b) Mineral water.
         c) Isopropanol.
         d) Ethanol.
         e) 0.025 percent detergent solution.
         f) 1.0 percent soap solution.
         g) 10 percent sodium hydroxide.
         h) 10 percent hydrochloric acid.
         i) 30 percent sulfuric acid.
         j) 5 percent acetic acid.
   b. Physical Properties with Aggregates: For resin blended with Georgia white marble, ground, grouted, and cured per requirements in NTMA’s "Terrazzo Specifications and Design Guide"; comply with the following:
      1) Flammability: Self-extinguishing, maximum extent of burning 1/4 inch per ASTM D 635.
      2) Thermal Coefficient of Linear Expansion: 0.0025 inch/inch per deg F for temperature range of minus 12 to plus 140 deg F per ASTM D 696.
5. Aggregates: Comply with NTMA gradation standards for mix indicated and contain no deleterious or foreign matter.
   a. Abrasion and Impact Resistance: Less than 40 percent loss per ASTM C 131.
   b. 24-Hour Absorption Rate: Less than 0.75 percent.
   c. Dust Content: Less than 1.0 percent by weight.
6. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 1.0 percent.
2.3 PRECAST EPOXY-RESIN TERRAZZO

A. Basis of Design Product: Subject to compliance with requirements, provide Terrazzo & Marble Supply Companies; "Precast Terrazzo" or comparable product by one of the following:
1. Precast Terrazzo Enterprises, Inc.
2. Romoco Precast Terrazzo Products.
3. Wausau Tile Inc.

B. Precast Terrazzo Base Units: Minimum 3/8 inch (9.5 mm) thick; cast in maximum lengths possible, but not less than 36 inches.
1. Type: Coved with minimum 3/4-inch (19-mm) radius.
2. Top Edge: Beveled with polished top surface.
4. Outside Corner Units: With finished returned edges at outside corner.

C. Precast Terrazzo Stair Treads and Nosings (including nosings at landings unless indicated otherwise): 3/8 inch (9.5 mm) thick with rounded nosing edge.
   a. Extruded Units: Aluminum, 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) UPNOVR, Inc. (ACL Industries, Inc.)
         b) American Safety Tread Co., Inc.
         c) Amstep Products.
         d) Armstrong Products, Inc.
         e) Balco, Inc.
         f) Granite State Casting Co.
         g) Nystrom, Inc.
         h) Wooster Products Inc.
      2) Provide solid-abrasive-type units without ribs.
      3) Nosings: Square-back units, 2 inches wide, for casting into terrazzo stair treads and landings.
   b. Provide anchors for embedding units in terrazzo, either integral or applied to units, as standard with manufacturer.
   c. Drill for mechanical anchors and countersink. Locate holes not more than 4 inches from ends and not more than 12 inches o.c., evenly spaced between ends, unless otherwise indicated. Provide closer spacing if recommended by manufacturer.
   d. Apply clear lacquer to concealed surfaces of extruded units.
   e. Colors: As selected by Architect from manufacturer’s full range.
2. Color, Pattern, and Finish: As selected by Architect from manufacturer’s full range.

D. Precast Terrazzo Units: Comply with NTMA’s written recommendations for fabricating precast terrazzo units in sizes and profiles indicated. Reinforce units as required by unit sizes, profiles, and thicknesses and as recommended by manufacturer. Finish exposed-to-view edges and reveals to match face finish. Ease exposed edges to 1/8-inch radius.
2.4 STRIP MATERIALS
A. Thin-Set Divider Strips: L-type angle or T-type, depth required for topping thickness indicated.
   1. Material: White-zinc alloy or aluminum.
   2. Top Width:
      a. At Concrete Construction Joints: 16 gauge (1.6 mm) unless indicated otherwise.
      b. Other Joints: 16 gauge (1.6 mm) unless indicated otherwise.
B. Heavy-Top Divider Strips: L-type angle in depth required for topping thickness indicated.
   1. Bottom-Section Material: Matching top-section material.
   3. Top Width: 16 gauge (1.6 mm) unless indicated otherwise.
C. Control-Joint Strips: Separate, double L-type angles, positioned back to back, that match material and color of divider strips and in depth required for topping thickness indicated.
D. Accessory Strips: Match divider-strip width, material, and color unless otherwise indicated.
   Use the following types of accessory strips as required to provide a complete installation:
   1. Base-bead strips for exposed top edge of terrazzo base.
   2. Edge-bead strips for exposed edges of terrazzo.
   3. Nosings for terrazzo stair treads and landings.
E. Abrasive Strips: Three-line abrasive inserts at nosings. Silicon carbide or aluminum oxide, or combination of both, in epoxy-resin binder and set in channel.
   1. Width: 1/2 inch (12.7 mm).
   2. Depth: As required by terrazzo thickness.
   3. Length: 4 inches (100 mm) less than stair width.
   4. Color: As selected by Architect from full range of industry colors.

2.5 MISCELLANEOUS ACCESSORIES
A. Strip Adhesive: Epoxy-resin adhesive recommended by adhesive manufacturer for this use.
B. Anchoring Devices:
   1. Strips: Provide mechanical anchoring devices or adhesives for strip materials as recommended by manufacturer and required for secure attachment to substrate.
   2. Precast Terrazzo: Provide mechanical anchoring devices as recommended by fabricator for proper anchorage and support of units for conditions of installation and support.
C. Patching and Fill Material: Terrazzo manufacturer’s resinous product approved and recommended by manufacturer for application indicated.
D. Joint Compound: Terrazzo manufacturer’s resinous product approved and recommended by manufacturer for application indicated.
E. Resinous Matrix Terrazzo Cleaner: Chemically neutral cleaner with pH factor between 7 and 10 that is biodegradable, phosphate free, and recommended by sealer manufacturer for use on terrazzo type indicated.
F. Sealer: Slip- and stain-resistant, penetrating-type sealer that is chemically neutral; does not affect terrazzo color or physical properties; is recommended by sealer manufacturer; and complies with NTMA’s "Terrazzo Specifications and Design Guide" for terrazzo type

RESINOUS MATRIX TERRAZZO FLOORING

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1. Surface Friction: Not less than 0.6 according to ASTM D 2047.
2. Acid-Base Properties: With pH factor between 7 and 10.
3. Products shall comply with the requirements of the California Department of Public Health’s "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
4. Type: Water-based acrylic.
   a. Basis-of-Design Product: Subject to compliance with requirements, provide Terrazzo & Marble Supply Companies; “Terroxy” WB Urethane Sealer or equal.

PART 3 - EXECUTION

3.1 EXAMINATION
   A. Examine substrates and areas, with Installer and epoxy terrazzo flooring manufacturer’s technical representative present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
   B. Proceed with installation only after unsatisfactory conditions, including levelness tolerances, have been corrected.

3.2 PREPARATION
   A. Clean substrates of substances, including oil, grease, and curing compounds, that might impair terrazzo bond. Provide clean, dry, and neutral substrate for terrazzo application.
   B. Concrete Slabs:
      1. Provide sound concrete surfaces free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants incompatible with terrazzo.
         a. Shot-blast surfaces with an apparatus that abrades the concrete surface, contains the dispersed shot within the apparatus, and recirculates the shot by vacuum pickup. Shot-blast surfaces to a profile consistent with ICRI Technical Guidelines for CSP 3-4.
         b. Acid washing and/or grinding of concrete slabs is not allowed.
         c. Review vacuum blasted concrete slab substrate for cracks with epoxy terrazzo technical representative. Rout out and fill significant non-moving cracks with epoxy resin, and patch lesser non-moving cracks with fine mesh strip set into wet primer and embedded in epoxy resin as recommended by technical representative.
         d. Provide an epoxy or cementitious pre-fill material manufactured or recommended by epoxy flooring manufacturer and compatible with flooring system to fill low slab areas to attain acceptable substrate. This companion material is considered part of the epoxy terrazzo flooring system and shall be included in the system warranty. Gypsum composition underlayment pre-fill material is not acceptable.
   C. Verify that concrete substrates are dry and moisture-vapor emissions are within acceptable levels according to manufacturer’s written instructions.
      1. Moisture Testing: Perform tests indicated below.
         a. Calcium Chloride Test: Perform anhydrous calcium chloride test per ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
b. In-Situ Probe Test: Perform relative-humidity test using in-situ probes per
ASTM F 2170. Proceed with installation only after substrates have a maximum
75 percent relative-humidity-level measurement.

c. Contractor shall carefully record all vital conditions (temperature, relative
humidity, dew points, etc.) when conducting the testing and then document in
writing the results to the Architect and Owner.

2. Moisture Vapor Treatment (MVT): After initial moisture testing is complete, install
MVT in accordance with manufacturer’s written instructions. If moisture testing
indicates measurements are within acceptable levels for flooring installation without
need of moisture vapor treatment, MVT may be omitted where approved by the
Architect.

   a. After installation of MVT, perform final moisture tests to verify that moisture-
   vapor-emission rate is at an acceptable level for flooring installation. Proceed
   with flooring installation only after substrates have maximum moisture-vapor-
   emission rate of 3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) in 24
   hours.

D. Prior to and during each day of installation, the terrazzo installer shall verify that the dew
point is at least 5 degrees F less than the slab and air temperature.

E. Protect other work from water and dust generated by grinding operations. Control water and
dust to comply with environmental protection regulations.

   1. Erect and maintain temporary enclosures and other suitable methods to limit water
damage and dust migration and to ensure adequate ambient temperatures and
   ventilation conditions during installation.

3.3 EPOXY-RESIN TERRAZZO INSTALLATION

   A. Comply with NTMA’s written recommendations for terrazzo and accessory installation.

   B. Extend terrazzo flooring into toe spaces, closets, and similar openings unless otherwise
   indicated. Extend terrazzo flooring to center of cased openings and to center under door
   leafs at door openings unless indicated otherwise. Where transitions occur to another
   flooring material, extend or terminate terrazzo flooring to suit transition.

   C. Place, rough grind, grout, cure grout, fine grind, and finish terrazzo according to
   manufacturer’s written instructions and NTMA’s Terrazzo Specifications and Design
   Guide.”

   D. Installation Tolerance: Limit variation in terrazzo surface from level to 1/4 inch in 10 feet;
   noncumulative.

   E. Ensure that matrix components and fluids from grinding operations do not stain terrazzo by
   reacting with divider and control-joint strips.

   F. Delay fine grinding until heavy trade work is complete and construction traffic through area
   is restricted.

   G. Flexible Reinforcing Membrane:

   1. Prepare and prefill substrate cracks with membrane material.

   2. Install membrane at substrate cracks in areas to receive terrazzo unless indicated
   otherwise.

   3. Reinforce membrane with fiberglass scrim.

   4. Prepare membrane according to manufacturer’s written instructions before applying
   substrate primer.

   H. Primer: Apply to terrazzo substrates according to manufacturer’s written instructions.

   I. Strip Materials:
1. Divider and Control-Joint Strips:
   a. Locate divider strips in locations indicated.
   b. Install control-joint strips back to back directly above concrete-slab control joints in locations indicated.
   c. Install control-joint strips with 1/4-inch (6.4-mm) gap between strips, and install sealant in gap.
   d. Install strips in adhesive setting bed without voids below strips, or mechanically anchor strips as required to attach strips to substrate, as recommended by strip manufacturer.

2. Accessory Strips: Install as required to provide a complete installation.

3. Abrasive Strips: Install with surface of abrasive strip positioned 1/16 inch (1.6 mm) higher than terrazzo surface.

J. Fine Grinding: Grind with stones 800 grit or finer until all grout is removed from surface. Repeat rough grinding, grout coat, and fine grinding if large voids exist after initial fine grinding. Produce surface with a minimum of 70 percent aggregate exposure. Provide level of finish and polish accepted by Owner from approved sample.

3.4 PRECAST TERRAZZO INSTALLATION
   A. Install precast terrazzo units using method recommended by NTMA and manufacturer unless otherwise indicated.
   B. Do not install units that are chipped, cracked, discolored, or not properly finished.
   C. Seal joints between units with joint compound matching precast terrazzo matrix.

3.5 REPAIR
   A. Cut out and replace terrazzo areas that evidence lack of bond with substrate. Cut out terrazzo areas in panels defined by strips and replace to match adjacent terrazzo, or repair panels according to NTMA’s written recommendations, as approved by Architect.

3.6 FIELD QUALITY CONTROL
   A. Inspection Reports of Manufacturer’s Representative: Arrange for and schedule the epoxy terrazzo manufacturer’s representative inspection of the work. The manufacturer’s representative shall provide copies of his written inspection reports to the Architect within 10 working days of the inspection. The Installer shall notify the manufacturer’s representative of intended start date and schedule of work.
      1. The manufacturer’s representative shall inspect the work no less than two times during the construction.
         a. The first inspection shall be of the mockup, if any, or the first area completed that is over 100 square feet in size.
         b. The second inspection shall be at substantial completion.
      2. If the inspection reveals any defects, the Contractor shall immediately rectify all such defects at his cost.

3.7 CLEANING AND PROTECTION
   A. Cleaning:
      1. Remove grinding dust from installation and adjacent areas.
      2. Wash surfaces with cleaner according to NTMA’s written recommendations and manufacturer’s written instructions; rinse surfaces with water and allow them to dry thoroughly.
   B. Sealing:
      1. Seal surfaces according to NTMA’s written recommendations.
2. Apply sealer according to sealer manufacturer’s written instructions.

C. Protection: Provide final protection and maintain conditions, in a manner acceptable to Installer, that ensure that terrazzo is without damage or deterioration at time of Substantial Completion.

1. Leave finished installation clean and free of cracked, chipped, broken, unbonded, and otherwise defective terrazzo work. Repair or replace defective terrazzo work to attain the specified NTMA standards for finished work. The party responsible for the damaged or otherwise non-confirming work shall be responsible for the cost of repair.

END OF SECTION 096623
SECTION 096813 - TILE CARPETING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 ACTION SUBMITTALS
   A. Product Data: For each type of product indicated. Include manufacturer’s written data on physical characteristics, durability, and fade resistance. 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. Existing flooring materials to be removed.
      3. Existing flooring materials to remain.
      4. Carpet tile type, color, and dye lot.
      5. Type of subfloor.
      6. Type of installation.
      7. Pattern of installation.
      8. Pattern type, location, and direction.
      10. Type, color, and location of insets and borders.
      11. Type, color, and location of edge, transition, and other accessory strips.
      12. 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.
      2. Exposed Edge, Transition, and other Accessory Stripping: 12-inch-long Samples.
   D. Product Schedule: For carpet tile. Use same designations indicated on Drawings.

1.3 INFORMATIONAL SUBMITTALS
   A. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency.
   B. Sample Warranty: For special warranty.

1.4 CLOSEOUT SUBMITTALS
   A. Maintenance Data: For carpet tiles to include in maintenance manuals. Include the following:
      1. Methods for maintaining carpet 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 carpet tile.
   B. Warranty: Special warranty specified in this Section.
1.5 QUALITY ASSURANCE
A. Fire-Test-Response Characteristics: Provide products with the critical radiant flux classification indicated in Part 2, as determined by testing identical products per ASTM E 648 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.

1.6 SUBSTITUTIONS:
A. Prequalifications: Manufacturers seeking consideration as an acceptable alternative to the specified carpet tile material must submit samples, specifications and certified test data a minimum of 10 days prior to receipt of bids to the Architect. Materials not meeting all product, technical and performance criteria will not be considered.

1.7 DELIVERY, STORAGE, AND HANDLING
A. Comply with CRI Carpet Installation Standard, Section 5, “Storage and Handling.”

1.8 PROJECT CONDITIONS
A. Comply with CRI Carpet Installation Standard, Section 7, “Site Conditions – All Installations” and Section 11, “Ventilation.”
B. Environmental Limitations: Do not install carpet tiles until wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
C. Do not install carpet tiles 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 carpet tiles, install carpet tiles before installing these items.

1.9 WARRANTY
A. Special Warranty for Carpet Tiles: Manufacturer’s standard form in which 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 loss of face fiber, edge raveling, snags, runs, loss of tuft bind strength, dimensional stability, excess static discharge, and delamination.
3. Warranty Period: 10 years from date of Substantial Completion.

1.10 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. Carpet Tile: Full-size units equal to 5 percent of amount installed for each type indicated, but not less than 10 sq. yd.
PART 2 - PRODUCTS

2.1 CARPET TILE PRODUCTS
   A. Products: Provide specified carpet tile or prequalified alternate carpet tile only. No substitutions will be considered after award of Contract.
   B. Subject to compliance with requirements, provide Basis-of-Design carpet tile product or comparable product by one of the following manufacturers, subject to acceptance by Architect:
      1. Bentley Mills
      2. Interface, Inc.
      3. Mannington Mills
      4. Milliken, Inc.

2.2 CARPET TILE (C-TILE-A)
   A. Manufacturer: Milliken, Inc.
      1. Product Name: Major Frequency: Three Collection, Impromptu
      2. Color: As selected by Architect from manufacturer's full range.
      3. Fiber Content: Universal Fibers Type 6,6 Nylon
      4. Gauge: 1/12
      5. Stitches: 10.2 per inch.
      7. Size: 9.85 by 39.4 inches

2.3 CARPET TILE (C-TILE-B)
   A. Manufacturer: Milliken, Inc.
      1. Product Name: Change Agent Collection, Brushed Metal
      2. Color: As selected by Architect from manufacturer's full range.
      3. Fiber Content: Type 6,6 Nylon
      4. Gauge: 1/12
      5. Stitches: 9.8 per inch.
      7. Size: 19.7 by 39.4 inches

2.4 CARPET TILE (C-TILE-C)
   A. Manufacturer: Milliken, Inc.
      1. Product Name: Arctic Survey Collection, Expedition
      2. Color: As selected by Architect from manufacturer's full range.
      3. Fiber Content: Universal Fibers Type 6,6 Nylon
      4. Gauge: 1/12
      5. Stitches: 12.4 per inch.
      7. Size: 9.85 by 39.4 inches

2.5 CARPET TILE (C-TILE-D)
   A. Manufacturer: Milliken, Inc.
      1. Product Name: Low County Collection, Sea Rise
      2. Color: As selected by Architect from manufacturer's full range.
      3. Fiber Content: Type 6,6 Nylon
2.6 CARPET TILE (C-TILE-E)
A. Manufacturer: Milliken, Inc.
   1. Product Name: OBEX Collection, CutX Drift Tile
   2. Color: As selected by Architect from manufacturer’s full range.
   3. Fiber Content: Type 6,6 Nylon
   4. Gauge: 5/32
   5. Stitches: 9.5 per inch.
   7. Size: 19.7 by 19.7 inches

2.7 INSTALLATION ACCESSORIES
A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.
B. Moisture Vapor Treatment (MVT): Where flooring is installed over concrete slabs, provide the following:
   1. Subject to compliance with requirements, provide alkaline-resistant product designed to control excessive moisture vapor transmission through concrete slab, and approved by the flooring manufacturer, equivalent to one of the following:
      a. Duraamen Engineered Products, Inc.; “Perdure MVT.”
      b. Maxxon Corporation; “Maxxon MVP.”
      c. Tnemec Company, Inc.; “Epoxoprime MVT, Series 208.”
   2. Verify with flooring manufacturer that submitted product maintains compliance with all provisions of flooring manufacturer’s warranty.
   3. Low-VOC: Provide product with VOC content less than 15 g/L.
   4. Bond Strength to Concrete: Minimum 400 psi per ASTM D 4541 (100% concrete failure).
   5. Permeance: Maximum 0.1 perm per ASTM E 96, and 0.10 grains/hr/ft²/in-Hg, per ASTM F 3010.
   6. Applications: Provide MVT for all concrete slabs on-grade and lightweight concrete elevated slabs.
C. Adhesives: 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.
   1. VOC Limits: Adhesives with VOC content not more than 50 g/L when calculated according to 40 CFR 59, Subpart D (EPA method 24).

PART 3 - EXECUTION
3.1 EXAMINATION
A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet tile performance. Examine carpet tile for type, color, pattern, and potential defects.
B. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710 and the following:
   1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by carpet tile manufacturer.
   2. Subfloor finishes comply with requirements specified in Division 3 Section “Cast-in-Place Concrete” for slabs receiving carpet tile.
   3. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.

C. For wood subfloors, verify the following:
   1. Underlayment over subfloor complies with requirements specified in Division 6 Section “Rough Carpentry.”
   2. Underlayment surface is free of irregularities and substances that may interfere with adhesive bond or show through surface.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. General: Comply with CRI Carpet Installation Standard, Section 7 “Site Conditions – All Installations,” and with carpet tile manufacturer’s written installation instructions for preparing substrates indicated to receive carpet tile installation.

B. Concrete Substrates:
   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 floor tile manufacturer. Do not use solvents.
   3. Alkalinity and Adhesion Testing: Perform tests recommended by floor tile manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 9 pH.
   4. Moisture Testing: Perform tests so that each test area does not exceed 200 sq. ft. and perform not less than 2 tests in each installation area and with test areas evenly spaced in installation areas.
      a. Perform anhydrous calcium chloride test according to ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor emission rate indicated.
         1) Moisture-Vapor-Emission Rate: Maximum 3 lbs. of water/1,000 sq. ft. in 24 hours, unless indicated otherwise by flooring manufacturer’s requirements.
      b. Perform relative humidity test using in situ probes according to ASTM F 2170. Proceed with installation only after substrates have a maximum relative humidity level measurement indicated.
   5. Moisture Vapor Treatment (MVT): After initial moisture testing is complete, prepare slab and install MVT in accordance with manufacturer’s written instructions. If moisture testing indicates measurements are within acceptable levels for flooring installation without need of moisture vapor treatment, MVT may be omitted where approved by the Architect.
      a. After installation of MVT, perform final moisture tests to verify that moisture-vapor-emission rate is at an acceptable level for flooring installation. Proceed with flooring installation only after substrates demonstrate a moisture-vapor-emission rate and relative humidity not more than maximum indicated.
C. Use trowelable leveling and patching compounds, according to manufacturer’s written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8 inch wide or wider and protrusions more than 1/32 inch, unless more stringent requirements are required by manufacturer’s written instructions.

D. Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by carpet tile manufacturer.

E. Clean metal substrates of grease, oil, soil and rust, and prime if directed by adhesive manufacturer. Rough sand painted metal surfaces and remove loose paint. Sand aluminum surfaces, to remove metal oxides, immediately before applying adhesive.

F. Broom and vacuum clean substrates to be covered immediately before installing carpet tile.

3.3 INSTALLATION

A. General: Comply with CRI Carpet Installation Standard, Section 18 “Modular Carpet,” and with carpet tile manufacturer’s written installation instructions.

B. Installation Method: Direction indicated as follows and as recommended in writing by carpet tile manufacturer for specific pattern used. Glue down; install every tile with full-spread, releasable, pressure-sensitive adhesive.
   1. C-TILE-A: Quarter Turned
   2. C-TILE-B: All plank method.
   3. C-TILE-C: All plank method.
   4. C-TILE-D: All plank method.
   5. C-TILE-E: Modular.

C. Maintain dye lot integrity. Do not mix dye lots in same area.

D. 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.

E. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings. Extend carpet tile to center of cased openings and to center under door leafs at door openings unless indicated otherwise. Where transitions occur to another flooring material, extend or cut carpet tile to suit transition.

F. 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.

G. Install pattern parallel to walls and borders.

H. Stagger joints of carpet tiles so carpet tile grid is offset from access flooring panel grid. Do not fill seams of access flooring panels with carpet adhesive; keep seams free of adhesive.

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.

B. Protect installed carpet tile to comply with CRI Carpet Installation Standard, Section 20, “Protection of 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.

3.5 OWNER TRAINING

A. Instruct Owner’s personnel responsible for maintaining installed carpet in accordance with manufacturer’s published recommendations. Carpet manufacturer’s technical representative shall conduct a training seminar for Owner’s Lead of Facilities Maintenance and selected supervisors to demonstrate manufacturer’s recommended cleaning, spot cleaning and preventive maintenance procedures of the installed carpet products.

1. Conduct the training seminar within the Substantially Completed facility, utilizing cleaning equipment purchased by the Owner for facilities maintenance.
2. Training seminar shall include both demonstrations and hands-on cleaning of the installed product(s) by Owner’s personnel.
3. Carpet manufacturer’s technical representative shall digitally record the training seminar and furnish the Owner with two (2) copies (in DVD format) for future instruction of Facilities Maintenance personnel.

END OF SECTION 096813
SECTION 096817 - TEXTILE COMPOSITE FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 DEFINITIONS
   A. Textile Composite Flooring: A hybrid floor covering consisting of a tufted loop nylon or polyester fiber wear layer thermally fused to a cushioned polyester backing, commonly referred to as textile composite flooring (TCF), vinyl cushion tufted textile (VCTT), or tufted textile flooring.

1.3 SUBMITTALS
   A. Shop Drawings: Showing the extent of installation, seam direction of TCF, and accessories shall be submitted to Architect for approval prior to installation. Check pattern match, if any, for matching during installation and possible waste factors in ordering required amounts. Shop drawings shall also indicate columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet. A copy of the approved shop drawings shall be available on job site during installation.
   B. Schedule: TCF schedule using same room designations indicated on drawings.
   C. Product Data: Provide data on specified products, describing physical and performance characteristics, sizes, patterns, colors available, and method of installation.
   D. Selection Samples: Submit manufacturer’s complete set of color samples for Architect’s initial color selection.
   E. Manufacturer’s Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention. Submit installation instructions and seaming diagram.
   F. Maintenance Data: Include maintenance procedures, recommendations for maintenance materials and equipment, and suggested schedule for cleaning. In-house maintenance demonstration to be given by carpet manufacturer within 30 days after installation with end user.
   G. Manufacturer’s Warranty in writing, registered with manufacturer.

1.4 QUALITY ASSURANCE
   A. Manufacturer Qualifications:
      1. Manufacturer to provide representative to assist in project start-up and to inspect installation while in process and upon completion. Representative will notify designated contact if any installation instructions are not followed.
      2. Single Source Responsibility: Obtain each type of carpet from one source and by a single manufacturer.
   B. Installer Qualifications:
      1. Flooring contractor must submit list of certified installers prior to bid.
      2. Flooring contractor to be a specialty contractor normally engaged in this type of work and shall have prior experience in the installation of these types of materials.
      3. Flooring contractor shall be responsible for proper product installation, including floor testing and preparation, as specified by the carpet manufacturer.
1.5 DELIVERY, STORAGE, & HANDLING

A. Deliver materials to the site in manufacturer’s original packaging listing manufacturer’s name, product name, identification number, and related information.

B. Store in a dry location, between 60 degrees F and 80 degrees F and a relative humidity below 65 percent. Protect from damage and soiling. Place pallets of textile composite flooring modules on a flat surface (do not double stack pallets).

C. Make stored materials available for inspection by the Owner’s representative.

D. Store materials in area of installation for minimum period of 48 hours prior to installation.

1.6 PROJECT CONDITIONS

A. Sub-floor preparation is to include all required work to prepare the existing floor for installation of the product as specified in this document and manufacturer’s installation instructions.

B. The maximum amount of moisture evacuation from the floor is 3.0 pounds per 1,000 square feet in 24 hours. The acceptable pH level of the substrate is between 7.0 and 9.0. Flooring contractor is responsible for floor testing.

C. All material used in sub-floor preparation and repair shall be recommended by the carpet manufacturer and shall be chemically and physically compatible with the carpet system being bid. Architect to verify concrete curing agent for compatibility.

D. Maintain minimum 65 degrees F ambient temperature and 65% Relative Humidity for 72 hours prior to, during, and 48 hours after installation.

E. Do not install flooring until space is enclosed and weatherproof, wet-work in space is completed and nominally dry, work above ceilings is complete, and ambient temperature and humidity conditions are and shall be continuously maintained at values near those indicated for final occupancy.

1.7 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. Coordinate storage location with owner.

1. TCF Tile: Full-size units equal to 5 percent of amount installed for each type indicated, but not less than 10 sq. yd.

1.8 WARRANTY

A. Warranty to be sole source responsibility of the manufacturer. Second source warranties and warranties that involve parties other than the carpet manufacturer is unacceptable.

B. If the product fails to perform as warranted when properly installed and maintained the affected area shall be repaired or replaced at the discretion of the manufacturer.

C. Warranty shall not exclude TCF product installed on stairs provided it is properly installed and maintained.

D. Warranty shall be for a minimum period of 10 years.

E. The wear layer warranty shall cover against and specifically define the following:

2. Colorfastness to light and crocking.
4. Static Protection.
5. Zippering.
F. The backing layer warranty shall cover against and specifically define the following:
   1. Edge Ravel.
   2. Delamination.
   3. Dimensional Stability.

G. Tuft Bind warranty in lieu of edge ravel and zipper is not acceptable.

PART 2 - PRODUCTS

2.1 PRODUCTS

A. Available Products: Subject to compliance with requirements, provide Basis-of-Design product(s) indicated or comparable product submitted during bidding, approved by Architect, and identified by Addendum. Acceptance of submitted product(s) shall be at the sole discretion of the Architect, based on the availability of a pattern matching the Basis-of-Design to the approval of the Architect, and on product characteristics generally matching the Basis-of-Design, including module size, thickness, and pile weight/density.

B. Available Products: Subject to compliance with requirements, provide one of the following:
   2. EF Contract; “[<>]Kinetex.”
   3. Forbo Flooring, Inc.; “Flotex.”
   4. Patcraft; “Walk Right In II.”
   5. Tandus Centiva; “Powerbond ethos.”

2.2 TEXTILE COMPOSITE FLOORING

A. Basis-of-Design Product (TCF):
   1. Manufacturer: J&J Flooring
   2. Contact: Pheatra Line 704-620-7587
   3. Product Name: Kinextex; "Timber"
   4. Color: As selected by Architect from manufacturer's full range.
   5. Size: 12 by 48 inches
   6. Installation Method: Random

B. Products installed with a mill-applied releasable “dry” adhesive system to securely attach product to sub-floor in compliance with ADA guidelines, Section 4.5.3. Free-lay and stretch-in installations NOT allowed.

2.3 PERFORMANCE CHARACTERISTICS

A. Test reports for the following performance assurance testing to be submitted upon request. Submitted results shall represent average results for production goods of the referenced style.

B. Requirements listed below must be met by all products.
   1. Flooring Radiant Panel: ASTM E 648 / NFPA 253: Class 1 (CRF: > 0.45 watts/sq cm)
   2. Federal Flammability: CPSC FF 1-70: Passes
   4. Electrostatic Propensity: AATCC 134 (Step & Scuff): 3.0 kV or less
   5. Static Coefficient of Friction: ASTM C 1028: Passes ADA Guidelines for Accessible Routes (Minimum 0.60)
7. Lightfastness: AATCC 16E: &gt; 4 @ 100 hours
8. Vetterman Drum: ASTM D 5417: Minimum 3 @ 22,000 cycles
9. Seam Integrity: Seam to remain intact after 50,000 cycles per Phillips Chair Test

2.4 ACCESSORIES

A. Adhesives: Supply products with a pre-cured, mill-applied or other “dry” adhesive system.
B. Base, Carpet Edge, and Transition Strips: As specified in applicable sections.
C. Moisture Vapor Treatment (MVT): Where flooring is installed over concrete slabs, provide the following:
   1. Subject to compliance with requirements, provide alkaline-resistant product designed to control excessive moisture vapor transmission through concrete slab, and approved by the flooring manufacturer, equivalent to one of the following:
      a. Duraamen Engineered Products, Inc.; “Perdure MVT.”
      b. Maxxon Corporation; “Maxxon MVP.”
      c. Tnemec Company, Inc.; “Epoxoprime MVT, Series 208.”
   2. Verify with flooring manufacturer that submitted product maintains compliance with all provisions of flooring manufacturer’s warranty.
   3. Low-VOC: Provide product with VOC content less than 15 g/L.
   4. Bond Strength to Concrete: Minimum 400 psi per ASTM D 4541 (100% concrete failure).
   5. Permeance: Maximum 0.1 perm per ASTM E 96, and 0.10 grains/hr/ft2/in-Hg, per ASTM F 3010.
   6. Applications: Provide MVT for all concrete slabs on-grade and lightweight concrete elevated slabs.

PART 3 - EXECUTION

3.1 EXAMINATION / PREPARATION

A. Prepare sub-floor to comply with criteria established in manufacturer’s installation instructions. Use only preparation materials that are acceptable to the manufacturer.
B. Concrete Substrates:
   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 floor tile manufacturer. Do not use solvents.
   3. Alkalinity and Adhesion Testing: Perform tests recommended by floor tile manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 9 pH.
   4. Moisture Testing: Perform tests so that each test area does not exceed 1000 sq. ft. and perform not less than 2 tests in each installation area and with test areas evenly spaced in installation areas.
      a. Perform anhydrous calcium chloride test according to ASTM F 1869.
      b. Perform relative humidity test using in situ probes according to ASTM F 2170.
   5. Moisture Vapor Treatment (MVT): After initial moisture testing is complete, prepare slab and install MVT in accordance with manufacturer’s written instructions. If moisture testing indicates measurements are within acceptable levels for flooring installation without need of moisture vapor treatment, MVT may be omitted where
approved by the Architect.

a. After installation of MVT, perform final moisture tests to verify that moisture-vapor-emission rate is at an acceptable level for flooring installation. Proceed with flooring installation only after substrates demonstrate a moisture-vapor-emission rate and relative humidity not more than maximum indicated.

1) Moisture-Vapor-Emission Rate: Maximum 3 lbs. of water/1,000 sq. ft. in 24 hours, unless indicated otherwise by flooring manufacturer’s requirements.

2) Relative Humidity: Maximum 75 percent relative humidity, unless indicated otherwise by flooring manufacturer’s requirements.

C. Use trowelable leveling and patching compounds, according to manufacturer’s written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8-inch-wide or wider and protrusions more than 1/32 inch, unless more stringent requirements are required by manufacturer’s written instructions.

D. Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by the flooring manufacturer.

3.2 INSTALLATION

A. Install product in accordance with manufacturer’s installation instructions.

B. Install TCF tight and flat on sub-floor, well fastened at edges, with a uniform appearance.

C. Roll with appropriate roller for complete contact of TCF with mill-applied adhesive to sub-floor.

D. Trim TCF neatly at walls and around interruptions.

E. Extend tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings. Extend tile to center of cased openings and to center under door leafs at door openings unless indicated otherwise. Where transitions occur to another flooring material, extend or cut tile to suit transition.

F. Completed TCF installation is to be smooth and free of bubbles, puckers, and other defects.

G. There shall be no exceptions to the provisions stated in the manufacturer’s installation instructions.

3.3 PROTECTION & CLEANING

A. Remove excess adhesive and/or seam sealer from floor and wall surfaces without damage.

B. All rubbish, wrappings, debris, trimmings, etc. to be removed from site and disposed of properly.

C. Clean and vacuum TCF tile surfaces using a beater brush/bar commercial vacuum.

D. After each area of TCF tile is installed, protect from soiling and damage by other trades by covering with Kraft paper or approved equal by end user.

END OF SECTION 096817
SECTION 097200 - WALL COVERINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 PREINSTALLATION MEETINGS
   A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS
   A. Product Data: For each type of product.
      1. Include data on physical characteristics, durability, fade resistance, and fire-test-response characteristics.
   B. Shop Drawings: Show location and extent of each wall-covering type. Indicate pattern placement and veneer matching seams and termination points.
   C. Samples for Verification: For each type of wall covering and for each color, pattern, texture, and finish specified, full width by 36-inch-long in size.
      1. Wood-Veneer Wall-Covering Sample: From same flitch to be used for the Work, with specified finish applied.
   D. Product Schedule: For wall coverings.

1.4 INFORMATIONAL SUBMITTALS
   A. Qualification Data: For testing agency.
   B. Product Test Reports: For each wall covering, for tests performed by a qualified testing agency.

1.5 CLOSEOUT SUBMITTALS
   A. Maintenance Data: For wall coverings to include in maintenance manuals.

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. Wall-Covering Materials: For each type, color, texture, and finish, full width by length to equal to 5 percent of amount installed.

1.7 QUALITY ASSURANCE
   A. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and to set quality standards for installation.
      1. Build mockups for each type of wall covering on each substrate required. Comply with requirements in ASTM F 1141 for appearance shading characteristics.
      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.
1.8 FIELD CONDITIONS
A. Environmental Limitations: Do not deliver or install wall coverings until spaces are enclosed and weathertight, 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 levels intended for occupants after Project completion during the remainder of the construction period.
   1. Wood-Veneer Wall Coverings: Condition spaces for not less than 48 hours before installation.
B. Lighting: Do not install wall covering until lighting that matches conditions intended for occupants after Project completion is provided on the surfaces to receive wall covering.
C. Ventilation: Provide continuous ventilation during installation and for not less than the time recommended by wall-covering manufacturer for full drying or curing.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS
A. Fire-Test-Response Characteristics: As determined by testing identical wall coverings applied with identical adhesives to substrates according to test method indicated below by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
   1. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
      a. Flame-Spread Index: 25 or less.
      b. Smoke-Developed Index: 450 or less.
   2. Fire-Growth Contribution: Textile wall coverings tested according to NFPA 265 or NFPA 286 and complying with test protocol and criteria in the applicable building code.

2.2 WOOD-VENEER WALL COVERING
A. General:
   1. Products (cloth-backed UNO): Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
      a. Flexible Materials Incorporated; “Flexwood.” (paper backed)
      b. Koroseal; "Arbor" (Basis of Design)
      c. Jacaranda Inc.; “Sanfoot.”
      d. MDC; “Natural Woods.”
      e. SR Wood Inc.; “Craftwood.”
      f. Wallcovering Industries, Inc.; “Curvwood UBG.”
      g. Wolf-Gordon; “Wood.”
B. Description: Provide wood-veneer wall covering in rolls from same production run.
C. Forest Certification: Fabricate products with wood veneer produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, “FSC Principles and Criteria for Forest Stewardship.”
D. Sheet Size: 24 by 96 inches (610 by 2440 mm).
E. Veneer Construction: Single ply veneer.
F. Wood Species: As selected by Architect from manufacturer's full range.

G. Cut and Figure: Rift cut.

H. Veneer Match: Book.

I. Sheet Match: Running.

J. Applied Backing Material: Fabric

K. Finish: Field-applied using wall-covering manufacturer’s standard stain and polyurethane system.
   1. Colors: As selected by Architect from manufacturer’s full range.

2.3 ACCESSORIES

A. Adhesive: Mildew-resistant, nonstaining, strippable adhesive, for use with specific wall covering and substrate application indicated and as recommended in writing by wall-covering manufacturer.

B. Primer/Sealer: Mildew resistant, complying with requirements in Section 099100 “Painting” and recommended in writing by primer/sealer and wall-covering manufacturers for intended substrate.

C. Metal Primer: Interior ferrous metal primer complying with Section 099100 “Painting” and recommended in writing by primer and wall-covering manufacturers for intended substrate.

D. Wall Liner: Nonwoven, synthetic underlayment and adhesive as recommended in writing by wall-covering manufacturer.

E. Seam Tape: As recommended in writing by wall-covering manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for levelness, wall plumbness, maximum moisture content, and other conditions affecting performance of the Work.

B. 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 bond of wall covering, including dirt, oil, grease, mold, mildew, and incompatible primers.

C. Prepare substrates to achieve a smooth, dry, clean, structurally sound surface free of flaking, unsound coatings, cracks, and defects.
   1. Moisture Content: Maximum of 5 percent on new plaster, concrete, and concrete masonry units when tested with an electronic moisture meter.
   2. Plaster: Allow new plaster to cure. Neutralize areas of high alkalinity. Prime with primer recommended in writing by primer/sealer manufacturer and wall-covering manufacturer.
   3. Metals: If not factory primed, clean and apply primer recommended in writing by primer/sealer manufacturer and wall-covering manufacturer.
   4. Gypsum Board: Prime with primer as recommended in writing by primer/sealer manufacturer and wall-covering manufacturer.
   5. Painted Surfaces: Treat areas susceptible to pigment bleeding.
D. Check painted surfaces for pigment bleeding. Sand gloss, semigloss, and eggshell finish with fine sandpaper.
E. Remove hardware and hardware accessories, electrical plates and covers, light fixture trims, and similar items.
F. Acclimatize wall-covering materials by removing them from packaging in the installation areas not less than 24 hours before installation.

3.3 WALL LINER INSTALLATION
A. Install wall liner, without gaps or overlaps. Form smooth wrinkle-free surface for finished installation. Do not begin wall-covering installation until wall liner has dried.

3.4 WALL-COVERING INSTALLATION
A. Comply with wall-covering manufacturers’ written installation instructions applicable to products and applications indicated.
B. Cut wall-covering strips in roll number sequence. Change the roll numbers at partition breaks and corners.
C. Install strips in same order as cut from roll.
   1. For solid-color, even-texture, or random-match wall coverings, reverse every other strip.
D. Install wall covering without lifted or curling edges and without visible shrinkage.
E. Match pattern every 72 inches.
F. Install seams vertical and plumb at least 6 inches (150 mm) from outside corners and 3 inches (75 mm) from inside corners unless a change of pattern or color exists at corner. Horizontal seams are not permitted.
G. Trim edges and seams for color uniformity, pattern match, and tight closure. Butt seams without overlaps or gaps between strips.
H. Fully bond wall covering to substrate. Remove air bubbles, wrinkles, blisters, and other defects.

3.5 FIELD FINISHING OF WOOD-VENEER WALL COVERINGS
A. Apply wood-veneer-wall-covering manufacturer’s standard stain and polyurethane system according to coating manufacturer’s written instructions to produce finish that is consistent in color and gloss and matches approved Samples.
B. Apply no fewer than two finish coats.

3.6 CLEANING
A. Remove excess adhesive at seams, perimeter edges, and adjacent surfaces.
B. Use cleaning methods recommended in writing by wall-covering manufacturer.
C. Replace strips that cannot be cleaned.
D. Reinstall hardware and hardware accessories, electrical plates and covers, light fixture trims, and similar items.

END OF SECTION 097200
SECTION 098413 - ACOUSTICAL WALL PANELS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 DEFINITIONS
   A. NRC: Noise reduction coefficient.

1.3 SUBMITTALS
   A. Product Data: For each type of panel edge, core material, and mounting indicated.
   B. Samples for Verification: For the following products. Prepare Samples from same material to be used for the Work.
      1. Fabric: Full-width by 36-inch long Sample from dye lot to be used for the Work, and as follows:
         a. Mark top and face of fabric.
      2. Panel Edge: 12-inch long Sample showing edge profile, corner, and finish.
      3. Core Material: 12-inch square Sample showing corner.
      5. Sample Panels: No larger than 36 by 36 inches. Show joints and mounting methods.
   C. Product Certificates: For each type of acoustical wall panel, signed by product manufacturer.
   D. Qualification Data: For fabricator and testing agency.
   E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each type of acoustical wall panel.
   F. Maintenance Data: For acoustical wall panels to include in maintenance manuals. Include fabric manufacturers’ written cleaning and stain-removal recommendations.
   G. Warranty: Special warranty specified in this Section.

1.4 QUALITY ASSURANCE
   A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.
   B. Source Limitations: Obtain acoustical wall panels through one source and single manufacturer.
   C. Fire-Test-Response Characteristics: Provide acoustical wall panels with the following surface-burning characteristics as determined by testing identical products per ASTM E 84 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
      1. Flame-Spread Index: 25 or less.
      2. Smoke-Developed Index: 450 or less.

1.5 DELIVERY, STORAGE, AND HANDLING
   A. Comply with fabric and acoustical wall panel manufacturers’ written instructions for minimum and maximum temperature and humidity requirements for shipment, storage, and handling.
   B. Deliver materials and panels in unopened bundles and store in a temperature-controlled dry place with adequate air circulation.
C. Protect panel edges from crushing and impact.

1.6 PROJECT CONDITIONS
A. Environmental Limitations: Do not install acoustical wall panels 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. Air-Quality Limitations: Protect acoustical wall panels from exposure to airborne odors such as tobacco smoke and install panels under conditions free from odor contamination of ambient air.

1.7 WARRANTY
A. Special Warranty: Manufacturer’s standard form in which manufacturer agrees to repair or replace components of acoustical wall panels that fail in performance, materials, or workmanship within specified warranty period.
   1. Failure in performance includes, but is not limited to, acoustical performance.
   2. Failures in materials include, but are not limited to, fabric sagging, distorting, or releasing from panel edge; or warping of core.
   3. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS
2.1 CORE MATERIALS
A. Glass-Fiber Board: ASTM C 612, Type IA or Types IA and IB; density as specified, unfaced, dimensionally stable, molded rigid board, with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.

2.2 BACK-MOUNTED, EDGE-REINFORCED ACOUSTICAL WALL PANELS WITH GLASS-FIBER BOARD CORE
A. Products: Subject to compliance with requirements, provide Owens Corning / Conwed; "Respond A100" or comparable product by one of the following:
   1. Acoustical Panel Systems (APS, Inc.).
   2. Acoustical Solutions, Inc.
   3. Decoustics Limited; a Saint Gobain company.
   4. Panel Solutions, Inc.
   5. Armstrong World Industries.
B. Panel Construction: Manufacturer’s standard panel construction consisting of facing material laminated to front face, edges, and back border of dimensionally stable, rigid glass-fiber board core; with edges chemically hardened to reinforce panel perimeter against warpage and damage.
C. Nominal Core Density: 6 to 7 lb/cu. ft.
D. Facing Material: Fabric from same dye lot; color and pattern as indicated by manufacturer’s designations.
   1. Manufacturer: Arc-Com
   2. Pattern: "Apollo" AC63350
   3. Color: As selected by Architect from manufacturer’s full range.
   4. Content: 100% Polyester
   5. Finish/Back: None
6. Width: 54 inches
E. Nominal Core Thickness and Overall System NRC: 1 inch and not less than NRC 0.80, for Type A mounting per ASTM E 795.
F. Panel Size and Height: Fabricated width, height and mounting height as indicated on Drawings.
G. Panel Edge Detail: Square, unless indicated otherwise.
H. Corner Detail: Square to form continuous profile to match edge detail.
I. 1. Basis-of-Design Products: Design is based on indicated profiles manufactured by Fry Reglet Corp. 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. Flannery, Inc.
   b. Fry Reglet Corp. (Basis of Design)
   c. Gordon, Inc.
   d. Pittcon Industries
   e. Stockton Products.
2. Trim Profile Characteristics: Provide the following trim types, where indicated. Provide profiles in depth required to match acoustical paneling depth indicated.
   a. Straight Edge Reveal Channel: 1/2-inch width reveals between acoustical panels.
3. Accessories: Provide manufacturer’s factory-fabricated intersection components, including custom fabrications as required for reveal layout indicated.
4. Aluminum: Alloy and temper with not less than the strength and durability properties of ASTM B 221, Alloy 6063-T5.
5. Finish: Clear anodic

2.3 DUCT LINER
A. Fiberglass Duct Liner Board: Fiberglass duct lining in board form, 1”, 2” or 4” thick, as indicated conforming to ASTM C1071 standard “Thermal and Acoustical Insulation.”
   1. Surface: Black mat surface acrylic coating, without manufacturer’s markings, that is damage-resistant and does not tear or abrade easily.
   2. Density: 3 lb/ft3 minimum, meeting the requirements of NFPA90-A.
   3. Maximum flame spread rating of 25 and smoke rating 50 per ASTM E-84.
   4. Duct liner board shall have the following minimum sound absorption coefficients when tested in accordance with ASTM C423 and E795 procedures mounting type “A”.

2.4 FABRICATION
A. Sound-Absorption Performance: Provide acoustical wall panels with minimum NRCs indicated, as determined by testing per ASTM C 423 for mounting type specified.
B. Acoustical Wall Panels: Panel construction consisting of facing material adhered to face, edges and back border of dimensionally stable core; with rigid edges to reinforce panel perimeter against warpage and damage.
C. Fabric Facing: Stretched straight, on the grain, tight, square, and free from puckers, ripples, wrinkles, sags, blisters, seams, adhesive, or other foreign matter. Applied with visible surfaces fully covered.
1. Where square corners are indicated, tailor corners.
2. Where fabrics with directional patterns is indicated, mark fabric top and attach fabric in same direction so pattern matches in adjacent panels.

D. Dimensional Tolerances of Finished Units: Plus or minus 1/16 inch for the following:
   1. Thickness.
   2. Edge straightness.
   3. Overall length and width.
   4. Squareness from corner to corner.
   5. Chords, radii, and diameters.

E. Back-Mounting Devices: Concealed on backside of panel, recommended to support weight of panel, with base-support bracket system where recommended by manufacturer for additional support of panels, and as follows:
   1. Metal “Z” Clips: Two-part panel clips, with one part of each clip mechanically attached to back of panel and the other part to wall substrate, designed to allow for panel removal.TYPICAL

2.5 OCTAVE BAND CENTER FREQUENCY, Hz

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PART 3 - EXECUTION

3.1 EXAMINATION
   A. Examine fabric, substrates, and conditions, with Installer present, for compliance with requirements, installation tolerances, and other conditions affecting performance of acoustical wall panels.
      1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION
   A. Install acoustical wall panels in locations indicated with vertical surfaces and edges plumb, top edges level and in alignment with other panels, faces flush, and scribed to fit adjoining work accurately at borders and at penetrations.
   B. Comply with acoustical wall panel manufacturer’s written instructions for installation of panels using type of concealed mounting accessories indicated or, if not indicated, as recommended by manufacturer. Anchor panels securely to supporting substrate.
   C. Match and level fabric pattern and grain among adjacent panels.
   D. Installation Tolerances: As follows:
      1. Variation from Level and Plumb: Plus or minus 1/16 inch.

3.3 DUCT LINER INSTALLATION
   A. Install duct liner board as shown on the drawings. The black mat face shall face the room.
B. Adhere to substrate by a 100% covering of fire retardant adhesive. In addition, use non-ferrous mechanical fasteners such as welded pins and speed clips, 12” on center maximum. Attach the pins to substrate with adhesive and screws. Cut pins flush and install washers. Apply a brush coat of adhesive to washers, extending onto material surface a minimum of 2”. Install caps on top of pins to secure washers and for safety. Install so that no gaps or loose edges occur in the material.

3.4 CLEANING
   A. Clip loose threads; remove pills and extraneous materials.
   B. Clean panels with fabric facing, on completion of installation, to remove dust and other foreign materials according to manufacturer’s written instructions.

3.5 PROTECTION
   A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, to ensure that acoustical wall panels are without damage or deterioration at time of Substantial Completion.
   B. Replace acoustical wall panels that cannot be cleaned and repaired, in a manner approved by Architect, before time of Substantial Completion.

END OF SECTION 098413
SECTION 098414 - CEMENTITIOUS WOOD-FIBER ACOUSTICAL PANELS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 ACTION SUBMITTALS
A. Product Data: For each type of product indicated.
B. Shop Drawings: Show fabrication and installation details for acoustical wall panels, including plans, elevations, sections, details, and attachments to other Work.
C. Samples: Show texture, finish, and edge and end configurations of cementitious wood-fiber panels, 12 inches (305 mm) square.

1.3 INFORMATIONAL SUBMITTALS
A. Material Test Reports: From a qualified testing agency indicating and interpreting test results of cementitious wood-fiber panels for compliance with requirements indicated.

1.4 QUALITY ASSURANCE
A. Manufacturer Qualifications: A firm experienced in manufacturing cementitious wood-fiber acoustical wall panels similar to those indicated for this Project and with a record of successful in-service performance.
B. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, with the experience and capability to conduct the testing indicated, as documented according to ASTM E 548.
C. Source Limitations for Cementitious Wood-Fiber Acoustical Wall Panels: Obtain cementitious wood-fiber acoustical wall panels from one source with resources to provide products of consistent quality in appearance and physical properties.
D. Fire-Test-Response Characteristics: Provide cementitious wood-fiber acoustical wall panels with the following surface-burning characteristics as determined by testing identical products per ASTM E 84 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify acoustical wall panels with appropriate markings of applicable testing and inspecting agency.
   1. Flame Spread: 25 or less.
   2. Smoke Developed: 450 or less.

1.5 DELIVERY, STORAGE, AND HANDLING
A. Protect cementitious wood-fiber acoustical wall panels from excessive moisture when shipping, storing, and handling. Deliver in unopened bundles and store in a dry place with adequate air circulation. Do not deliver material to building until wet-work, such as concrete, has been completed and cured to a condition of equilibrium. Protect panel edges from crushing and impact.

1.6 PROJECT CONDITIONS
A. Air-Quality Limitations: Protect cementitious wood-fiber acoustical wall panels from exposure to airborne odors, such as tobacco smoke, and install panels under conditions free from odor contamination of ambient air.
B. Field Measurements: Verify wall surface dimensions 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 surface dimensions and proceed with fabricating cementitious wood-fiber acoustical wall panels without field measurements. Coordinate wall construction to ensure that actual surface dimensions correspond to established dimensions.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Products: Subject to compliance with requirements, provide products by one of the following:

1. Monolithic Cementitious Wood-Fiber Panels:
   a. Acoustex Specialty Products; “Acoustex-Plank.”
   c. Martin Fireproofing Georgia, Inc.; “Fibroplank.”
   d. Troy Acoustics Corporation; “Troy Board.”

2.2 MATERIALS

A. Cementitious Wood-Fiber Panels, General: Manufacturer’s standard factory-cast structural panels complying with the following requirements:

1. Composition: Chemically processed long wood fibers mixed with the following, pressure bonded to produce panels of thicknesses and sizes indicated:
   a. Portland cement, ASTM C 150, Type III; or magnesium-oxysulfate hydraulic cement.

2. Properties: As follows, determined according to test method indicated:
   a. Noise Reduction Coefficient: Minimum NRC of 0.80; ASTM C 423.
   b. Light Reflectance: 60 percent; ASTM E 1349.

3. Finish: As selected by Architect from manufacturer's full range.

2.3 MONOLITHIC CEMENTITIOUS WOOD-FIBER PANELS

A. Panels: Manufacturer’s standard beveled-edged, cementitious wood-fiber panels; and as follows:

1. Thickness: 1 inch (26 mm)
2. Size: Fabricate panels to sizes and configurations indicated.

2.4 ACCESSORY MATERIALS

A. Furring and Blocking: Provide lumber furring conforming to Division 06 Section “Rough Carpentry.”

B. Mounting Accessories: Provide appropriate anchorage devices and accessories required for direct installation to substrates. Install panels on 1 inch by 4 inch fire retardant treated wood grounds in accordance with manufacturers fastening requirements.

2.5 ACOUSTICAL WALL PANELS, GENERAL

A. Fabricate panels to sizes and configurations indicated.

B. Sound-Absorption Performance: Provide cementitious wood-fiber acoustical wall panels with minimum noise reduction coefficients indicated, as determined by testing per ASTM C 423 for mounting type specified.
PART 3 - EXECUTION

3.1 EXAMINATION
A. Examine substrates and blocking, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting acoustical wall panel performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION
A. Install cementitious wood-fiber acoustical wall panels in locations indicated with vertical surfaces and edges plumb, top edges level and in alignment with other panels, and scribed to fit adjoining work accurately at borders and at penetrations. Comply with panel manufacturer’s written instructions for installation of panels using type of mounting accessories indicated or, if not indicated, as recommended by manufacturer.
B. Installation on Furring: Install cementitious wood-fiber acoustic panels in locations indicated with vertical surfaces and edges plumb, top edges level, and in alignment with other panels, scribed to fit adjoining work accurately at borders and at penetrations. Countersink anchoring screws and fill holes with caulk or putty; touch up paint finish for uniform appearance.
1. Install wood furring of thickness indicated direct to substrate as indicated. Mount acoustic panels to lumber for assembly indicated.
2. Painting of exposed wood furring and cementitious wood-fiber acoustical panels is specified in Division 09 Section “Painting.”

C. Construction Tolerances: As follows:
1. Variation from Plumb and Level: Plus or minus 1/16 inch (1.6 mm).
2. Variation of Joints from Hairline: Not more than 1/16 inch (1.6 mm).

3.3 CLEANING
A. Remove surplus materials, rubbish, and debris resulting from cementitious wood-fiber acoustical wall panel installation, on completion of the Work, and leave areas of installation in a neat and clean condition.

3.4 PROTECTION
A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure acoustical wall panels are without damage or deterioration at time of Substantial Completion.
B. Replace panels that cannot be cleaned and repaired, in a manner approved by Architect, before time of Substantial Completion.

END OF SECTION 098414
SECTION 099100 - PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 DESCRIPTION OF WORK
A. Extent of painting work (PT) is indicated on drawings and schedules, and as herein specified.
   B. Work includes painting and finishing of all interior and exterior exposed items and surfaces throughout Project, except as otherwise indicated.
   1. Identification of fire- and smoke-rated walls: At fire-rated and smoke-rated walls,
      provide 1-inch high painted stencil lettering above finished ceilings and on the inside
      of ceiling access doors which provide access to such walls. Locate lettering at 8'-0"
      maximum horizontal intervals on both sides of concealed walls. Lettering shall be in
      all capital letters, in fluorescent “safety orange” paint color, stating description of
      fire-rated wall assembly and hourly rating.
      a. Provide descriptions as applicable in the following format, substituting actual
         hour rating and type for sample rating and type:
         1) ONE HOUR FIRE BARRIER.
         2) ONE-HALF HOUR FIRE PARTITION.
         3) THREE HOUR FIRE WALL.
         4) ONE HOUR SMOKE BARRIER.
      b. For incidental accessory use separations, provide the following:
         1) SMOKE-RESISTANT PARTITION.
      c. Do not provide lettering at rated walls that are exposed to view (that is, in
         spaces without dropped ceilings).
      d. Refer to the Life Safety Plans and Partition types for rated wall locations; and
         reflected ceiling plans for concealed rated wall locations.
   2. Surface preparation, priming and coats of paint specified are in addition to shop-
      priming and surface treatment specified under other sections of work.
   3. Painted Patterns and Accent Colors: Locations of multi-color paint patterns and
      accent color areas are indicated on the Drawings.
   C. Work includes field painting of exposed bare and covered pipes and ducts, and of hangers,
      exposed steel and iron work, and primed metal surfaces of equipment installed under
      mechanical and electrical work. (Labeling on pipes and ducts, including possible stencil
      lettering, is included in Division 21, 22 and 23 work.)
   D. “Paint” as used herein means all coating systems materials, including primers, emulsions,
      enamels, stains, sealers, fillers, & other applied materials whether used as prime,
      intermediate or finish coats.
   E. Surfaces to be Painted: Except where natural finish of material is specifically noted as a
      surface not to be painted, paint exposed surfaces whether or not colors are designated in
      “schedules.” Where items or surfaces are not specifically mentioned, paint the same as
      similar adjacent materials or areas. If color or finish is not designated, Architect will select
      these from standard colors or finishes available.
   F. Following categories of work are not included as part of field-applied finish work.
      1. Pre-Finished Items: Unless otherwise indicated, do not field-paint items specified for
         factory- or installer-finishing; such as toilet enclosures, acoustic materials,
architectural woodwork, mechanical and electrical equipment, light fixtures, switchgear and distribution cabinets.

2. Concealed Surfaces: Unless otherwise indicated, painting is not required on surfaces such as walls or ceilings in concealed areas and generally inaccessible areas, foundation spaces, furred areas, utility tunnels, and pipe spaces, and elevator and duct shafts.

3. Finished Metal Surfaces: Unless otherwise indicated, metal surfaces of anodized aluminum, stainless steel, chromium plate, copper, bronze and similar finished materials will not require finish painting.

4. Operating Parts: Moving parts of operating units, mechanical and electrical parts, such as valve and damper operators, linkages, sensing devices, motor and fan shafts will not require finish painting.

G. Following categories of work are included under other sections of these specifications.

1. Shop Primers: Unless otherwise specified, shop priming of ferrous metal items is included under various sections for structural steel, metal fabrications, hollow metal work and similar items.

2. Unless otherwise specified, shop priming of fabricated components such as architectural woodwork, wood casework and shop-fabricated or factory-built mechanical and electrical equipment or accessories is included under other sections of these specifications.

H. Do not paint over any code-required labels, such as Underwriters' Laboratories and Factory Mutual, or any equipment identification, performance rating, name, or nomenclature plates.

1.3 QUALITY ASSURANCE

A. Single Source Responsibility: Provide primers, other undercoat paint, and finish coat products produced by same manufacturer for each paint system. Use only thinners approved by paint manufacturer, and use only within recommended limits.

B. Coordination of Work: Review other sections of these specifications in which prime paints are to be provided to ensure compatibility of total coatings system for various substrates. Upon request from other trades, furnish information or characteristics of finish materials provided for use, to ensure compatible prime coats are used.

1. Test primers, bonding primers and coating products for compatibility and adhesion to existing substrates.

C. Field Samples: On designated wall surfaces and other interior components, duplicate finishes of prepared samples. Provide full-coat finish samples on at least 100 sq. ft. of surface until required sheen, color and texture are obtained; simulate finished lighting conditions for review of in-place work.

1. Water-Borne Epoxy Enamel System: Prior to providing 100 sq. ft. sample area on CMU substrate, conduct a Preinstallation Conference for water-borne epoxy enamel system including the Contractor, painting subcontractor, coating system manufacturer's representative, and Architect to establish preparation, material application methods, film thickness, and inspection requirements.

D. Color Selection Sample Areas: Architect will designate required field sample area colors and locations. Final acceptance of those colors will be from job-applied samples.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer's technical information including Paint label analysis and application instructions for each material proposed. Include paint system schedule in the format used in this specification section.
1. For DTM enamel and water-borne epoxy enamel products, provide the following performance data.
   a. Abrasion Resistance test data per ASTM D4060 with CS-17 wheel, 1000 gram load for 1000 cycles. (CS-10 wheel data not acceptable).
   b. Direct Impact Resistance test data per ASTM D2794.
   c. Adhesion test data per ASTM D4541.

B. Color Chips: Submit color chips of manufacturer's complete range of colors for each paint type for Architect's review of color and texture (sheen). These will be used for initial color selection if the submitted range is adequate.
   1. Based on products of the selected manufacturer and paint systems specified in this Section, the Architect will prepare an initial color schedule indicating paint colors to be used in each space. The Architect will indicate required colors by referencing the selected paint manufacturer's color chips, or by referencing drawdowns or other standard (such as “match laminate color”).
   2. Provide 8-1/2 x 11 inch color samples (“drawdowns”) for all paint colors and sheens for which the color in Architect’s color schedule is not indicated by colors of the selected paint manufacturer for approval prior to application in the field. Provide paint drawdowns in finish sheens applicable to those in the field.
   3. Paint Color Formulations: Using paint color references same as indicated in Architect’s Color and Finish Schedule, provide schedule listing each paint color and corresponding color formulation of paint manufacturer actually provided. Include color formulations by manufacturer’s alpha-numeric indexing system for standard colors of the manufacturer, and custom blend mixes for non-standard colors. Provide hardcopy and electronic copy, Microsoft Word unless noted otherwise, as directed by Owner.

1.5 DELIVERY AND STORAGE

A. Deliver materials to job site in original, new and unopened packages and containers bearing manufacturer's name and label, and following information:
   1. Name or title of material.
   2. Manufacturer's stock number and date of manufacture.
   3. Manufacturer's name.
   4. Contents by volume, for major pigment and vehicle constituents.
   5. Thinning instructions.
   6. Application instructions.
   7. Color name and number.

B. Store materials not in actual use in tightly covered containers. Maintain containers used in storage of paint in a clean condition, free of foreign materials and residue.

C. Protect from freezing where necessary. Keep storage area neat and orderly. Remove oily rags and waste daily. Take precautions to ensure workmen and work areas are adequately protected from fire hazards and health hazards resulting from handling, mixing and application of paints.

1.6 JOB CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and surrounding air are between 50°F and 90°F for water-base paints; and between 45°F and 95°F for solvent-thinned paints, unless otherwise permitted by paint manufacturer's printed instructions.

B. Do not paint in snow, rain, fog or mist, or when relative humidity exceeds 85%, or to damp or wet surfaces, unless otherwise permitted by paint manufacturer's printed instructions.
1. Painting may be continued during inclement weather if areas and surfaces to be painted are enclosed and heated within temperature limits specified by paint manufacturer during application and drying periods.

C. Wind: Do not spray coatings if wind velocity exceeds manufacturer's recommended limit.

D. Ventilation: Provide ventilation during coating evaporation stage in confined or enclosed areas in accordance with manufacturer's instructions.

E. Dust and Contaminants:
   1. Schedule coating work to avoid excessive dust and airborne contaminants.
   2. Protect work areas from excessive dust and airborne contaminants during coating application and curing.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS
   A. Paint Manufacturer: Subject to compliance with requirements, provide products of one of the following:
      1. Benjamin Moore and Co. (Moore)
      2. PPG Architectural Coatings / PPG Paints. (PPG)
      3. Sherwin-Williams Co. (S-W) (Duron, a regional division of S-W, is not acceptable)
   B. Special Coatings Manufacturer: Subject to compliance with requirements, provide moisture curing aliphatic urethane coating system products of one of the following or prequalified other manufacturer:
      1. Benjamin Moore and Co. (Ben Moore).
      2. PPG Architectural Coatings / PPG Paints. (PPG)
      3. Sherwin-Williams Company. (S-W)
   C. Abuse-Resistant Coating Manufacturer: Subject to compliance with requirements, provide products of one of the following or prequalified other manufacturer:
      1. Benjamin Moore and Co. (Moore)
      2. California Paints, ICP Construction.
      3. Master Coating Technologies, Inc.

2.2 MATERIALS
   A. Material Quality: Provide best quality grade of various types of coatings as regularly manufactured by acceptable paint materials manufacturers. Materials not displaying manufacturer's identification as a standard, best-grade product will not be acceptable.
   B. Color Pigments: Pure, non-fading, applicable types to suit substrates and service indicated. Lead content in pigment, if any, is limited to contain not more than 0.06% lead, as lead metal based on the total non-volatile (dry-film) of paint by weight.

PART 3 - EXECUTION

3.1 INSPECTION
   A. Applicator must examine areas and conditions under which painting work is to be applied and notify Contractor in writing of conditions detrimental to proper and timely completion of work. Do not proceed with work until unsatisfactory conditions have been correct in a manner acceptable to Applicator.
   B. Starting of painting work will be construed as Applicator's acceptance of surfaces and conditions within any particular area.
C. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions otherwise detrimental to formation of a durable paint film.

3.2 SURFACE PREPARATION

A. General: Perform preparation and cleaning procedures in accordance with paint manufacturer's instructions and as herein specified, for each particular substrate condition.

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. Cleaning: Before applying paint or surface treatments, clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
1. Remove oil and grease prior to mechanical cleaning.
2. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
3. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.

D. Cementitious Materials: Prepare cementitious surfaces of concrete and concrete block to be painted by removing efflorescence, chalk, dust, dirt, grease, oils, and by roughening as required to remove glaze.
1. Determine alkalinity and moisture content of surfaces to be painted by performing appropriate tests. If surfaces are sufficiently alkaline to cause blistering and burning of finish paint, correct this condition before application of paint. Do not paint over surfaces where moisture content exceeds that permitted in manufacturer's printed directions.

E. Wood: Clean wood surfaces to be painted of dirt, oil, or other foreign substances with scrapers, suitable solvent, and sandpaper, as required. Sandpaper smooth those finished surfaces exposed to view, and dust off. Scrape and clean small, dry, seasoned knots and apply a thin coat of white shellac or other recommended knot sealer, before application of priming coat. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood-filler. Sandpaper smooth when dried.
1. Prime, stain, or seal wood required to be job-painted immediately upon delivery to job. Prime edges, ends, faces, undersides, and backsides of such wood, including cabinets, counters, cases, paneling.

F. Ferrous Metals: Clean ferrous surfaces, which are not galvanized or shop-coated, of oil, grease, dirt, loose mill scale and other foreign substances by solvent or mechanical cleaning.
1. Touch-up shop-applied prime coats wherever damaged or bare, where required by other sections of these specifications. Clean and touch-up with same type shop primer.

G. Galvanized Surfaces: Clean free of oil and surface contaminants with non-petroleum-based solvent. Provide wash coat if required by paint system manufacturer for prepared substrate.

3.3 MATERIALS PREPARATION

A. Mix and prepare painting materials in accordance with manufacturer's directions.

B. Maintain paint mixing and application containers in a clean condition, free of foreign materials and residue.
C. Stir materials before application to produce a mixture of uniform density, and stir as required during application. Do not stir surface film into material. Remove film and, if necessary, strain material before using.

3.4 APPLICATION

A. General: Apply paint in accordance with manufacturer's directions. Use applicators and techniques best suited for substrate and type of material being applied.

1. Provide access to representative of selected coating manufacturer for observation of material application only at all times during painting work. Unless specifically indicated by Architect, this representative shall have no authority to make decisions about the work.

2. Paint surface treatments, and finishes, are indicated in “schedules” of Contract Documents.

3. Provide finish coats that are compatible with prime paints used.

4. Apply additional coats when undercoats, stains or other conditions show through final coat of paint, until paint film is of uniform finish, color and appearance. Ensure that surfaces, including edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.

5. Paint surfaces behind movable and permanently fixed equipment and furniture.

6. Paint interior surfaces of ducts visible through registers or grilles, with flat, non-specular black paint.

7. Paint back sides of access panels, and removable or hinged covers.

8. Finish exterior and interior doors on tops, bottoms and side edges same as faces.

9. Sand lightly between each succeeding enamel or varnish coat.

10. Omit first coat (primer) on metal surfaces which have been shop-primed and touch-up painted, unless required to prevent “show-through” for finish topcoats.

B. Scheduling Painting: Apply first-coat material to surfaces that have been cleaned, pretreated or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.

1. Allow sufficient time between successive coatings to permit proper drying. Do not recoat until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and application of another coat of paint does not cause lifting or loss of adhesion of the undercoat.

C. Minimum Coating Thickness: Apply materials at not less than manufacturer's recommended spreading rate, to establish total DFT indicated or as recommended by coating manufacturer.

D. Mechanical and Electrical Work: Painting of mechanical and electrical work is limited to items exposed in equipment rooms and in occupied spaces. Do not paint prefinished equipment items unless directed otherwise.

E. Prime Coats: Apply prime coat of material which is required to be painted or finished, and which has not been prime coated by others. Recoat primed and sealed surfaces where there is evidence of suction spots or unsealed areas in first coat, to assure a finish coat with no burn-through or other defects due to insufficient sealing.

F. Finish Coats: Provide finish quality for new and repainted surfaces as follows:

1. Pigmented (Opaque) Finishes: Completely cover to provide an opaque, smooth surface of uniform finish, color, appearance and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness or other surface imperfections will not be acceptable.

G. Tinting: Tint each undercoat a lighter shade to simplify identification of each coat when multiple coats of the 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.

H. Completed Work: Match approved samples for color, texture and coverage. Remove, refinish or repaint work not in compliance with specified requirements.

3.5 CLEAN-UP AND PROTECTION

A. Clean-Up: During progress of work, remove from site discarded paint materials, rubbish, cans and rags at end of each work day. Upon completion of painting work, clean window glass and other paint spattered surfaces. Remove spattered paint by proper methods of washing and scraping, using care not to scratch or damage finished surfaces.

B. Protection: Protect work of other trades, whether to be painted or not, against damage by painting and finishing work until date of Substantial Completion. Correct any damage by cleaning, repairing or replacing, and repainting, as acceptable to Architect.

1. Provide “Wet Paint” signs to protect newly-painted finishes. Remove temporary protective wrappings provided by others for their work after completion of painting.

2. At completion of work of other trades, touch-up & restore all damaged painted surfaces.

3.6 EXTERIOR PAINT SCHEDULE

A. General: Provide the following Paint systems for the various substrates, as indicated.

B. Zinc-Coated or Zinc-rich Primer-Coated Metal with Direct to Metal ("DTM") Gloss Acrylic Enamel Finish: 2 topcoats of DTM gloss enamel over primer, with min. total DFT of 2.5 mils.

1. Prime Coat (Tie-Coat): Lead-free, acrylic base interior/exterior galvanized metal primer, premium grade. Apply over shop primer.
   c. S-W: B66 Pro-Cryl Universal Primer.

2. First and Second Coats: DTM Acrylic Gloss Enamel.

C. Cast Iron Downspout Boots with Direct to Metal ("DTM") Gloss Acrylic Enamel Finish: 2 topcoats of DTM gloss enamel over universal bonding primer, at 2.5 mils over standard shop primer.

1. Prime Coat (Tie-Coat): (Same as for zinc-coated metal.)

2. First and Second Coats: DTM Acrylic Gloss Enamel. (Same as for zinc-coated metal.)

D. Field-Applied Coatings for Ferrous Metal (AESS): Aliphatic urethane system of intermediate coat and topcoat. Provide scheduled products for exposed steel fabrications indicated as AESS.

1. Field Touch-up: Match moisture curing urethane zinc-rich shop primer.

2. Intermediate Coat: Moisture curing urethane and micaceous iron oxide or epoxy.

3. Top Coat: Aliphatic urethane at 2.0 – 3.0 mils DFT.

E. Concrete: Acrylic latex satin finish, two finish coats over alkali-resistant primer with minimum total DFT of not less than 3.5 mils.
   b. PPG: 4-603 Perma-Crete Int/Ext Alkali Resistant Primer.
2. First and Second Finish Coats: Exterior 100% Acrylic – Satin sheen; premium grade.
   b. PPG: 76-45 Sun-Proof Ext House & Trim, Satin.

F. Concrete Masonry Units: Acrylic latex satin finish, two finish coats over primer with minimum total DFT of not less than 3.5 mils.
   b. PPG: 6-15 Speedhide Int/Ext Acrylic Masonry Block Filler.
2. First and Second Finish Coats: Exterior 100% Acrylic – Satin sheen; premium grade.
   b. PPG: 76-45 Sun-Proof Ext House & Trim, Satin.

G. Exterior Gypsum Soffit Board with Heavy Duty Textured Coating: Top coat(s) for total DFT of 10.0 mils minimum over primer-sealer.
   a. Moore: 023 Fresh Start All Purpose 100% Acrylic Int/Ex Latex Primer.
   b. PPG: 4-603 Perma-Crete Interior/Exterior Alkali Resistant Primer.
   c. S-W: B51-450, Multi-Purpose Primer.
2. First and Second Coats: High-build acrylic-latex texture coating. (select texture).
   b. PPG: 4-50 Perma-Crete 100% Acrylic Texture Coating.

H. Exterior Gypsum Soffit Board with Smooth Finish 100% Acrylic Coating: Top coat(s) for total DFT of 10.0 mils minimum over primer-sealer.
   a. Moore: N023 Fresh Start All Purpose 100% Acrylic Int/Ex Latex Primer.
   b. PPG: 6-9 Speedhide Exterior Wood Primer Oil.
   c. S-W: B51-450, Multi-Purpose Primer.
2. First and Second Finish Coats: Exterior 100% Acrylic – Flat finish; premium grade.
   a. Moore: 183 Super Spec 100% Acrylic Ext. Flat Paint or N105 MoorLife 100% Acrylic Flat House Paint.
   b. PPG: 72-45 Sun-Proof Ext House & Trim. Flat Latex 100% Acrylic
   c. S-W: A6 Series A-100 Exterior Latex Flat

I. General Painted Wood and Plywood with Acrylic Latex Satin Finish: 2 finish coats over primer with total DFT not less than 3.5 mils.
   a. Ben Moore: 176 SuperSpec Alkyd Exterior Primer
   b. PPG: 6-9 Speedhide Exterior Wood Primer
2. First and Second Finish Coats: Exterior 100% Acrylic – Satin sheen; premium grade.
   a. Ben Moore: 184 Super Spec 100% Acrylic Exterior Satin Finish or N096 Moorglo Latex House and Trim Paint.
   b. PPG: 76-45 Sun-Proof Ext House & Trim, Satin.

### 3.7 INTERIOR PAINT SCHEDULE:

A. General: Provide the following paint systems for the various substrates, as indicated. Dry film thickness is noted as “DFT.” Provide compatibility test areas on existing painted substrates.

B. Concrete Masonry Units: Low-VOC Acrylic Satin Finish. 2 Coats over filler, with total DFT not less than 2.5 mils. (Provide for CMU except where “epoxy finish” is indicated.) *(PT-A)*

1. Filler Coat: Acrylic-latex Block Filler. Apply filler coat at a rate to ensure complete coverage with pores filled. Brush, spray or roller apply and back roll.
   a. Moore: 571 Ultra Spec Hi-Build Masonry Block Filler.

2. Waterproofing Filler Coat – Showers & Wet Applications: Cementitious resin or epoxy block filler applied by brush, spray or roller and back rolled or squeegeed for smooth, pinhole-free treatment.
   b. PPG: 95-217 Epoxy Ester Cementitious Waterproofing Block Filler.
   c. S-W: B42W400/B42V401 Kem Cat-Coat HS Epoxy Filler/Sealer

   b. PPG: 17-921 PPG Seal Grip Acrylic Universal Primer/Sealer.

   b. PPG 6-4300 Speedhide Zero VOC Interior Eggshell Latex.

C. Concrete Masonry Units - Semi-Gloss Water-Borne Epoxy Finish: 2 Coats over filler *(EPX-PT)*:

1. Block Filler Coat: Acrylic-latex or as required by manufacturer for topcoat. Brush, spray or roller apply and back roll for smooth pinhole-free treatment.
   a. Moore: 571 Ultra Spec Hi-Build Masonry Block Filler.
   b. PPG: 6-15 Speedhide Int/Ext Acrylic Masonry Block Filler.
   c. PPG: 16-90 Pitt-Glaze WB Int/Ext Block Filler Latex.

2. First and Second Coats: Two-component, semi-gloss water born polyamide epoxy enamel applied at a DFT of 1.5 to 4.0 mils per coat.
D. Concrete Walls and Ceilings: Semi-Gloss Finish: 2 Coats over primed surface with DFT 3.5 mils min. (PT-A)
   1. Primer Coat: Alkali-Resistant acrylic masonry primer applied at rate to ensure complete coverage and secure bond to cured concrete. Brus, spray or roller apply and back roll.
      b. PPG: 4-603 Perma-Crete Int/Ext Alkali Resistant Primer.
   2. First and Second Finish Coats: DTM Acrylic Semi-Gloss Enamel. (30-40 units @ 60°)

E. Gypsum Board Systems with Latex Finish: Satin (egg-shell) finish at walls and flat finish on ceilings except as indicated otherwise. Provide best commercial Low-VOC formulation with 0 VOC per EPA test method 24. (PT-A)
   1. Filler Coat: 0 VOC (per EPS test method 24) Latex Primer.
      b. PPG: 6-4900 Speedhide Zero VOC Interior Latex Primer.
   2. First & Second Finish Coats: Interior Low-VOC Acrylic Satin Finish. (Low lustre/Satin = 25-45% @60°) Provide for wall finishes unless indicated otherwise.
      b. PPG: 6-4100 Speedhide Zero VOC Interior Latex Flat.

F. Gypsum Board Systems with Water-Borne Polyamide Epoxy Finish (EPX-PT):
   1. Filler Coat: Manufacturer’s recommended primer.
      b. PPG: 6-2 Speedhide Interor Latex Sealer.
   2. First and Second Coats: Two-component, water born polyamide epoxy enamel applied at a DFT of 1.5 to 4.0 mils per coat. Provide semi-gloss finish unless directed otherwise.

G. Gypsum Board Systems with “Abuse-Resistant Coating” Finish: Satin (egg-shell) sheen abuse-resistant finish. (PT-B)
1. Filler Coat:

2. First & Second Finish Coats: Interior Satin Finish. (Low lustre/Satin = 25-45% @60°) Provide for abuse-resistant wall finishes indicated.
   a. Ultra Aquaborne Ceramic Interior Paint Eggshell 100% acrylic coating with ceramic microspheres.

H. Ferrous Metal with Latex Dry Fog Finish: One finish coat over primed exposed construction. Provide nominal 50 square foot sample area to test for paint compatibility with substrates.
   1. Prime Coat: (Acrylic or recommended VOC-compliant metal primer for surfaces not pre-primed.) 2.0 mils DFT.
      a. Moore: N110 Superkote 5000 DryFall latex Flat.

2. Top Coat: All exposed structure as scheduled. Acrylic Dry Fog 3.0 mils DFT. Provide color finish as selected by Architect from manufacturer’s full range.
   a. Moore: N110 Superkote 5000 DryFall Latex Flat.
   b. PPG: 6-724XI Series Speedhide Super Tech WB Int. Dry-Fog Flat Latex Flat.
   c. S-W: B42 BW3 Waterborne Acrylic Dry Fall, Flat.

I. Ferrous Metal: Semi-Gloss Direct to Metal (“DTM”) Acrylic Enamel Finish: 2 Coats over primer, with total DFT not less than 2.5 mils.
   1. Prime Coat: Lead-free, acrylic Base Primer. Not required on shop primed items.

2. Bonding Primer (previously painted): Acrylic bonding primer designed for previously painted ferrous metal to ensure secure bond. Brush, spray or roller apply and back roll.

3. First and Second Coat: DTM Acrylic Semi-Gloss Enamel. (30-40 units @ 60°)

J. Zinc-Coated Metal: Semi-Gloss Direct to Metal (“DTM”) Acrylic Enamel Finish: 2 Coats over primer, with min. total DFT of 2.5 mils.
   1. Prime Coat: Lead-free, acrylic base interior galvanized metal primer, premium grade.
2. First and Second Coats: DTM Acrylic Semi-Gloss Enamel. Same as for ferrous metal.

K. Intumescent Mastic-Coated Metal: Semi-Gloss Direct to Metal (“DTM”) Acrylic Enamel Finish as approved by intumescent coating manufacturer: 2 Coats, with min. total DFT of 2.5 mils.

L. Wood Floor with Semi-Gloss Acrylic Floor Enamel: 2 Coats over primer on cured surface.
   1. Primer Coat: Acrylic primer, brush or roller applied over prepared concrete.
      a. Moore: 122 Floor and Patio Enamel (thinned 1 pint/gallon).
      b. PPG: 3-510 Pittsburgh Acrylic Floor Enamel Thin 25%.
      c. S-W: B90W110 ArmorSeal Tread-Plex Primer.
   2. Second Finish Coats: 100% Acrylic Floor Enamel or comparable performance enamel. Provide 1.5 - 2.0 mils DFT per coat.
      b. PPG: 3-510 Pittsburgh Acrylic Floor Enamel.
      c. S-W: B90 ArmorSeal Tread-Plex.

M. Painted Woodwork and Hardboard: Semi-Gloss Direct to Metal (“DTM”) Acrylic Enamel Finish: Two topcoats over undercoater. Provide at painted wood shelving, electrical panel boards, and as noted. (PT-A)
   1. First Coat: Interior Oil Undercoat.
      a. Moore: 024 All-Purpose Alkyd Primer.
      b. PPG: 17-941NF Seal Grip Int/Ext. Alkyd Universal Primer.
      c. S-W: B49 W8820 Multi-Purpose Oil-Based Primer.
   2. First Coat: Interior Latex Undercoat, for medium-duty, low-VOC formulation.
      a. Moore: N023 All-Purpose 100% Acrylic Primer.
      b. PPG: 17-921 Seal Grip Int/Ext Acrylic Universal Primer.
   4. First and Second Finish Coats: Premium Acrylic Semi-Gloss Enamel <150 g/L. DFT 3.5 Mils min.
      b. PPG: 87-6 Manor Hall Interior Semi-Gloss Acrylic Latex.

N. Stained woodwork with transparent finish is specified in Division 6 Sections by woodworker.

END OF SECTION 099100
SECTION 101400 - SIGNAGE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 ALLOWANCES
A. Allowance: Provide surface-mounted individual panel signs under allowance specified in Division 01 Section "Allowances."

1.3 DEFINITIONS

1.4 SUBMITTALS
A. Product Data: For each type of product indicated.
B. Shop Drawings: Show fabrication and installation details for signs.
   1. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
   2. Signage schedule (sign types) showing typestyles, graphic elements, including tactile characters and Braille, and layout for each sign.
C. Samples: For each of the following products and for the full range of color, texture, and sign material indicated, of sizes indicated:
   1. Plaque Casting: 6 inches square including border.
   2. Dimensional Characters: Full-size Samples of each type of dimensional character (letter, number, and graphic element). Show character style, material, finish, and method of attachment.
   3. Panel Signs: Full-size Samples of each type of sign required.
   4. Approved samples will not be returned for installation into Project.
D. Signage Schedule: Use same designations indicated on Drawings.
E. Qualification Data: For Installer.
F. Warranty: Special warranty specified in this Section.

1.5 QUALITY ASSURANCE
A. Installer Qualifications: An employer of workers trained and approved by manufacturer.
B. Source Limitations for Signs: Obtain each sign type indicated from one source from a single manufacturer.
   1. Interior Code Signage: Provide signage as required by accessibility regulations and requirements of authorities having jurisdiction. These include, but are not limited to, the following:
      a. Tactile Exit Signs.
      b. Stairway Identification.
2. Related Code Signage Sections:
   a. Illuminated Exit Signs: Refer to Division 26.
   b. Identification of Fire- and Smoke-Rated Walls: Refer to Division 09 Section “Painting.”

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.

1.6 PROJECT CONDITIONS
   A. Weather Limitations: Proceed with installation only when weather conditions permit installation of signs in exterior locations to be performed according to manufacturers’ written instructions and warranty requirements.
   B. Field Measurements: Where sizes of signs are determined by dimensions of surfaces on which they are installed, verify dimensions by field measurement before fabrication and indicate measurements on Shop Drawings.

1.7 COORDINATION
   A. Coordinate placement of anchorage devices with templates for installing signs.

1.8 WARRANTY
   A. Special 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 polymer finishes beyond normal weathering.
   2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS
   A. Aluminum Castings: ASTM B 26, of alloy and temper recommended by sign manufacturer for casting process used and for use and finish indicated.
   B. Aluminum Sheet and Plate: ASTM B 209, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with at least the strength and durability properties of Alloy 5005-H32.
   C. Aluminum Extrusions: ASTM B 221, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with at least the strength and durability properties of Alloy 6063-T5.
   D. Bronze Castings: ASTM B 584, Alloy UNS No. C86500 (No. 1 manganese bronze).
   E. Polycarbonate Sheet: Of thickness indicated, manufactured by extrusion process, coated on both surfaces with abrasion-resistant coating:
      1. Impact Resistance: 16 ft-lbf/in. per ASTM D 256, Method A.
      2. Tensile Strength: 9000 lbf/sq. in. per ASTM D 638.
      3. Flexural Modulus of Elasticity: 340,000 lbf/sq. in. per ASTM D 790.
5. Abrasion Resistance: 1.5 percent maximum haze increase for 100 revolutions of a Taber abraser with a load of 500 g per ASTM D 1044.

2.2 PLAQUES
   A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      1. Acorn Sign Graphics, Inc.
      2. Advance Corporation; Braille-Tac Division.
      5. Matthews International Corporation; Bronze Division.

   B. Cast Plaques: Provide castings free of pits, scale, sand holes, and other defects, as follows:
      1. Plaque Material: Aluminum.
      2. Background Texture: Manufacturer’s standard stipple texture.
      5. Size: For bid purposes, assume one plaque, 18- by 24-inch Building Plaque.
      6. Text and Typeface: Finish raised characters to contrast with background. Typeface as selected by Architect from manufacturer's full range.

   C. Cast Plaques: Provide castings free of pits, scale, sand holes, and other defects, as follows:
      1. Background Texture: Manufacturer's standard stipple texture.
      2. Graphics: Custom seal or logo, provided by Owner. For bid purposes, assume 7 30-inch diameter seals.
      3. Text and Typeface: Finish raised characters to contrast with background. Typeface as selected by Architect from manufacturer’s full range.
      5. Mounting: Concealed studs, noncorroding for substrates encountered.

2.3 DIMENSIONAL CHARACTERS
   A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      3. ASI-Modulex, Inc.
      5. Gemini Incorporated.
      6. Innerface Sign Systems, Inc.
      7. Metal Arts; Div. of L&H Mfg. Co.
B. Cast Characters: Produce characters with smooth flat faces, sharp corners, and precisely formed lines and profiles, free of pits, scale, sand holes, and other defects. Cast lugs into back of characters and tap to receive threaded mounting studs. Alloy and temper recommended by sign manufacturer for casting process used and for use and finish indicated. Comply with the following requirements.
   2. Thickness: As indicated.
   3. Color(s): As selected by Architect from manufacturer’s full range.

C. Dimensional Character Sign Schedule:
   1. Sign Type: Exterior Building Identification Signage
      a. Location: Front of Building.
         1) Character Size: 12-inches tall and 10-inches, as indicated.
         2) Text/Message: “MOORE COUNTY COURTHOUSE.”

2.4 PANEL SIGNS (By Allowance)

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   2. Allen Industries Architectural Signage
   3. APCO Graphics, Inc.
   4. ASI-Modulex, Inc.
   5. Best Sign Systems Inc.
   7. Innerface Sign Systems, Inc.
   8. InPro Corporation
   9. Matthews International Corporation; Bronze Division.
   13. Supersine Company (The)

B. Interior 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. Phenolic-Backed Photopolymer Sheet: Provide light-sensitive, water-wash photopolymer face layer bonded to a phenolic base layer to produce a composite sheet with overall, face layer, and base-layer thicknesses, respectively, of 0.160, 0.040, and 0.120 inch.
      a. Available Product: Subject to compliance with requirements, a product that may be incorporated into Work includes, but is not limited to, “Jet-388 (1/8-inch) Phenolic Interior Signage” by JetUSA.
   2. PETG-Backed Photopolymer Sheet: Provide light-sensitive, water-wash photopolymer face layer bonded to PETG base layer to produce a composite sheet with overall, face layer, and base-layer thicknesses, respectively, of 0.120, 0.040, and 0.080 inch.
      a. Available Product: Subject to compliance with requirements, a product that may be incorporated into Work includes, but is not limited to, "NovAcryl PT Series Interior Signage” by Nova Polymers.
3. Edge Condition: Square cut.
4. Corner Condition: Rounded to radius indicated.
6. Custom Paint Colors: Match Pantone color matching system.
7. Color: As selected by Architect from manufacturer’s full range.
8. Tactile Characters: Characters and Grade 2 Braille raised 1/32 inch (0.8 mm) above surface with contrasting colors.

C. Exterior Tactile 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. Phenolic-Backed Photopolymer Sheet: Provide exterior grade light-sensitive, water-wash photopolymer face layer bonded to a phenolic base layer to produce a composite sheet with overall, face layer, and base-layer thicknesses, respectively, of 0.160, 0.040, and 0.120 inch.
   a. Available Product: Subject to compliance with requirements, a product that may be incorporated into Work includes, but is not limited to, “Jet-388 EX (1/8-inch) Exterior Signage” by JetUSA.
2. PETG-Backed Photopolymer Sheet: Provide exterior grade light-sensitive, water-wash photopolymer face layer bonded to PETG base layer to produce a composite sheet with overall, face layer, and base-layer thicknesses, respectively, of 0.120, 0.040, and 0.080 inch.
   a. Available Product: Subject to compliance with requirements, a product that may be incorporated into Work includes, but is not limited to, "NovAcryl NovEx Exterior Signage” by Nova Polymers.

3. Edge Condition: Square cut.
6. Custom Paint Colors: Match Pantone color matching system.
7. Color: As selected by Architect from manufacturer’s full range.
8. Tactile Characters: Characters and Grade 2 Braille raised 1/32 inch (0.8 mm) above surface with contrasting colors.

D. Tactile and Braille Sign: Manufacturer’s standard process for producing text and symbols complying with Accessibility Guidelines. 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.
2. Raised-Copy Thickness: Not less than 1/32 inch.

2.5 ACCESSORIES
A. Anchors and Inserts: Provide nonferrous-metal or hot-dip galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion resistance. Use toothed steel or lead expansion-bolt devices for drilled-in-place anchors. Furnish inserts, as required, to be set into concrete or masonry work.

2.6 FABRICATION
A. General: Provide manufacturer’s standard signs of configurations indicated.
1. Welded Connections: Comply with AWS standards for recommended practices in shop welding. Provide welds behind finished surfaces without distortion or discoloration of exposed side. Clean exposed welded surfaces of welding flux and dress exposed and contact surfaces.
2. Mill joints to tight, hairline fit. Form joints exposed to weather to exclude water penetration.
3. 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.
4. Conceal fasteners if possible; otherwise, locate fasteners where they will be inconspicuous.

2.7 FINISHES, GENERAL
A. Comply with NAAMM’s “Metal Finishes Manual for Architectural and Metal Products” for recommendations for applying and designating finishes.
B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.8 ALUMINUM FINISHES
A. Color Anodic Finish: Manufacturer’s standard Class 1 integrally colored or electrolytically deposited color anodic coating, 0.018 mm or thicker, in color selected by architect from manufacturer's full range applied over a satin (directionally textured) mechanical finish, 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 and other conditions affecting performance of work.
B. Verify that items, including anchor inserts, and electrical power are sized and located to accommodate signs.
C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION
A. Locate signs and accessories where indicated, 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. Wall-Mounted 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, to the right of the right hand door for double active doors. Locate tactile signs to maintain a clear space beyond swing of door, centered on and in front of each sign, of 18 inches by 18 inches.
B. Wall-Mounted Signs: Comply with sign manufacturer’s written instructions except where more stringent requirements apply.
   1. Mounting: Use liquid-silicone adhesive and mechanical mounting (minimum 4 pre-drilled holes per sign) recommended by sign manufacturer to attach signs to irregular, porous, or vinyl-covered surfaces. Use double-sided vinyl tape where recommended in writing by sign manufacturer to hold sign in place until adhesive has fully cured.
Use for all wall applications. (“Glued” and “screwed” mounting).

2. Signs Mounted on Glass: Provide matching opaque plate on opposite side of glass to conceal mounting materials.

C. Dimensional Characters: Mount characters using standard fastening methods to comply with manufacturer’s written instructions for character form, type of mounting, wall construction, and condition of exposure indicated. Provide heavy paper template to establish character spacing and to locate holes for fasteners.

1. Projected Mounting: Mount characters at 1/2-inch projection distance from wall surface unless otherwise indicated.

D. Cast-Metal Plaques: Mount plaques using standard fastening methods to comply with manufacturer’s written instructions for type of wall surface indicated.

1. Concealed Mounting: Mount plaques by inserting threaded studs into tapped lugs on back of plaque. Set in predrilled holes filled with quick-setting cement.

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 101400
SECTION 102113 - PHENOLIC-CORE TOILET COMPARTMENTS (2)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 SUBMITTALS
   A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
      1. Submit data for proposed wall anchor for attaching wall brackets.
      2. Provide data substantiating hardware (latch) complies with handicap accessibility standards (ADA).
   B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
      1. Show locations of cutouts for compartment-mounted toilet accessories.
   C. Samples for Verification: Of each type of color and finish required for units, prepared on 6-inch- (150-mm-) square Samples of same thickness and material indicated for Work.

1.3 QUALITY ASSURANCE
   B. Source Limitations: Obtain toilet compartments through one source from a single manufacturer.
   D. Fire-Test-Response Characteristics: Provide phenolic core panels with the following surface-burning characteristics as determined by testing identical products per ASTM E 84 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
      1. Flame-Spread Index: 75 or less.
      2. Smoke-Developed Index: 450 or less.

1.4 PROJECT CONDITIONS
   A. Field Measurements: Field-verify actual locations of walls and other construction contiguous with toilet compartments before fabrication and indicate measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 PHENOLIC-CORE UNITS
   A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      1. Accurate Partitions Corporation.
      3. Ampco.
      5. General Partitions Mfg. Corp.
      7. Metpar Corp.

B. Door, Panel and Pilaster Construction: Solid phenolic-core panel material with melamine facing on both sides fused to substrate during panel manufacture (not separately laminated), and with eased and polished edges. Provide minimum 3/4-inch- (19-mm-) thick doors and pilasters and minimum 1/2-inch- (13-mm-) thick panels.
   1. Facing Sheet Color: One color in each room as selected by Architect from manufacturer’s full range of colors.
   2. Core Color: Manufacturer’s standard dark color.

C. Pilaster Shoes: Stainless steel, ASTM A 666, Type 302 or 304, not less than 0.0312 inch (0.8 mm) specified thickness and 3 inches (75 mm) high, finished to match hardware.

D. Brackets (Fittings):
   1. Full-Height Continuous Type: Manufacturer’s standard design; extruded aluminum with minimum .125-inch wall thickness. Provide continuous brackets at panel-to-stile, panel-to-wall, and stile-to-wall.
      a. Length: One inch less than height of panels.

E. Overhead Cross Bracing for Ceiling-Hung Units: As recommended by manufacturer.RARE

2.2 ACCESSORIES

A. Hardware and Accessories: Manufacturer’s standard design, heavy-duty operating hardware and accessories.
      a. Hinges, Wraparound: 8-inch height, 0.125 inch wall thickness extruded aluminum wraparound hinges fully adjustable up to 360 degrees with satin anodized finish. Provide nylon pivot pin with 0.250 inch stainless steel reinforcing pin. Provide pre-drilled hinge leaves for mounting and stainless steel though-bolts. Hinges shall provide emergency access by lifting the door.
   2. Latch and Keeper: Manufacturer’s standard surface-mounted latch unit designed for emergency access and with combination rubber-faced door strike and keeper. Provide units that comply with regulatory requirements for accessibility at compartments designated as accessible.
      a. Extruded Aluminum Surface Mounted: Clear anodized aluminum with satin finish. Provide a minimum 4-inch high strike and keeper (jamb piece) with minimum .125 inch wall thickness and integral rubber bumper door stop. Provide slide latch with minimum .250 inch wall thickness slide bar, and latch knob riveted to slide bar.
   3. Coat Hook: Manufacturer’s standard combination hook and rubber-tipped bumper, sized to prevent in-swinging door from hitting compartment-mounted accessories.
   4. Door Bumper: Manufacturer’s standard rubber-tipped bumper at out-swinging doors and entrance-screen doors.
   5. Door Pull: Manufacturer’s standard unit at out-swinging doors that complies with regulatory requirements for accessibility. Provide units on both sides of doors at compartments designated as accessible.

B. Overhead Bracing: Manufacturer’s standard continuous, extruded-aluminum head rail with anti-grip profile and in manufacturer’s standard finish.

C. Anchorages and Fasteners: Manufacturer’s standard exposed fasteners of stainless steel, finished to match hardware, with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications. For concealed anchors, use hot-dip galvanized or other rust-resistant, protective-coated steel.
1. Provide anchorage devices to CMU wall construction to afford a minimum ultimate load capacity of 1000 lb. in tension & in shear in ASTM C 90 CMU. Powers Fasteners “Hollow-Set Dropin” anchor in 1/4-inch size.
2. Where anchorage to gypsum board is sufficient for load, provide toggle bolts ultimately rated for not less than 4 times required tensile load or 235 pounds, whichever is greater.

2.3 FABRICATION
A. Overhead-Braced Units: Provide manufacturer’s standard corrosion-resistant supports, leveling mechanism, fasteners, and anchors at pilasters to suit floor conditions. Make provisions for setting and securing continuous head rail at top of each pilaster. Provide shoes at pilasters to conceal supports and leveling mechanism.
B. Urinal Screen Size: Screen shall extend from 12 inches above floor maximum to 60 inches above floor minimum at 18 inches from urinal wall, but not less than 6 inches beyond front lip of urinal.
C. Doors: Unless otherwise indicated, provide 24-inch- (610-mm-) wide in-swinging doors for standard toilet compartments and 36-inch- (914-mm-) wide out-swinging doors with a minimum 32-inch- (813-mm-) wide clear opening for compartments indicated to be accessible to people with disabilities.

PART 3 - EXECUTION
3.1 INSTALLATION
A. General: Comply with manufacturer’s written installation instructions. Install units rigid, straight, level, and plumb. Secure units in position with manufacturer’s recommended anchoring devices.
   1. Maximum Clearances:
      a. Pilasters and Panels: 1/2 inch (13 mm).
      b. Panels and Walls: 1 inch (25 mm).
   2. Continuous Brackets: Secure panels to walls and pilasters, and pilasters to walls with continuous brackets.
B. Overhead-Braced Units: Secure pilasters to floor and level, plumb, and tighten. Secure continuous head rail to each pilaster with not less than two fasteners. Hang doors to align tops of doors with tops of panels and adjust so tops of doors are parallel with overhead brace when doors are in closed position.
C. Wall-Hung Urinal Screens: Attach with anchoring devices to suit supporting structure. Set units level and plumb and to resist lateral impact.

3.2 ADJUSTING
A. Hardware Adjustment: Adjust and lubricate hardware according to manufacturer’s written instructions for proper operation. Set hinges on in-swinging doors to hold doors open approximately 30 degrees from closed position when unlatched unless indicated otherwise. Set hinges on all accessible (barrier free) compartment doors and on all out-swinging doors and doors in entrance screens to return doors to fully closed position.

END OF SECTION 102113
SECTION 102600 - WALL AND DOOR PROTECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 PERFORMANCE REQUIREMENTS
   A. Structural Performance: Provide handrails capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
      1. Uniform load of 50 lbf/ft. (0.73 kN/m) applied in any direction.
      2. Concentrated load of 200 lbf (0.89 kN) applied in any direction.
      3. Uniform and concentrated loads need not be assumed to act concurrently.

1.3 SUBMITTALS
   A. Product Data: Include construction details, material descriptions, impact strength[<>], dimensions of individual components and profiles, and finishes for each impact-resistant wall protection unit.
   B. Sustainable Design Submittals: Refer to Division 1 Section “Sustainable Design Requirements.”
   C. Shop Drawings: For each impact-resistant wall protection unit showing locations and extent. Include sections, details, and attachments to other work.
      1. 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.
   D. Samples for Initial Selection: For each type of impact-resistant wall protection unit indicated.
      1. Include similar Samples of accent strips and accessories involving color selection.
   E. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below.
      1. Corner Guards: 12 inches (300 mm) long. Include examples of joinery, corners, end caps, and field splices.
   F. Qualification Data: For qualified Installer.
   G. Material Certificates: For each impact-resistant plastic material, from manufacturer.
   H. Material Test Reports: For each impact-resistant plastic material.
   I. Maintenance Data: For each impact-resistant wall protection unit to include in maintenance manuals.
      1. Include recommended methods and frequency of maintenance for maintaining optimum condition of plastic covers under anticipated traffic and use conditions. Include precautions against using cleaning materials and methods that may be detrimental to plastic finishes and performance.
   J. Warranty: Sample of special warranty.

1.4 QUALITY ASSURANCE
   A. Installer Qualifications: An employer of workers trained and approved by manufacturer.
   B. Source Limitations: Obtain impact-resistant wall protection units from single source from single manufacturer.
C. Product Options: Drawings indicate size, profiles, and dimensional requirements of impact-resistant wall protection units and are based on the specific system indicated. Refer to Division 01 Section “Quality Requirements.”
   1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect’s approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

D. Forest Certification: Fabricate wood rails from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, “FSC Principles and Criteria for Forest Stewardship.”

E. Surface-Burning Characteristics: Provide impact-resistant, plastic wall protection units with surface-burning characteristics as determined by testing identical products per ASTM E 84, NFPA 255, or UL 723 by UL or another qualified testing agency.

F. 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.

G. Preinstallation Conference: Conduct conference at Project site.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store impact-resistant wall protection units in original undamaged packages and containers inside well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.
   1. Maintain room temperature within storage area at not less than 70 deg F (21 deg C) during the period plastic materials are stored.
   2. Keep plastic sheet material out of direct sunlight.
   3. Store plastic wall protection components for a minimum of 72 hours, or until plastic material attains a minimum room temperature of 70 deg F (21 deg C).
      a. Store corner-guard covers in a vertical position.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install impact-resistant wall protection units until building is enclosed and weatherproof, wet work is complete and dry, and HVAC system is operating and maintaining temperature at 70 deg F (21 deg C) for not less than 72 hours before beginning installation and for the remainder of the construction period.

1.7 WARRANTY

A. Special Warranty: Manufacturer’s standard form in which manufacturer agrees to repair or replace components of impact-resistant wall protection units that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Structural failures.
      b. Deterioration of plastic and other materials beyond normal use.
   2. Warranty Period: Five years from date of Substantial Completion.

1.8 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. Corner-Guard Covers: Full-size plastic covers of maximum length equal to 2 percent of each type, color, and texture of units installed, but no fewer than two, 8-foot-long units.
B. Include mounting and accessory components. Replacement materials shall be from same production run as installed units.

PART 2 - PRODUCTS

2.1 MATERIALS

A. PVC Plastic: ASTM D 1784, Class 1, textured, chemical- and stain-resistant, high-impact-resistant PVC or acrylic-modified vinyl plastic with integral color throughout; extruded material, thickness as indicated.
   1. Impact Resistance: Minimum 25.4 ft-lbf/in. (1356 J/m) of notch when tested according to ASTM D 256, Test Method A.
   2. Chemical and Stain Resistance: Tested according to ASTM D 543.
   3. Self-extinguishing when tested according to ASTM D 635.
   4. Flame-Spread Index: 25 or less.
   5. Smoke-Developed Index: 450 or less.

B. Polycarbonate Plastic Sheet: ASTM D 6098, S-PC01, Class 1 or 2, abrasion resistant; with a minimum impact-resistance rating of 15 ft-lbf/in. (800 J/m) of notch when tested according to ASTM D 256, Test Method A.

C. Aluminum Extrusions: Alloy and temper recommended by manufacturer for type of use and finish indicated, but with not less than strength and durability properties specified in ASTM B 221 (ASTM B 221M) for Alloy 6063-T5.

D. Stainless-Steel Sheet: ASTM A 240/A 240M.

E. Fasteners: Aluminum, nonmagnetic stainless-steel, or other noncorrosive metal screws, bolts, and other fasteners compatible with items being fastened. Use security-type fasteners where exposed to view.

F. Adhesive: As recommended by impact-resistant plastic wall protection manufacturer and with a VOC content of 70 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.2 CORNER GUARDS

A. Surface-Mounted, Resilient, Plastic Corner Guards: Assembly consisting of snap-on plastic cover installed over continuous retainer; including mounting hardware; fabricated with 90- or 135-degree turn to match wall condition.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   2. Cover: Extruded rigid plastic, minimum 0.078-inch (2.0-mm) wall thickness; as follows:
      a. Profile: Nominal 2-inch- (50-mm-) long leg and 1/4-inch (6-mm) corner radius
      b. Height: 8 feet (2.4 m).
      c. Color and Texture: As selected by Architect from manufacturer’s full range.
   3. Retainer: Minimum 0.060-inch- (1.5-mm-) thick, one-piece, extruded aluminum.
   4. Retainer Clips: Manufacturer’s standard impact-absorbing clips.
   5. Top and Bottom Caps: Prefabricated, injection-molded plastic; color matching cover; field adjustable for close alignment with snap-on cover.

2.3 END-WALL GUARDS

A. Surface-Mounted, Resilient, Plastic End-Wall Guard: Assembly consisting of snap-on plastic cover installed over continuous retainer at each corner, with end of wall covered by
semirigid, impact-resistant sheet wall covering; including mounting hardware.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
2. Cover: Extruded rigid plastic, minimum 0.078-inch (2.0-mm) wall thickness; as follows:
   a. Profile: Nominal 2-inch- (50-mm-) long leg and 1/4-inch (6-mm) corner radius.
   b. Height: 8 feet (2.4 m).
   c. Color and Texture: As selected by Architect from manufacturer’s full range.
3. Retainer: Minimum 0.060-inch- (1.5-mm-) thick, one-piece, extruded aluminum.
4. Top and Bottom Caps: Prefabricated, injection-molded plastic; color matching cover; field adjustable for close alignment with snap-on cover.

2.4 FABRICATION
A. Fabricate impact-resistant wall protection units to comply with requirements indicated for design, dimensions, and member sizes, including thicknesses of components.
B. Preform curved semirigid, impact-resistant sheet wall covering in factory for radius and sheet thickness as follows:
   1. Sheet Thickness of 0.040 Inch (1.0 mm): 24-inch (610-mm) radius.
   2. Sheet Thickness of 0.060 Inch (1.5 mm): 36-inch (914-mm) radius.
C. Assemble components in factory to greatest extent possible to minimize field assembly. Disassemble only as necessary for shipping and handling.
D. Fabricate components with tight seams and joints with exposed edges rolled. Provide surfaces free of wrinkles, chips, dents, uneven coloration, and other imperfections. Fabricate members and fittings to produce flush, smooth, and rigid hairline joints.
E. Miter corners and ends of wood handrails for returns.

2.5 METAL FINISHES
A. Comply with NAAMM’s “Metal Finishes Manual for Architectural and Metal Products” for recommendations for applying and designating finishes.
   1. Remove tool and die marks and stretch lines, or blend into finish.
   2. Grind and polish surfaces to produce uniform finish, free of cross scratches.
   3. Run grain of directional finishes with long dimension of each piece.
   4. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
B. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION
3.1 EXAMINATION
A. Examine substrates and wall areas, with Installer present, for compliance with requirements for installation tolerances, fire rating, and other conditions affecting performance of work.
B. Examine walls to which impact-resistant wall protection will be attached for blocking, grounds, and other solid backing that have been installed in the locations required for secure attachment of support fasteners.
   1. For impact-resistant wall protection units attached with adhesive or foam tape, verify compatibility with and suitability of substrates, including compatibility with existing
finishes or primers.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION
A. Complete finishing operations, including painting, before installing impact-resistant wall protection system components.
B. Before installation, clean substrate to remove dust, debris, and loose particles.

3.3 INSTALLATION
A. General: Install impact-resistant wall protection units level, plumb, and true to line without distortions. Do not use materials with chips, cracks, voids, stains, or other defects that might be visible in the finished Work.
1. Provide splices, mounting hardware, anchors, and other accessories required for a complete installation.
   a. Provide anchoring devices to withstand imposed loads.
   b. Where splices occur in horizontal runs of more than 20 feet (6.1 m), splice aluminum retainers and plastic covers at different locations along the run, but no closer than 12 inches (305 mm).
   c. Adjust end caps as required to ensure tight seams.

3.4 CLEANING
A. Immediately after completion of installation, clean plastic covers and accessories using a standard, ammonia-based, household cleaning agent.
B. Remove excess adhesive using methods and materials recommended in writing by manufacturer.

END OF SECTION 102600
SECTION 102800 - TOILET AND BATH ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. Provisions of the Contract and of the Contract Documents apply to this Section.

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. Setting Drawings: For cutouts required in other work; include templates, substrate preparation instructions, and directions for preparing cutouts and installing anchoring devices.
C. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.
   1. Identify locations using room designations indicated.
   2. Identify products using designations indicated.
D. Maintenance Data: For accessories to include in maintenance manuals specified in Division 01. Provide lists of replacement parts and service recommendations.

1.3 QUALITY ASSURANCE
A. Source Limitations: Provide products of same manufacturer for each type of accessory unit and for units exposed to view in same areas, unless otherwise approved by Architect.
   1. All grab bars are considered one “type” and shall be of similar design.
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. Product Options: Accessory requirements, including those for materials, finishes, dimensions, capacities, and performance, are established by specific products indicated in the Toilet and Bath Accessory Schedule.
   1. Products of other manufacturers with equal characteristics, as judged solely by Architect, may be provided.
   2. Do not modify aesthetic effects, as judged solely by Architect, except with Architect's approval. Where modifications are proposed, submit comprehensive explanatory data to Architect for review.
D. Accessibility Requirements: Comply with applicable provisions in the Department of Justice 2010 ADA Standards for Accessible Design.

1.4 COORDINATION
A. Coordinate accessory locations with other work to prevent interference with clearances required for access by disabled persons, 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. Coordinate type and location of blocking required for wall-mounted accessories.

1.5 WARRANTY

A. General Warranty: Special warranty 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 Contractor under requirements of the Contract Documents.

B. 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. Minimum Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 and Part 3 articles where titles below introduce lists, the following requirements apply to product selection:

1. Products: Subject to compliance with requirements, available products include, but are not limited to, those listed.

B. Available Manufacturers: Subject to compliance with requirements, manufacturers offering accessories that may be incorporated into the Work include, but are not limited to, the following:

1. Toilet and Bath Accessories:
   a. A & J Washroom Accessories, Inc.
   b. American Specialties, Inc.
   c. Bobrick Washroom Equipment, Inc.
   d. Bradley Corporation.

2. Infant-Care Products:
   a. A & J Washroom Accessories, Inc.
   b. American Infant Care Products Inc.
   c. American Specialties, Inc.
   d. Brocar Products, Inc.
   e. Koala Kare division of Bobrick Washroom Equipment, Inc.
   f. Bradley Corporation.
   g. Rubbermaid Commercial Products.
   h. Safe-Strap Company, Inc.

2.2 MATERIALS

A. Stainless Steel: ASTM A 666, Type 304, with No. 4 finish (satin), in 0.031-inch (0.8-mm) minimum nominal thickness, unless otherwise indicated.

B. Steel Sheet: ASTM A 1008, Designation CS (cold rolled, commercial steel), 0.036-inch minimum nominal thickness.

C. Galvanized-Steel Sheet: ASTM A 653, with G60 hot-dip zinc coating.


E. 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.

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. Logo: One, maximum 1-1/2-inch (38-mm-) diameter, unobtrusive stamped manufacturer logo, as approved by Architect, is permitted on exposed face of accessories. On interior surface not exposed to view or back surface of each accessory, provide printed, waterproof label or stamped nameplate indicating manufacturer’s name and product model number.

C. Recessed Toilet Accessories: Unless otherwise indicated, fabricate units of all-welded construction, without mitered corners.

D. Framed Glass-Mirror Units: Fabricate frames for glass-mirror units to accommodate glass edge protection material. Provide mirror backing and support system that permits rigid, tamper-resistant glass installation and prevents moisture accumulation.
   1. Provide galvanized steel backing sheet, not less than 0.034 inch (0.85 mm) and full mirror size, with nonabsorptive filler material. Corrugated cardboard is not an acceptable filler material.

E. Mirror-Unit Hangers: Provide mirror-unit mounting system that permits rigid, tamper- and theft-resistant installation, one of the following:
   1. One-piece, galvanized steel, wall-hanger device with spring-action locking mechanism to hold mirror unit in position with no exposed screws or bolts.
   2. Heavy-duty wall brackets of galvanized steel, equipped with concealed locking devices requiring a special tool to remove.

F. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner’s representative.

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 and verify that mechanisms function properly. Replace damaged or defective items.

B. Remove temporary labels and protective coatings.

C. Clean and polish exposed surfaces according to manufacturer’s written recommendations.

3.3 TOILET AND BATH ACCESSORY SCHEDULE

A. The following products make reference to the Toilet Accessories Schedule in the drawings, herein designated as “TBA.”
B. Grab Bar **TBA-A, B, C**: Where these designations are indicated, provide stainless-steel grab bar complying with the following:
   1. Products: Available products include the following:
      a. UG2 Series; A & J Washroom Accessories, Inc.
      b. 3700 Series; American Specialties, Inc.
      c. B-5806 Series; Bobrick Washroom Equipment, Inc.
      d. 832 Series; Bradley Corporation.
   2. Stainless-Steel Nominal Thickness: Minimum 0.05 inch (1.3 mm).
   3. Mounting: Concealed with manufacturer’s standard flanges and anchors.
   4. Gripping Surfaces: Smooth, satin finish. [Manufacturer’s standard slip-resistant texture].
   5. Outside Diameter: 1-1/4 inches (32 mm) for medium-duty applications [<>].

C. Toilet Tissue (Double Roll) Dispenser **TBA-D**: Where this designation is indicated, provide toilet tissue dispenser complying with the following:
   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. Model U806-NC; A & J Washroom Accessories, Inc.
      b. 0264-1 series; American Specialties, Inc.
      c. Model B-2740; Bobrick Washroom Equipment, Inc.
   2. Type: Double roll dispenser with molded high-impact ABS spindle, and tamper-resistant release mechanism.
   3. Mounting: Surface mounted with exposed anchorage
   5. Operation: Non-control delivery with manufacturer’s standard spindle.
   6. Capacity: Designed for up to 6-inch- (152-mm-) diameter-core tissue rolls.

D. Sanitary Napkin Disposal Unit (Flip Lid) **TBA-E**: Where this designation is indicated, provide stainless-steel sanitary napkin disposal unit complying with the following:
   1. Products: Available products include the following:
      a. Model B-270 Contura; Bobrick Washroom Equipment, Inc.
      b. Model U591; A & J Washroom Accessories, Inc.
      c. Model 20852; American Specialties, Inc.
      d. Model 4781-15; Bradley Corporation.
   2. Surface-Mounted Type: With seamless exposed walls; self-closing top cover; locking bottom panel with stainless-steel, continuous hinge; and removable, reusable receptacle.

E. Soap Dispenser (Surface Tank) **TBA-F**: Where this designation is indicated, provide soap dispenser complying with the following:
   1. Products: Available products include the following:
      a. Model U126; A & J Washroom Accessories, Inc.
      b. Model 0347; American Specialties, Inc.
      c. Model B-2111; Bobrick Washroom Equipment, Inc.
      d. Model 6562; Bradley Corporation.
   2. Liquid Soap Dispenser, Vertical-Tank Type: Surface-mounted type, minimum 40-oz. capacity tank with stainless-steel piston, springs, and internal parts designed to dispense soap in measured quantity by pump action; and stainless-steel cover with unbreakable window-type refill indicator.

F. Mirror Unit **TBA-G**: Where this designation is indicated, provide mirror unit complying with the following:
1. Products: Available products include the following:
   a. U700 Series; A & J Washroom Accessories, Inc.
   b. 0600 A Series; American Specialties, Inc.
   c. Model B-290; Bobrick Washroom Equipment, Inc.
   d. Model 780; Bradley Corporation.

2. Stainless-Steel, Angle-Framed Mirror: Fabricate frame from minimum nominal 0.05-inch- (1.3-mm-) thick stainless-steel angles, with square corners mitered, welded, and ground smooth.

G. Paper Towel Dispenser TBA-Q: Where this designation is indicated, provide stainless-steel paper towel dispenser complying with the following:
   1. Products: Available products include the following:
      a. Model U180; A & J Washroom Accessories, Inc.
      b. Model 0210; American Specialties, Inc.
      c. Model B-262; Bobrick Washroom Equipment, Inc.262 has keyed lock
      d. Model 250-15; Bradley Corporation.
   2. Surface-Mounted Type: Sized for minimum of 400 C-fold or 575 multifold paper towels without using special adapters; with hinged front equipped with tumbler lockset; and with refill indicators that are pierced slots at sides or front. Unit shall project no more than 4 inches from wall surface.

H. Robe Hook: Provide robe hook complying with the following, as indicated:
   1. Products: Available products include the following:
      a. Model UX112; A & J Washroom Accessories, Inc.
      b. Model 7345; American Specialties, Inc.
      c. Model B-7672; Bobrick Washroom Equipment, Inc.
      d. Model 9124; Bradley Corporation.
   2. Double-Prong Unit: Stainless-steel, double-prong robe hook with rectangular wall bracket and backplate for concealed mounting.

I. Mop and Broom Holder with Utility Shelf: Where indicated, provide mop and broom holder complying with the following:
   1. Products: Available products include the following:
      a. Model UJ41A; A & J Washroom Accessories, Inc.
      b. Model 1315; American Specialties, Inc.
      c. Model B-224 x 36; Bobrick Washroom Equipment, Inc.
      d. Model 9983; Bradley Corporation.
   2. 36-inch- Long Unit: Minimum nominal 0.05-inch- thick stainless steel unit with shelf; support brackets for wall mounting; three hooks for wiping rags; four spring-loaded, rubber hat, cam-type, mop/broom holders mounted on front of shelf; and approximately 1/4-inch- diameter, stainless-steel rod suspended beneath shelf for drying rags.

J. Diaper-Changing Station TBA-H: Where this designation is indicated, provide infant-care product complying with the following:
   1. Products: Available products include the following:
      a. Model KB200; Koala Kare, Bobrick Washroom Equipment, Inc.
      b. Model U944; A & J Washroom Accessories, Inc.
      c. Model 9012; American Specialties, Inc.
   2. Description: Horizontal unit that opens by folding down from stored position and with child-protection strap.
      a. Engineered to support a minimum of 200-lb static load when opened.
b. Conforms to ADA accessibility requirements.
3. Mounting: Surface mounted, with unit projecting not more than 4 inches from wall when closed.
5. Material and Finish: FDA-approved high-density polyethylene or polypropylene with reinforced full-length steel hinge mechanism, 11-gage steel mounting plates and hardware.
   a. Color: As selected from manufacturer’s full line of available colors.

END OF SECTION 102800
SECTION 104400 - FIRE-PROTECTION SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 SUBMITTALS
A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for fire-protection cabinets.
   1. Fire Extinguishers: Include rating and classification.
   2. 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.

1.3 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 Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.
   1. Provide fire extinguishers approved, listed, and labeled by FMG.

1.4 COORDINATION
A. Coordinate size of fire-protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.

1.5 SEQUENCING
A. Apply decals on field-painted fire-protection cabinets after painting is complete.

PART 2 - PRODUCTS

2.1 MANUFACTURERS
A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
   1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

2.2 MATERIALS
A. Cold-Rolled Steel Sheet: ASTM A 1008, Commercial Steel (CS), Type B.
B. Tempered Break Glass: ASTM C 1048, Kind FT, Condition A, Type I, Quality q3, 1.5 mm thick.

2.3 PORTABLE FIRE EXTINGUISHERS
A. Available Manufacturers:
   1. Amerex Corporation.
   2. Ansul Incorporated.
5. Fire End & Croker Corporation.
6. JL Industries, Inc.
8. Larsen’s Manufacturing Company.
9. Modern Metal Products; Div. of Technico.
10. Moon American.

B. General: Provide fire extinguishers of type, size, and capacity for each fire-protection cabinet and mounting bracket indicated.

C. Multipurpose Dry-Chemical Type in Steel Container: UL-rated 4-A:60-B:C, 10-lb (4.5-kg) nominal capacity, with monoammonium phosphate-based dry chemical in enameled-steel container.

2.4 FIRE-PROTECTION CABINET

A. Available Manufacturers:
1. JL Industries, Inc.
2. Kidde Fyrnetics.
3. Larsen’s Manufacturing Company.
4. Modern Metal Products; Div. of Technico.
5. Potter Roemer Fire Pro.

B. Cabinet Type: Suitable for fire extinguisher.

C. Cabinet Construction: Nonrated.

D. Cabinet Material: Enameled-steel sheet.
   1. Shelf: Same metal and finish as cabinet.

E. Semirecessed Cabinet: Cabinet box partially recessed in walls of shallow depth to suit style of trim indicated; with one-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend).
   1. Square-Edge Trim: 1-1/4- to 1-1/2-inch backbend depth.
   2. Rolled-Edge Trim: 2-1/2-inch backbend depth.

F. Surface-Mounted Cabinet: Cabinet box fully exposed and mounted directly on wall; with no trim.

G. Cabinet Trim Material: Steel sheet.

H. Door Material: Steel sheet.

I. Door Style: Fully glazed, frameless, backless, acrylic panel.

J. Door Glazing: Clear float glass.

K. Door Hardware: Manufacturer’s standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.
   1. Provide manufacturer’s standard lever handle and latch.
   2. Provide manufacturer’s standard hinge permitting door to open 180 degrees.

L. Accessories:
   1. Mounting Bracket: Manufacturer’s standard steel, designed to secure fire extinguisher to fire-protection cabinet, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.
   2. Break-Glass Strike: Manufacturer’s standard metal strike, complete with chain and mounting clip, secured to cabinet.
3. Lettered Door Handle: One-piece, cast-iron door handle with the word “FIRE” embossed into face.
4. Door Lock: Cam lock that allows door to be opened during emergency by pulling sharply on door handle.
5. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.
   a. Identify fire extinguisher in fire-protection cabinet with the words “FIRE EXTINGUISHER.”
      1) Location: Applied to cabinet door.
      3) Lettering Color: Red.
      4) Orientation: Vertical.
6. Alarm: Manufacturer’s standard alarm that actuates when fire-protection cabinet door is opened and that is powered by batteries.

M. Finishes:
1. Manufacturer’s standard baked-enamel paint for the following:
   a. Exterior of cabinet, door, and trim, except for those surfaces indicated to receive another finish.
   b. Interior of cabinet and door.
2. Steel: Baked enamel.
   a. Color and Texture: As selected by Architect from manufacturer’s full range.

2.5 MOUNTING BRACKETS
A. Available Manufacturers:
   1. Amerex Corporation.
   2. Ansul Incorporated.
   5. Fire End & Croker Corporation.
   6. JL Industries, Inc.
   7. Larsen’s Manufacturing Company.
B. Mounting Brackets: Manufacturer’s standard galvanized steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.
C. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.
   1. Identify bracket-mounted fire extinguishers with the words “FIRE EXTINGUISHER” in red letter decals applied to mounting surface.

2.6 EMERGENCY KEY ACCESS BOX
A. The Knox Company, as required by the local Fire Marshal. Provide Knox-Box recessed mount 3200 Series model, nominal 4 inches by 5 inches by 3-1/4 inches deep, with tamper switch and recessed mounting kit. Provide manufacturer’s polyester powdercoat finish in black color. No substitutions will be considered. Coordinate installation with adjacent construction and electrical connections as required for proper operation and in accordance with local Fire Marshal. Contact Knox Company: www.knoxbox.com
2.7  **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. 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.
   a. 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. Miter and weld perimeter door frames.

C. Cabinet Trim: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.

2.8  **FINISHES, GENERAL**

A. Comply with NAAMM`s “Metal Finishes Manual for Architectural and Metal Products” for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Finish fire-protection cabinets after assembly.

D. 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.

2.9  **STEEL FINISHES**

A. Surface Preparation: Clean surfaces of dirt, oil, grease, mill scale, rust, and other contaminants that could impair paint bond using manufacturer`s standard methods.

B. Baked-Enamel Finish: Immediately after cleaning and pretreating, apply manufacturer`s standard two-coat, baked-enamel finish consisting of prime coat and thermosetting topcoat. Comply with paint manufacturer`s written instructions for applying and baking to achieve a minimum dry film thickness of 2 mils (0.05 mm).

**PART 3 -EXECUTION**

3.1  **EXAMINATION**

A. Examine roughing-in for hose valves and cabinets to verify actual locations of piping connections before cabinet installation.

B. Examine walls and partitions for suitable framing depth and blocking where semirecessed cabinets will be installed.

C. Examine fire extinguishers for proper charging and tagging.
   1. Remove and replace damaged, defective, or undercharged units.

D. Proceed with installation only after unsatisfactory conditions have been corrected.
3.2 PREPARATION
A. Prepare recesses for semirecessed fire-protection cabinets as required by type and size of cabinet and trim style.

3.3 INSTALLATION
A. General: Install fire-protection specialties in locations and at mounting heights indicated or, if not indicated, at heights indicated below:
   1. Fire-Protection Cabinets: 48 inches above finished floor to top of cabinet.
   2. Mounting Brackets: 48 inches above finished floor to top of fire extinguisher.
B. Fire-Protection Cabinets: Fasten fire-protection cabinets to structure, square and plumb.
   1. Unless otherwise indicated, provide recessed fire-protection cabinets. If wall thickness is not adequate for recessed cabinets, provide semirecessed fire-protection cabinets.
   2. Provide inside latch and lock for break-glass panels.
   3. Fasten mounting brackets to inside surface of fire-protection cabinets, square and plumb.
C. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.
D. Identification: Apply decals at locations indicated.

3.4 INSTALLATION OF FIRE-RATED HOSE AND VALVE CABINETS
A. Install cabinet with not more than 1/16-inch tolerance between pipe OD and knockout OD. Center pipe within knockout.
B. Seal through penetrations with firestopping sealant as specified in Division 7 Section “Through-Penetration Firestop Systems.”

3.5 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 fire-protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.
C. On completion of fire-protection cabinet installation, clean interior and exterior surfaces as recommended by manufacturer.
D. Touch up marred finishes, or replace fire-protection cabinets that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by fire-protection cabinet manufacturer.
E. Replace fire-protection cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION
SECTION 105113.13 - METAL EVIDENCE LOCKERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 SUMMARY
   A. This Section includes the following metal evidence lockers:
      1. Evidence metal lockers. (interior, freestanding, pass-thru models)
      2. Evidence metal lockers. (interior, wall-mounted, non-pass-thru models)
      3. Refrigerated evidence metal lockers. (interior, freestanding, pass-thru models)
      4. Refrigerated evidence metal lockers. (interior, wall-mounted, non-pass-thru models)
      5. Personnel Duty Lockers.

1.3 DEFINITIONS
   A. Uncoated Steel Sheet Thicknesses: Indicated as the minimum thicknesses.

1.4 SUBMITTALS
   A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of metal evidence locker and bench.
   B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
      1. Show base, sloping tops, filler panels [<>] and other accessories.
      2. Include locker identification system.
   C. Samples for Initial Selection: For units with factory-applied color finishes.
   D. Samples for Verification: For metal evidence lockers [<>], in manufacturer’s standard sizes. (Samples of benches are not required.)
   E. Qualification Data: For Installer.
   F. Maintenance Data: For adjusting, repairing, and replacing locker doors and latching mechanisms to include in maintenance manuals.
   G. Warranty: Special warranty specified in this Section.

1.5 QUALITY ASSURANCE
   A. Installer Qualifications: An authorized representative of metal evidence locker manufacturer for installation and maintenance of units required for this Project.
   B. Source Limitations: Obtain metal evidence lockers and accessories through one source from a single manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING
   A. Do not deliver metal evidence lockers until spaces to receive them are clean, dry, and ready for metal evidence locker installation.
   B. Deliver master and control keys for evidence lockers and combination control charts for exterior lockers to Owner by secure procedure established by Owner.

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

B. Coordinate with the following related work:
   1. Division 6 Section “Rough Carpentry” for furring, blocking, and shims required for installing metal lockers and concealed within other construction before metal locker installation.
   2. Division 6 Section “Interior Architectural Woodwork” for countertops mounted to evidence lockers.
   3. Division 10 Section “Metal Lockers” for metal wardrobe lockers.
   5. Division 23 Sections for mechanical exhaust systems connected to metal lockers.

1.8 WARRANTY
   A. Special Warranty: Manufacturer’s standard form in which manufacturer agrees to repair or replace components of metal evidence 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 All-Welded Metal evidence Lockers: 4 years from date of Substantial Completion.

1.9 EXTRA MATERIALS
   A. Furnish extra materials described below, before construction begins, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
      1. Provide 20 full-size units of the following metal evidence locker hardware items:
         a. Locks.

PART 2 -PRODUCTS

2.1 MANUFACTURERS
   A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
      1. Basis-of-Design Product: The design for each metal evidence locker specified is based on the product named. Subject to compliance with requirements, provide either the named product or a comparable product by one of the other manufacturers specified.

2.2 MATERIALS
   A. Cold-Rolled Steel Sheet: ASTM A 1008, Commercial Steel (CS) Type B, suitable for exposed applications.
   B. Expanded Metal: ASTM F 1267, Type II (flattened), Class I, 3/4-inch (19-mm) steel mesh, with at least 70 percent open area.
   C. Stainless-Steel Sheet: ASTM A 666, Type 304.
   D. Fasteners: Zinc- or nickel-plated steel, slotless-type exposed bolt heads, and self-locking nuts or lock washers for nuts on moving parts.
E. Anchors: Select material, type, size, and finish required for secure anchorage to each substrate.
   1. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls[<>] for corrosion resistance.
   2. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.

2.3 EVIDENCE METAL LOCKERS (Interior, Non-Pass-Through models)

A. DSM Law Enforcement “Evidence Locker” or a comparable product of one of the following: HYPERLINK "http://www.dsmlawenforcement.com" www.dsmlawenforcement.com
   1. HYPERLINK "http://www.safetyleague.com" www.safetyleague.com

B. Steel Lockers: Fabricated from cold-rolled steel sheet with thicknesses as follows:
   1. Tops, Bottoms, Sides, and Shelves: 0.0528 inch thick (16 gage).
   2. Inner Skins: 0.0428 inch thick (18 gage).
   3. Backs: 0.0329 inch thick (20 gage).
   4. Frames: 0.0528 inch thick. (16 gage).
   5. Base: 0.0677 inch thick (14 gage).
   6. Doors: 0.0528 inch thick. (16 gage).
   7. Exposed Ends of Non-recessed Lockers: 0.0528 inch thick. (16 gage).

C. Body: Assembled by welding or riveting body components to frames using aluminum or stainless-steel rivets; flanged for double thickness at back vertical corners, and back ventilated.

D. Frames: Channel formed; lapped and welded at corners; with top, bottom, and cross frames welded into vertical main frames. Form continuous integral door strike on vertical main frames and equip frame with resilient bumpers to cushion door closing.
   1. Cross Frames: Channel formed and fabricated from same material as main frames; welded to vertical frame members.

E. Doors: Double-wall with perimeter reinforcement, self-closing, formed into channel or tube shape at vertical and horizontal edges; fabricated to swing 180 degrees. Brace or reinforce inner face of doors with manufacturer’s standard reinforcing angles, channels, or stiffener panels.

F. Hinges: Manufacturer’s standard, continuous type, of same material as door. Weld hinge to inside of door frame and attach hinge to door with factory-installed fasteners that are completely concealed and tamper resistant when door is closed.

G. Projecting Handle: Manufacturer’s standard; stainless steel, pry resistant, and vandal resistant.

H. Built-in “Keyless” Evidence Locks: Self-contained lock units mounted on interior of door with bolt to engage frame. Operation shall permit selection, access and deposit of evidence without key; and removal of evidence by keyed access to maintain chain-of-custody of evidence. Mount instruction decals on both faces of door. Furnish one change key for each lock and one master key in accordance with secure procedure acceptable to Owner.

I. Finish: Baked enamel Baked enamel or powder coat.
   1. Color(s): [As indicated by manufacturer’s designations][Match Architect’s sample] As selected by Architect from manufacturer’s full range [Two colors, with door one color and frame and body another color; as selected by Architect from manufacturer’s
2.4 PASS-THRU EVIDENCE LOCKERS 420560

A. Basis-of-Design Product: DSM Law Enforcement Products “Evidence Locker” in sizes and configurations as indicated on Drawings and complete with 4-compartment refrigerated module (DSM RSD4 Module) or a comparable product of one of the following:
   1. HYPERLINK "http://www.safetyleague.com" www.safetyleague.com

B. Steel Lockers: Fabricated from cold-rolled steel sheet with thicknesses as follows:
   1. Tops, bottoms, sides and shelves: 0.0528 inch thick (16 gage).
   2. Internal skins: 0.0429 inch thick. (18 gage)
   3. Frames: 0.0528 inch thick (16 gage).
   4. Base: 0.677 inch thick (14 gage).
   5. Doors: 0.0528 inch thick. (16 gage).
   6. Exposed Ends of Non-recessed Lockers: 0.0528 inch thick. (16 gage).

C. Body: Assembled by welding body components to frames.

D. Frames: Channel formed; lapped and welded at corners; with top, bottom, and cross frames welded into vertical main frames. Form continuous integral door strike on vertical main frames and equip frame with resilient bumpers to cushion door closing.
   1. Cross Frames: Channel formed and fabricated from same material as main frames; welded to vertical frame members.

E. Doors: Double-wall with perimeter reinforcement, self-closing, formed into channel or tube shape at vertical and horizontal edges; fabricated to swing 180 degrees. Brace or reinforce inner face of doors with manufacturer’s standard reinforcing angles, channels, or stiffener panels; all corners welded and ground smooth prior to painting. Equip doors with self-closing devices

F. Hinges: Manufacturer’s standard, continuous type, of same material as door. Weld hinge to inside of door frame and attach hinge to door with factory-installed fasteners that are completely concealed and tamper-resistant when door is closed.

G. Projecting Handle: Manufacturer’s standard; stainless steel, pry resistant, and vandal resistant.

H. Built-in “Keyless” Evidence Locks: Self-contained lock units mounted on door interior with bolt to engage frame. Operation shall permit selection, access and deposit of evidence without key; and removal of evidence from rear by keyed access by authorized personnel to maintain chain-of-custody of evidence. Mount instruction decals on face of each door. Furnish one change key per lock and one master key in accordance with secure procedure acceptable to Owner.
   1. Bolt Operation: Manually locking deadbolt Manually locking deadbolt or automatically locking spring bolt.

I. Finish: Baked enamel or powder coat.
   1. Color: As selected by Architect from manufacturer’s full range.

2.5 POLICE WARDROBE AND GEAR LOCKERS 420560

A. Airflow Wardrobe Locker” as manufactured by Tiffin Metal Products; 1-800-537-0983 or HYPERLINK "http://www.tiffinmetal.com" www.tiffinmetal.com. Subject to compliance with specified requirements, provide the specified product in sizes and configurations as indicated or a comparable product of one of the following:
1. Exterior Locker.  HYPERLINK "http://www.safetyleague.com"
www.safetyleague.com
2. HYPERLINK "http://www.dsmlawenforcement.com"
www.dsmlawenforcement.com

B. Construction — General: Fabricated from stainless-steel sheet with thicknesses as follows:
1. Tops, Bottoms, Sides, Backs, and Shelves: 0.0250 inch thick, with No. 2B finish.
2. Frames: 0.0625 inch thick, with No. 3 or 4 finish.
3. Doors: 0.0625 inch thick, louvers at bottom, with decorator patterned finish on face of doors.
4. Boot Drying Rack:
5. Exposed Ends of Non-recessed Lockers: 0.0625 inch thick, with No. 3 or 4 finish.

C. Body: Assembled by welding or riveting body components to frames using aluminum or stainless-steel rivets; flanged for double thickness at back vertical corners.

D. Frames: Channel formed; lapped and welded at corners; with top, bottom, and cross frames welded into vertical main frames. Form continuous integral door strike on vertical main frames and equip frame with resilient bumpers to cushion door closing.
1. Cross Frames: Channel formed and fabricated from same material as main frames; welded to vertical frame members.

E. Doors:
1. Double-wall with perimeter reinforcement formed into channel or tube shape at vertical and horizontal edges; fabricated to swing 180 degrees. Brace or reinforce inner face of doors with manufacturer’s standard reinforcing angles, channels, or stiffener panels.
2. Doors: One-piece, formed into channel shape at vertical edges and flanged at right angles at horizontal edges; fabricated to swing 180 degrees. Brace or reinforce inner face of doors with manufacturer’s standard reinforcing angles, channels, or stiffener panels.

F. Expanded-Metal Doors: Fabricated from 0.090-inch (2.28-mm) nominal-thickness expanded metal; welded to 0.105-inch (2.66-mm) nominal-thickness steel angle frame; with 0.090-inch (2.28-mm) nominal-thickness, steel sheet lock panel backed by 0.060-inch (1.52-mm) nominal-thickness steel sheet retainer welded to door frame.

G. Hinges: Manufacturer’s standard, continuous type, of same material as door. Weld hinge to inside of door frame and attach hinge to door with factory-installed fasteners that are completely concealed and tamper resistant when door is closed.

H. Projecting Handle: Manufacturer’s standard; stainless steel, pry resistant, and vandal resistant.

I. Locks: Fabricate lockers to receive the following locking devices, installed on lockers using security-type fasteners:
1. Built-in Combination Locks: Key-controlled, three-number dialing combination locks; capable of at least five combination changes made automatically with a control key. Provide bolt operation with automatic dead-bolt action.

J. Interior Configuration:
1. Headgear shelf at top of locker; 8-inch high x full-width x full 24-inch depth.
2. Briefcase or personal shelf immediately below headgear shelf; 5 feet high x full-width x full-depth.
3. Hanging clothes section with coat rack bar, 55-5/16-inch high x 17-inch wide x full depth and with removable perforated metal boot tray at bottom for drying of
footwear.

4. 3 small shelves for miscellaneous items or gear 9-1/4-inch high x 7-inch wide x full depth; one with lockable door for safe storage of sidearm or personal valuables.

5. Body armor compartment with hook, allowing full flow of air; 28-12/16-inch high x 7-inch wide x full depth.


7. Left door equipped with pegboard type panel with hooks for hanging of duty belt and with large pocket for police clipboard.

8. Right door equipped with unbreakable stainless steel mirror with magnetic attachment for notes.

9. Lockable gear drawer under main locker keyed to match locker doors; 18-inch high x 24-inch wide x 36-inch deep.

10. Hardwood bench of laminated maple 9’1/2-inch deep by lengths to match each run of lockers fitted to top of drawers on each bank of lockers.

2.6 DUTY BAG LOCKERS

A. DB2436WB Duty Bag Locker” as manufactured by Tiffin Metal Products; HYPERLINK "http://www.tiffenmetal.com" www.tiffenmetal.com. Subject to compliance with specified requirements, provide the specified product in sizes and configurations as indicated or a comparable product of one of the following:


B. Steel Lockers: Fabricated from unperforated cold-rolled steel sheet with thicknesses as follows:

1. Tops, bottoms, sides and shelves: 0.067 inch thick (14 gage).

2. Frames: 0.067 inch thick (14 gage).

3. Doors: 0.067 inch thick (14 gage).

4. Exposed Ends of Non-recessed Lockers: 0.067 inch thick (14 gage).

C. Configuration: Four locker units high, each 24 inches wide by 36 inches deep by 18 inches high for total height of 72 inches. Top three lockers are front-access with hinged door; bottom unit is top-access drawer. Tiffin DB2436WB

D. Body: Assembled by riveting or bolting body components together.

E. Frames: Channel formed; lapped and welded at corners; with top, bottom, and cross frames welded into vertical main frames. Form continuous integral door strike on vertical main frames and equip frame with resilient bumpers to cushion door closing.

1. Cross Frames: Channel formed and fabricated from same material as main frames; welded to vertical frame members.

F. Doors: One-piece, formed into channel shape at vertical edges and flanged at right angles at horizontal edges; fabricated to swing a minimum of 130 degrees. Brace or reinforce inner face of doors with manufacturer’s standard reinforcing angles, channels, or stiffener panels.

G. Hinges: Manufacturer’s standard, continuous type, of same material as door. Weld hinge to inside of door frame and attach hinge to door with factory-installed fasteners that are completely concealed and tamper-resistant when door is closed.

H. Drawer: Bottom drawer formed on all sides with heavy-duty 200 lb. capacity 28 inch drawer slides and bayonet engaged.
I. Projecting Handle: Manufacturer’s standard; stainless steel, pry resistant, and vandal resistant.

J. Cylinder Locks: Built-in, flush, cam locks with five-pin tumbler keyway, keyed separately and master keyed. Furnish two change keys for each lock and two master keys.
   1. Provide master key override feature.
   2. Bolt Operation: Manually locking deadbolt or automatically locking spring bolt.

K. Finish: Baked enamel or powder coat.
   1. Color: As selected by Architect from manufacturer’s full range.

2.7 EXTERIOR POLICE GEAR METAL LOCKERS (Exterior)

A. Available Products:
   2. HYPERLINK "http://www.dsmlawenforcement.com"
      www.dsmlawenforcement.com

B. Stainless-Steel Lockers: Fabricated from stainless-steel sheet with thicknesses as follows:
   1. Tops, Bottoms, Sides, Backs, and Shelves: 0.0625 inch thick (14 gage) with No. 2B finish.
   2. Frames: 0.0625 inch thick (14 gage) with No. 3 or 4 finish.
   3. Doors: 0.0528 inch thick (16 gage) with decorator patterned finish.
   4. Exposed Ends of Non-recessed Lockers: 0.0625 inch thick (14 gage) with No. 3 or 4 finish.

C. Construction:
   1. Body: Assembled by welding or riveting body components to frames using aluminum or stainless-steel rivets; flanged for double thickness at back vertical corners.
   2. Frames: Channel formed; lapped and welded at corners; with top, bottom, and cross frames welded into vertical main frames. Form continuous integral door strike on vertical main frames and equip frame with resilient bumpers to cushion door closing.
   3. Cross Frames: Channel formed and fabricated from same material as main frames; welded to vertical frame members.
   4. Doors: Double-wall with perimeter reinforcement, self-closing, formed into channel or tube shape at vertical and horizontal edges; fabricated to swing 180 degrees. Brace or reinforce inner face of doors with manufacturer’s standard reinforcing angles, channels, or stiffener panels.
   5. Doors: One-piece, self-closing, formed into channel shape at vertical edges and flanged at right angles at horizontal edges; fabricated to swing 180 degrees. Brace or reinforce inner face of doors with manufacturer’s standard reinforcing angles, channels, or stiffener panels.
   6. Hinges: Manufacturer’s standard, continuous type, of same material as door. Weld hinge to inside of door frame and attach hinge to door with factory-installed fasteners that are completely concealed and tamper resistant when door is closed.
   7. Projecting Handle: Manufacturer’s standard; stainless steel, pry resistant, and vandal resistant.
   8. Locks: Fabricate lockers to receive the following locking devices, installed on lockers using security-type fasteners:
      a. Built-in Combination Locks: Key-controlled, three-number dialing combination locks; capable of at least five combination changes made...
automatically with a control key. Provide bolt operation with automatic deadbolt action.

b. Built-in Coin-Operated Locks: Self-contained units mounted on interior of door with replaceable lock cylinders keyed separately and master keyed. Mount instruction decals on both faces of door. Furnish one change key for each lock[<>] and one master key.


d. Lock Type: Fee return/deposit.

e. Fee Type: Token.

1) Coin Box: Manufacturer’s standard housing or stainless-steel cash box with stainless-steel flanged cover set into base of lock channel frame.

2) Furnish with removable cylinder and key, and master code changer key.

9. Finish: Baked enamel. NA FOR STAINLESS

D. LOCKS

2. Built-in Card-Operated Locks: Self-contained units mounted on interior of door with replaceable lock cylinders keyed separately and master keyed. Mount instruction decals on both faces of door. Furnish one change card-key for each lock[<>] and one master card-key.

3. Digital Keypad Locks: Battery-powered electronic keypad with reprogrammable manager and owner codes that override access. Three consecutive incorrect code entries shall disable lock for three minutes.

2.8 LOCKER BENCHESNA

2.9 FABRICATION

A. General: Fabricate metal evidence lockers square, rigid, and without warp; with metal faces flat and free of dents or distortion. Make exposed metal edges free of sharp edges and burrs, and safe to touch.

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 a complete installation.

B. Unit Principle: Fabricate each metal evidence locker with an individual door and frame; individual top, bottom, and back; and common intermediate uprights separating compartments.

C. All-Welded Construction: Factory preassemble metal evidence 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.

D. Identification Plates: Manufacturer’s standard etched, embossed, or stamped aluminum plates; with numbers and letters at least 3/8 inch high.

E. Continuous Base: Formed into channel or Z profile for stiffness, and fabricated in lengths as long as practicable to enclose base and base ends of metal evidence lockers; finished to match lockers. (Interior lockers)

F. Continuous Sloping Tops: Fabricated in lengths as long as practicable, without visible fasteners at splice locations; finished to match lockers. (Exterior lockers only)
G. Boxed End Panels: Fabricated with 1-inch- wide edge dimension, and designed for concealing fasteners and holes at exposed ends of non-recessed metal evidence lockers; finished to match lockers.
   1. Provide one-piece panels for double-row (back-to-back) locker ends. (exterior lockers)

H. Center Dividers: Full-depth, vertical partitions between bottom and shelf; finished to match lockers.

2.10 STEEL SHEET FINISHES (Interior lockers)
   A. General: Comply with NAAMM’s “Metal Finishes Manual for Architectural and Metal Products” for recommendations for applying and designating finishes.
   B. Factory finish steel surfaces and accessories except stainless-steel and chrome-plated surfaces.
   C. Surface Preparation: Clean surfaces of dirt, oil, grease, mill scale, rust, and other contaminants that could impair paint bond. Use manufacturer’s standard methods. Provide either of the following finishes.
      1. Baked-Enamel Finish: Immediately after cleaning, pretreating, and phosphatizing, apply manufacturer’s standard thermosetting baked-enamel finish. Comply with paint manufacturer’s written instructions for application, baking, and minimum dry film thickness.
      2. 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.

2.11 STAINLESS-STEEL FINISHES
   A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
   B. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.
      1. Run grain of directional finishes with long dimension of each piece.
      2. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

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 work.
   B. 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. Install anchors through backup reinforcing plates, channels, or blocking as required to prevent metal distortion, using concealed fasteners.
      2. Anchor single rows of metal evidence lockers to walls near top and bottom of lockers [<>]. (Interior only)
      3. Anchor freestanding back-to-back metal evidence lockers to floor or concrete base. (Interior and exterior.)
B. All-Welded Metal evidence Lockers: Connect groups of all-welded metal evidence lockers together with standard fasteners, with no exposed fasteners on face frames.

C. 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 door locks on doors using security-type fasteners.
   2. Identification Plates: Identify metal evidence lockers with identification established by Owner.
      a. Attach plates to each locker door, near top, centered, with at least two aluminum rivets.
   3. Attach filler panels with concealed fasteners. Locate fillers panels where indicated on Drawings.
   4. Attach boxed end panels with concealed fasteners to conceal exposed ends of non-recessed exterior metal evidence lockers.

D. Fixed Locker Benches: Provide not less than 2 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. Verify that integral locking devices operate properly.
   B. Protect metal evidence lockers from damage, abuse, dust, dirt, stain, or paint. Do not permit metal evidence locker use during construction.
   C. Touch up marred finishes, or replace metal evidence lockers that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by metal evidence locker manufacturer.

END OF SECTION
SECTION 105500 - POSTAL SPECIALTIES

PART 1 - GENERAL

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

1.2 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 postal specialty.
   B. Shop Drawings: For postal specialties. Include plans, elevations, sections, details, and attachments to other work.
      1. Include identification sequence for compartments.
      2. Include layout of identification text.
      3. Include setting drawings, templates, and installation instructions for anchor bolts and other anchorages installed as part of the work of other Sections.

1.3 CLOSEOUT SUBMITTALS
A. Maintenance Data: For postal specialties and 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. Key Blanks: 10 for each type of compartment-door lock installed.

1.5 QUALITY ASSURANCE
A. Installer Qualifications: A firm experienced in installing postal specialties and whose installations have been given final approval by local postmasters authorizing use by USPS.
   B. Source Limitations for Each Type of Postal Specialty: Obtain from single source from single manufacturer. For USPS-approved products, use only those included on current lists of USPS manufacturers and models.

1.6 DELIVERY, STORAGE, AND HANDLING
A. Deliver lock keys to Owner by registered mail or overnight package service with a record of each corresponding lock and key number.

1.7 COORDINATION
A. Coordinate layout and installation of recessed postal specialties with wall construction.
   B. Templates: Obtain templates for installing postal specialties and distribute to parties involved.

1.8 WARRANTY
A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of postal specialties that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Structural failures.
      b. Faulty operation of hardware.
c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Aluminum: Manufacturer's standard alloy and temper for type of use and finish indicated, and as follows:
   2. Extruded Shapes: ASTM B 221.


2.2 USPS-APPROVED HORIZONTAL MAIL RECEPTACLES

A. Front-Loading, USPS-Approved Horizontal Mail Receptacles: Consisting of multiple compartments with fixed, solid compartment backs, enclosed within recessed wall box. Provide access to compartments for distributing incoming mail from front of unit by unlocking master lock and swinging side-hinged master door to provide accessibility to entire group of compartments. Provide access to each compartment for removing mail by swinging compartment door. Comply with USPS-STD-4C.
   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:
      b. American Postal Manufacturing Co.; Division of Postal Products Unlimited, Inc.
      c. Auth-Florence Manufacturing; a Florence company.
      d. Bommer Industries, Inc.
      e. Jensen Industries.
      f. Salsbury Industries.
      g. Security Manufacturing Corporation.
   2. Mail Delivery: USPS.
   3. Compartments: As indicated on Drawings.
   4. Front-Loading Master Door: Fabricated from extruded aluminum and braced and framed to hold compartment doors; prepared to receive master-door lock.
      a. Master-Door Lock: Door prepared to receive lock provided by local postmaster.
   5. Compartment Doors: Fabricated from extruded aluminum. Equip each with lock and tenant identification as required by cited standard. Provide mail slot in the compartment with master-door lock.
      a. Compartment-Door Locks: Comply with USPS-L-1172C, PSIN O910, for locks and keys, or equivalent as approved by USPS; with three keys for each compartment door. Key each compartment differently.
   6. Frames: Fabricated from extruded aluminum or aluminum sheet; ganged and nested units, with cardholder and blank cards for tenant's identification within each compartment.
   7. Snap-on Trim: Fabricated from same material and finish as compartment doors.
   8. Concealed Components and Mounting Frames: Aluminum or steel sheet with manufacturer's standard finish.
2.3 FABRICATION
A. Form postal specialties to required shapes and sizes, with true lines and angles, square, rigid, and without warp, and with metal faces flat and free of dents or distortion. Make exposed metal edges and corners free of sharp edges and burrs and safe to touch. Fabricate doors of postal specialties to preclude binding, warping, or misalignment.
B. Preassemble postal specialties in shop to greatest extent possible to minimize field assembly.
C. Mill joints to a tight, hairline fit. Cope or miter corner joints. Form joints exposed to weather to exclude water penetration.
D. Drill or punch holes required for fasteners and remove burrs. Use security fasteners where fasteners are exposed. If used, seal external rivets before finishing.
E. Weld in concealed locations to greatest extent possible without distorting or discoloring exposed surfaces. Remove weld spatter and welding oxides from exposed surfaces.
F. Fabricate tubular and channel frame assemblies with manufacturer's standard welded or mechanical joints. Provide subframes and reinforcement as required for a complete system to support loads.
G. Where dissimilar metals will contact each other, protect against galvanic action by painting contact surfaces with bituminous coating or by applying other permanent separation as recommended by manufacturers of dissimilar metals.

2.4 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.

PART 3- EXECUTION
3.1 EXAMINATION
A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for roughing-in openings, clearances, and other conditions affecting performance of the Work.
B. Examine walls and other adjacent construction for suitable conditions where units will be installed.
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 INSTALLATION
A. General: Install postal specialties level and plumb, according to manufacturer's written instructions and roughing-in drawings.
1. Where dissimilar metals will be in permanent contact with each other, protect against galvanic action by painting contact surfaces with bituminous coating or by applying other permanent separation as recommended by manufacturer for this purpose.

2. Where aluminum will contact grout, concrete, masonry, or wood, protect against corrosion by painting contact surfaces with bituminous coating.

3. Final acceptance of postal specialties served by USPS depends on compliance with USPS requirements.

B. Horizontal Mail Receptacles: Install horizontal mail receptacles with center of tenant-door lock cylinders and bottom of compartments at the maximum and minimum heights above finished floor established by USPS and manufacturer’s written instructions.

1. Install removable-core and keyed-in door lock cylinders as required for each type of cylinder lock.

2. Install and align two rack ladders for the first column of mail receptacles and one rack ladder for each additional adjacent column of mail receptacles.

3.3 FIELD QUALITY CONTROL

A. Arrange for USPS personnel to examine and test postal specialties served by USPS after they have been installed according to USPS regulations.

B. Obtain written final approval of postal specialties to be served by USPS. Obtain this approval from USPS postmaster that authorizes mail collection for the served installation.

3.4 ADJUSTING, CLEANING, AND PROTECTION

A. Remove temporary protective coverings and strippable films, if any, as postal specialties are installed unless otherwise indicated in manufacturer's written installation instructions.

B. Adjust doors, hardware, and moving parts to function smoothly, and lubricate as recommended by manufacturer. Verify that integral locking devices operate properly.

C. Touch up marred finishes or replace postal specialties that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by postal specialty manufacturer.

D. Replace postal specialties that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

E. On completion of postal specialty installation, clean interior and exterior surfaces as recommended by manufacturer.

END OF SECTION 105500
SECTION 105613 - METAL STORAGE SHELVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 PERFORMANCE REQUIREMENTS
A. Structural Performance for Post-and-Shelf Metal Storage Shelving: 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. Seismic Performance: Provide metal storage shelving capable of withstanding the effects of earthquake motions determined according to ASCE 7, “Minimum Design Loads for Buildings and Other Structures”: Section 9, “Earthquake Loads.”

1.3 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.
   1. Calculations: Include structural analysis data for shelving units, including capacities of shelving sections, compression members (posts), and shelf connectors; signed and sealed by the qualified professional engineer responsible for their preparation.

C. Color Samples for Initial Selection: For units with factory-applied color finishes. Include similar Samples of accessories involving color selection.

D. Samples for Verification: For the following components, of size indicated below.
   1. Posts: 12 inches long.
   2. Shelves: Full size, but not more than 24 inches wide by 12 inches deep.

E. Product Schedule: For metal storage shelving. Use same designations indicated on Drawings.

F. Maintenance Data: For metal storage shelving to include in maintenance manuals.

1.4 QUALITY ASSURANCE
A. Testing Agency Qualifications: An independent testing agency, with the experience and capability to conduct the testing indicated, as documented according to ASTM E 548.

B. Source Limitations: Obtain metal storage shelving through one source from a single manufacturer.

C. Product Options: Drawings indicate size, profiles, and dimensional requirements of metal storage shelving and are based on the specific system indicated. Refer to Division 1 Section “Product Requirements.”

1.5 DELIVERY, STORAGE, AND HANDLING
A. Deliver metal storage shelving on pallets, wrapped, or crated to provide protection during transit and Project-site storage. Protect shelving from damage.

1.6 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.

1.7 COORDINATION
A. Coordinate sizes and locations of blocking and backing required for installation of metal storage shelving attached to partition or wall assemblies.
B. Coordinate locations and installation of metal storage shelving that may interfere with ceiling systems including lighting, HVAC, and sprinklers.

PART 2 - PRODUCTS

2.1 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. Steel Tubing: ASTM A 513, Type 2.
D. Postinstalled Expansion Anchors in Concrete: With capability to sustain, without failure, a load equal to 4 times the load imposed, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.
   1. Corrosion Protection: Carbon-steel components zinc plated to comply with ASTM B 633, Class Fe/Zn 5 (0.005 mm) for Class SC 1 service condition (mild).

2.2 POST-AND-SHELF METAL STORAGE SHELVING
A. Closed Post-and-Shelf Metal Storage Shelving with Steel Backs: Factory-formed, field-assembled, freestanding, post-and-shelf metal storage shelving system; designed for shelves to span between and be supported by corner posts, with shelves adjustable over the entire height of shelving unit. Fabricate initial shelving unit with a post at each corner. Fabricate additional shelving units similarly, so each unit is independent, unless directed otherwise. Provide fixed top and bottom shelves, adjustable intermediate shelves, steel backs and accessories indicated.
   1. Basis of Design Product: Subject to compliance with requirements, provide post and metal storage shelving by Spacesaver, or comparable product by one of the following:
      a. Adjustable Steel Products.
      b. Borroughs Corporation.
      d. Lyon Metal Products, Inc.
      e. Penco Products, Inc.
      f. Republic Storage Systems Co.
      g. Richards-Wilcox, Inc.
      h. Schaefer Systems International, Inc.
i. Republic Industrial Clip Shelving.

2. Posts: Fabricated from 0.0677-inch thick, cold-rolled steel; in angle manufacturer’s standard shape; with perforations at 1-1/2 inches o.c. to receive shelf-to-post connectors.
   a. Add-On Shelf Posts (if requested by Owner): 0.0677-inch thick, cold-rolled steel, T-shaped; perforated to match main posts.
   b. Post Base: Steel foot plate, adjustable, and drilled for mechanical attachment to floor.

3. Bracing: Manufacturer’s standard double diagonal cross bracing at back and ends, as required for stability and load-carrying capacity.

4. Solid Backs: Fabricated from steel sheet of thickness required to provide bracing.

5. Solid Shelves: Fabricated from steel sheet, with slots or holes at 2 inches o.c. for shelf dividers, of thickness required to withstand the following load-carrying capacity:
   a. Load-Carrying Capacity: As indicated on Schedule.

6. Shelf Quantity: Seven (7) shelves per shelving unit.

7. Shelf-to-Post Connectors: Uniframe welded using manufacturer’s standard connectors.

8. Base: Closed, with sheet metal closure fabricated from same material and with same finish as shelving.

9. Overall Unit Height: not less than 84 inches.

10. Finish: Manufacturer’s standard baked enamel or color coated.

2.3 SHELVING SCHEDULE

<table>
<thead>
<tr>
<th>Type</th>
<th>Dimensions</th>
<th>Load Capacity per Shelf</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shelving Size A</td>
<td>36 x 12 inches</td>
<td>800 lb.</td>
</tr>
<tr>
<td>Shelving Size B</td>
<td>36 x 24 inches</td>
<td>800 lb.</td>
</tr>
</tbody>
</table>

2.4 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 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.

2.5 STEEL FINISHES
A. Surface Preparation: Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1, “White Metal Blast Cleaning,” or SSPC-SP 8, “Pickling.”

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. 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

3.1 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 to which metal storage shelving will be attached 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.

3.2 PREPARATION
A. Vacuum finished floor and wet mop resilient flooring over which metal storage shelving is to be installed.

3.3 INSTALLATION
A. Install metal storage shelving level, plumb, square, rigid, and true, and within erection tolerances specified.

1. Anchor shelving units to floor with postinstalled expansion anchors or power-actuated fasteners through foot plate. Shim foot plate as required to achieve level and plumb installation.

2. Anchor shelving units at wall locations to wall construction with postinstalled expansion anchors.

3. Install ribbed metal deck shelving spanning from front to back of shelving units.
4. Install seismic supports and bracing as recommended by manufacturer and authorities having jurisdiction, and as required for stability. Extend and fasten members to supporting structure.

5. Connect side-to-side and back-to-back shelving units together at corner posts with support ties.

6. Install shelves in each shelving unit at spacing indicated on Drawings or, if not indicated, at equal spacing.
   a. Post-and-Shelf Metal Storage Shelving: Install four clips, one at each post, for support of each shelf; with clips fully engaged in post perforations.

B. Erection Tolerances: Erect metal storage shelving with a maximum tolerance from vertical of 1/2 inch from 0 to 10 feet of height and remaining constant at a maximum of 1 inch for all heights taller than 10 feet.

3.4 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.

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 105613
SECTION 105626.13 - MANUAL MOBILE STORAGE SHELVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 REFERENCES
A. American National Standards Institute (ANSI) Standards:
   1. Applicable standards for fasteners used for assembly.
B. American Society for Testing and Materials (ASTM) Standards:
   1. Applicable standards for steel materials used for fabrication.
C. American Institute of Steel Construction (AISC) Standards:
   1. Applicable standards for steel materials used for fabrication.

1.3 SYSTEM DESCRIPTION
A. General: The system consists of manufactured storage units mounted on manufacturer’s track-guided carriages to form a compact storage system. System design permits access to any single aisle by manually moving units until the desired aisle is opened. The carriage/rail system provides uniform carriage movement along the total length of travel, even with unbalanced loads.

B. Carriage System Design and Features: The carriage system consists of a formed structural steel frame with machined and balanced wheels riding on steel rails surface mounted to the floor. Rails shall be types selected by the manufacturer to ensure smooth operation and self-centering of mobile storage units during travel without end play or binding. Rail types, quantities and spacing shall be selected by the manufacturer to suit installation conditions and requirements. All bearings used in the drive mechanism shall be permanently shielded and lubricated.

C. Movement Controls: Triple or single arm operating wheels with rotating hand knobs shall be provided on the accessible (drive) ends of shelf units, centered on the end panel, located 40 inches from the base of each unit to permit units to be moved to create a single aisle opening. Turning the handle transmits power through a chain drive to drive wheels on each carriage.

D. Drive System: The system shall be designed with a positive type mechanically-assisted drive which minimizes end play, ensures there is no play in the drive handle, and that carriages will stop without drifting.
   1. System shall include a chain sprocket drive system for each movable carriage to ensure that carriages move uniformly along the total length of travel, even with unbalanced loads. All system components shall be selected to ensure a smooth, even movement along entire carriage length. Drive system gearing shall be designed to permit 1 lb. of force applied to drive handle to move a minimum of 4,000 lbs. of load.
   2. A tensioning device shall be provided on each chain drive with provision for adjusting tension without removing end panels.
   3. All bearings used in drive mechanism shall be permanently shielded and lubricated.

E. Safety Features:
   1. Color-coded visual indicators shall provide verification that carriages are in a locked or unlocked mode.
   2. A single safety lock button, mounted on each operating wheel hub, will permit moving a carriage in either direction to create a new access aisle when pulled out
(unlocked), or locking the carriage when pushed in.

F. Finishes:
   1. Fabricated Metal Components and Assemblies: Manufacturer’s standard powder coat
      paint finish.
   2. End Panels and Back Panels, Accessible Ends: Plastic laminate, manufacturer’s
      standard high pressure textures and patterns.

1.4 PERFORMANCE REQUIREMENTS
A. Design Requirements:
   1. Limit overall height to 84 inches unless noted otherwise.
   2. Limit overall length and depth of systems to dimensions indicated on Drawings.
B. Ease of Movement: Provide mechanically-assisted units capable of being moved by
   exerting a maximum horizontal force of 5 pounds on the operating wheel.
C. Seismic Performance: Provide high-density mobile storage shelving system capable of
   withstanding the effects of seismic motions determined according to ASCE 7, “Minimum
   Design Loads for Buildings and Other Structures”: Section 9.6, “Earthquake Loads” for the
   Seismic Design Category and other seismic data indicated on Structural Drawing S01.

1.5 SUBMITTALS
A. Product Data: Submit manufacturer’s product literature and installation instructions for each
   type of shelving, track and installation accessory required. Include data substantiating that
   products to be furnished comply with requirements of the contract documents.
B. Shop Drawings: Show fabrication, assembly, and installation details including descriptions
   of procedures and diagrams. Show complete extent of installation layout including
   clearances, spacings, and relation to adjacent construction in plan, elevation, and sections.
   Indicate clear exit and access aisle widths; access to concealed components; assemblies,
   connections, attachments, reinforcement, and anchorage; and deck details, edge conditions,
   and extent of finish flooring within area where units are to be installed.
   1. Show installation details at non-standard conditions. Furnish floor layouts, technical
      and installation manuals for every unit shipment with necessary dimensions for rail
      layout and system configuration at the Project site. Include installed weight, load
      criteria, furnished specialties, and accessories.
   2. Provide layout, dimensions, and identification of each unit corresponding to sequence
      of installation and erection procedures. Specifically include the following:
      a. Location, position and configuration of tracks on all floors.
      b. Plan layouts of positions of carriages, including all required clearances.
      c. Details of shelving, indicating method and configuration of installation in
         carriages.
   3. Provide location and details of anchorage devices embedded or fastened to substrates.
   4. Provide installation schedule and erection procedures to ensure proper installation.
C. Color Samples: For units with factory-applied color finishes. Include similar Samples of
   accessories involving color selection.
D. Warranty: Submit draft copy of proposed warranty for review.
E. Maintenance Data: Provide in form suitable for inclusion in maintenance manuals for
   mobile storage units. Data shall include operating and maintenance instructions, parts
   inventory listing, purchase source listing, emergency instructions, and related information.
   1. Submit manufacturer’s instructions for proper maintenance materials and procedures.
1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Engage an experienced manufacturer who is ISO 9001 certified for the design, production, installation and service of carriage mounted high-density mobile storage units and support rails. Furnish certificate attesting manufacturer’s ISO 9001 quality system registration.

B. Installer Qualifications: Engage an experienced installer authorized by manufacturer for the specified products for installing carriages and anchoring shelving units to carriages.
   1. Minimum Qualifications: 1-year experience installing systems of comparable size and complexity to specified project requirements.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver high-density mobile storage system components palletized, wrapped, or crated to provide protection during transit and Project-site storage.

B. Comply with written instructions and recommendations of manufacturer for special delivery, storage and handling requirements.

1.8 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install high-density mobile storage system 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.

1.9 SEQUENCING AND SCHEDULING

A. Sequencing: Coordinate storage shelving system installation with other work to minimize possibility of damage and soiling during remainder of construction period.

B. Scheduling: Plan installation to commence after finishing operations, including painting have been completed.

C. Built-In Items: Provide components which must be built in at a time which causes no delays general progress of the Work.

D. Pre-installation Conference: Schedule and conduct conference on project site to review methods and procedures for installing mobile storage units including, but not limited to, the following:
   1. Review project conditions and levelness of flooring and other preparatory work performed under other contracts.
   2. Review and verify structural loading limitations.
   3. Recommended attendees include:
      a. Owner’s Representative.
      b. Prime Contractor or representative.
      c. Manufacturer’s representative.
      d. Subcontractors or installers whose work may affect, or be affected by, the work of this section.
1.10 WARRANTY
A. Submit a written warranty, executed by Contractor, Installer and Manufacturer, agreeing to repair or replace components of the entire high-density mobile storage system assembly that fail in materials or workmanship within the specified warranty period. This warranty shall be in addition to, and not a limitation of other rights the Owner may have under Contract Documents.
   1. Warranty Period: Five years from date of Substantial Completion.

PART 2 -PRODUCTS

2.1 MANUFACTURERS
A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
   1. Basis of Design Product: The design for each typ high-density mobile storage shelving is based on Spacesaver: “Mechanical Assist High Density Mobile Storage System.” Subject to compliance with requirements, provide either the named product or a comparable product by one of the following.
      a. Borroughs Corporation “MA 1000”
      b. Montel Inc. “Quadramobile”

2.2 MATERIALS
A. Hot-Rolled Steel Sheet: ASTM A 1011, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.
B. Cold-Rolled Steel Sheet: ASTM A 1008, Commercial Steel (CS), Type B.
C. Steel Tubing: ASTM A 513, Type 2.
D. Grout: Non-shrink, non-staining hydraulic cement compound with minimum 8000 psi compressive strength at 7 days.

2.3 MANUFACTURED COMPONENTS
A. Rails:
   1. Material: ASTM/AISI Type 1035 or 1045 steel, manufacturer’s selection.
   2. Capacity: 1,000 pounds per lineal foot of carriage.
   4. Provide rail sections in minimum 6 foot lengths.
   5. Rail configuration shall permit attachment to top of structural floor system with provision for leveling rails to compensate for variations in floor surface level.
   6. Provide rail connections designed to provide horizontal and vertical continuity between rail sections, to gradually transfer the concentrated wheel point load to and from adjoining rail sections. Butt joints are not permitted.
   7. Manufacturer shall provide for protection if required to prevent damage to rails during concrete back pours.

B. Ramp/Floor:
   2. Provide fire retardant treated floor/ramp materials when required by code.
   3. Finish Flooring Material: Provide room flooring finish as indicated.
      a. Texture: As selected by Architect from manufacturer's full range.
      b. Color: As selected by Architect from manufacturer's full range.

C. Carriages:
1. Provide manufacturer’s design movable carriages of welded or bolted steel construction. Galvanized structural components and riveted carriages are both unacceptable.

2. Provide fixed carriages of same construction and height as the movable carriages, anchored to rails. Setting fixed shelving directly on floors is not permitted.

3. When required, provide bolted carriage splices designed to maintain proper unit alignment and weight load distribution.

4. Design carriages to allow the shelving uprights to recess and interlock into the carriages a minimum of 3/4 inch. Top mount carriages are unacceptable.

5. Provide each carriage with two wheels per rail.

D. Drive / Guide System:

1. Design: Provide drive system which prevents carriage whipping, binding and excessive wheel/rail wear under normal operation.
   a. If line shafts are used, all wheels on one side of carriage shall drive.
   b. If synchronized drives are used, a minimum of one wheel assembly driving both sides of carriage at center location required. Drive shaft shall exhibit no play or looseness over the entire length of that assembly.

2. Shafts: Solid steel rod or tube.


4. Bearing Surfaces: Provide rotating load bearing members with ball or roller bearings. Provide shafts with pillow block or flanged self-aligning type bearings.

E. Wheels:


2. Size: Minimum 5 inches, outside diameter drive wheels.

3. Guides: Determined by manufacturer; minimum 2 locations.

F. Face Panels:


2. Finishes: Selected from manufacturer’s standard available colors and patterns.

G. Shelving:

1. 4-post shelving shall be provided to accomplish a capacity of 5,600 actual filing inches for letter size folders using 4 (four) Double Face moveable carriages and 2 (two) Single Faced platforms.

2. Where indicated, provide 7 levels of letter size filing with 9.75 inches clear space.

3. Where indicated, provide 6 levels of legal size filing with 11.25 or 14.25 inches clear space.

4. Manufacturer’s standard high pressure laminate back panels shall be applied to all back sides of fixed platforms.

2.4 FABRICATION

A. General: Coordinate fabrication and delivery to ensure no delay in progress of the Work.

B. Wheels: Provide precision machined and balanced units with permanently shielded and lubricated bearings.

C. Carriages: Fabricate to ensure no more than 1/4 inch maximum deviation from a true straight line. Splice and weld to ensure no permanent set or slippage in any spliced or welded joint when exposed to forces encountered in normal operating circumstances.

D. Shelving, Supports and Accessories: See individual descriptions in “Shelving” paragraphs.
2.5 FINISHES
   A. Colors: Selected from manufacturer’s standard available colors.
   B. Paint Finish: Provide factory-applied electrostatic powder coat paint on exposed metal surfaces. Meet or exceed specifications of the American Library Association.
   C. Laminate Finish: Provide factory-applied plastic laminate end panels at locations indicated on approved shop drawings.
   D. Edgings: Provide preformed edging, color-matched to unit colors selected.

2.6 FILE SYSTEM SCHEDULE
   A. High Density File System “A” (Room 115)
      1. Shelving at Fixed Carriages: Four post steel shelving - 7 levels and 3 dividers each level.
         a. 48 inch wide by 12 inch deep by (nominal) 84 inches tall.
      2. Shelving at Movable Carriages: Four post steel shelving - 7 levels and 3 dividers each level.
         a. 48 inch wide by 24 inch deep (2-sided) by (nominal) 84 inches tall.
      3. Overall System Size: 16’-6” x 8’-8” as indicated on Drawings.
      4. Surface-mounted rail installation.
   B. High Density File System “B” (Room 122)
      1. Shelving at Fixed Carriages: Four post steel shelving - 7 levels and 3 dividers each level.
         a. 48 inch wide by 12 inch deep by (nominal) 84 inches tall.
      2. Shelving at Movable Carriages: Four post steel shelving - 7 levels and 3 dividers each level.
         a. 48 inch wide by 24 inch deep (2-sided) by (nominal) 84 inches tall.
      3. Overall System Size: 25’-6” x 12’-8” as indicated on Drawings.
      4. Surface-mounted rail installation.
   C. High Density File System “C” (Room 127)
      1. Shelving at Fixed Carriage "A": Four post steel shelving - 6 levels. Provide 3 dividers each level.
         a. 36 inch wide by 15 inch deep by (nominal) 84 inches tall.
      2. Shelving at Fixed Carriage "B": Four post steel shelving - 7 levels. Provide 3 dividers each level.
         a. 36 inch wide by 12 inch deep by (nominal) 84 inches tall.
      3. Shelving at Movable Carriages "A": Four post steel shelving - 6 levels. Provide 3 dividers each.
         a. 36 inch wide by 30 inch deep (2-sided) by (nominal) 84 inches tall.
      4. Shelving at Movable Carriages "B": Four post steel shelving - 7 levels. Provide 3 dividers each.
         a. 36 inch wide by 24 inch deep (2-sided) by (nominal) 84 inches tall.
      5. Overall System Size: 19’-6” x 9’-8” as indicated on Drawings.
   D. High Density File System “D” (Room 157)
      1. Shelving at Fixed Carriages: Four post steel shelving - 6 levels and 3 dividers each level.
         a. 36 inch wide by 12 inch deep by (nominal) 84 inches tall.
2. Shelving at Movable Carriages: Four post steel shelving - 6 levels and 3 dividers each level.
   a. 36 inch wide by 24 inch deep (2-sided) by (nominal) 84 inches tall.
3. Overall System Size: 17'-7 1/8" x 9'-8 as indicated on Drawings.
4. Surface-mounted rail installation.

PART 3 -EXECUTION

3.1 EXAMINATION
   A. Examine floor surfaces with Installer present for compliance with requirements for installation tolerances and other conditions affecting performance of mobile storage units.
   B. Verify that intended installation locations of mobile storage units will not interfere with nor block established required exit paths or similar means of egress once units are installed.
   C. Prepare written report, endorsed by Installer, listing conditions detrimental to proper performance of mobile storage units, once installed.
   D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION
   A. Rails:
      1. Lay out rails using full length units to the maximum extent possible. Use cut lengths only at ends to attain total length required. Locate and position properly, following dimensions indicated on approved shop drawings. Verify thickness of finished floor materials to be installed (by others) and install level 1/6 inch above finished floor surfaces.
      2. Verify level, allowing for a minimum 1/4 inch of grout under high points. Position and support rails so that no movement occurs during grouting.
      3. Set rails in full grout bed, completely filling any voids entire length of all rails including rail connectors. Trim up sides flush with rails to ensure proper load transfer from rail to supporting floor. Using shims in lieu of full grouting is not permitted.
      4. Installation Tolerances: Do not exceed levelness of installed rails listed below:
         b. Maximum Variation between Adjacent (Parallel) Rails: 1/16 inch, perpendicular to rail direction.
         c. Maximum Variation in Height: 1/32 inch, measured along any 10 foot rail length.
      5. Verify rail position and level; anchor to structural floor system with anchor type and spacings indicated on approved shop drawings.
   B. Floors/Ramps:
      1. General: Finished elevation shall be 1/16 inch (1.6MM) below top of rails.
      2. Place floors and ramps to the extent indicated on drawings. Extend ramps under all movable ranges. (Extend under stationary ranges if dual control access as required.) Provide ramp at both ends of mobile system. Do not extend ramps beyond the ends of the carriages.
      3. Construct floors and ramps to prevent warping or deformation of floor panels in a normal operating environment. Support panels on levelers at maximum 16 inches on center.
      4. Ramp Slope: Do not exceed the following:
         a. ADA Accessible Ramps: Maximum 1:12 slope (4.76 degrees).
         b. Other Ramps: Maximum 9 degree slope (1.9:12).
3.3 FIELD QUALITY CONTROL
A. Verify shelving unit alignment and plumb after installation. Correct if required following manufacturer’s instructions.
B. Remove components which are chipped, scratched, or otherwise damaged and which do not match adjoining work. Replace with new matching units, installed as specified and in manner to eliminate evidence of replacement.

3.4 ADJUSTING AND CLEANING
A. Adjust components and accessories to provide smoothly-operating, visually-acceptable installation.
B. Immediately upon completion of installation, clear components and surfaces. Remove surplus materials, rubbish and debris resulting from installation upon completion of work and leave areas of installation in neat, clean condition.

3.5 DEMONSTRATION/TRAINING
A. Schedule and conduct detailed demonstration and training of Owner’s personnel in operation of installed high density mobile storage system components and features.
B. Schedule and conduct comprehensive maintenance training with Owner’s maintenance personnel. Training session shall include lecture and demonstration of all maintenance and repair procedures that end user personnel would normally perform.
C. Comply with Demonstration and Training requirements of Division 1 Section “Closeout Procedures”, including requirement for providing Owner with copies of digital CD recording of demonstration and maintenance training sessions.

3.6 PROTECTION
A. Protect system against damage during remainder of construction period. Advise Owner of additional protection needed to ensure that system will be without damage or deterioration at time of substantial completion.

END OF SECTION 10526.13
SECTION 107300 - PROTECTIVE COVERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 PERFORMANCE REQUIREMENTS
   A. Delegated Design: Engage a qualified professional engineer, as defined in Division 01 Section “Quality Requirements,” to design protective covers.
   B. General: Design, fabricate, and install protective covers to withstand loads from gravity, wind, snow, ice, ponding, drift, and structural movement, including thermally induced movement; and to resist, without failure, other conditions of in-service use, including exposure to weather.
   C. Structural Performance: Design, engineer, fabricate, and install protective covers system to withstand the structural loads required under IBC without exceeding the allowable design working stresses of the materials involved, including anchors and connections.
      1. Coordinate with foundations and footings indicated on Structural Drawings and specified in Division 3 Section “Cast-in-Place Concrete.”
      2. Provide engineered wall anchorage system capable of transferring structural loads to the primary structural element of the exterior wall assembly. Do not support protective covers from brick veneer or other non-structural exterior claddings.

1.3 SUBMITTALS
   A. Product Data: Include styles, material descriptions, construction details, fabrication details, dimensions of individual components and profiles, hardware, fittings, mounting accessories, features, finishes, and maintenance instructions for protective covers.
   B. Delegated Design Submittal: For protective covers, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation and is registered in the state where the project is located.
   C. Shop Drawings: Show location and extent of protective covers. Include elevations, sections, and details not shown in Product Data. Show materials, fabrication, dimensions, mounting heights, connections, anchorages, installation details, attachments to other work, and relationship to adjoining work.
      1. Show locations for reinforcement and supplementary structural support to be provided by others.
      2. Show location of light fixtures mounted to protective covers, include supplemental support framing. Coordinate with Division 26 Sections.
   D. Samples for Verification: For each of the following products and for the full range of anodized color variations required, prepared on Samples of size indicated below. If finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.
      1. Submit printed or coated metal samples of complete color range offered for Architect’s selection.
   E. Warranty: Special warranty specified in this Section.

1.4 QUALITY ASSURANCE
   A. Installer Qualifications: Engage an experienced Installer to perform unit of work of this section who has specialized in the installation of types of protective covers similar to that
required for this project and who is acceptable to, or certified by, manufacturer of protective covers.

B. Source Limitations: Obtain protective covers through one source from a single manufacturer.

C. Welding: Qualify procedures and personnel according to the following:

1.5 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit installation of protective covers in exterior locations to be performed according to manufacturers’ written instructions and warranty requirements.

B. Field Measurements: Where protective cover installation is indicated to fit to other work, Verify dimensions of other work by field measurements before fabrication and indicate measurements on Shop Drawings. Allow clearances for fenestration operation throughout the entire operating range. Notify Architect of discrepancies. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1.6 WARRANTY

A. Special Warranty: Manufacturer’s standard form in which manufacturer and fabricator agree to repair or replace components of protective covers that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Structural failures including framework.
      b. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
   2. Protective Cover Warranty Period: One year from date of Substantial Completion.

B. Special Finish Warranty: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of factory-applied finishes within specified warranty period.
   1. Fluoropolymer Finish (AAMA 2605): Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Building-Mounted Canopy Basis-of-Design Product: Subject to compliance with requirements, provide Mapes Architectural Products “Super Lumideck – Hanger Rod” building-mounted canopy or a comparable protective cover by one of the following:
   1. Aluminum Extruded Corrugated-Bottom Roof Panels & Extruded Aluminum Frames:
      a. Architectural Fabrication, Inc.
      b. Dittmer Architectural Aluminum.
      c. Mapes Architectural Products.
      d. Mitchel Metals.
      e. Perfection Architectural Systems, Inc.
      f. Superior Mason Products, LLC.
      g. Tennessee Valley Metals.

B. Post-Supported Covered Walkway Basis-of-Design Product: Subject to compliance with requirements, provide Mapes Architectural Products “Super Lumideck – Post-Supported Walkway Cover” or a comparable protective cover by one of the following:
1. Aluminum Extruded Corrugated-Bottom Roof Panels & Extruded Aluminum Frames:
   a. Architectural Fabrication, Inc.
   b. Dittmer Architectural Aluminum.
   c. Mapes Architectural Products.
   d. Mitchell Metals.
   e. Perfection Architectural Systems, Inc.
   f. Superior Mason Products, LLC.
   g. Tennessee Valley Metals.

2.2 MATERIALS
   A. Aluminum: Alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated and with not less than the strength and durability properties of alloy and temper required by structural loads.
      1. Aluminum Plate and Sheet: ASTM B 209.
      3. Extruded Structural Pipe and Round Tubing: ASTM B 429, standard weight (Schedule 40) unless another weight is indicated or required by structural loads.
      5. Aluminum Finish: Manufacturer's high-performance organic finish complying with finish manufacturer's printed instructions for surface preparation including pretreatment, application, baking, and minimum dry film thickness.

   B. Anchors, Fasteners, Fittings, Hardware, and Installation Accessories: Complying with performance requirements indicated and suitable for exposure conditions, supporting structure, anchoring substrates, and installation methods indicated. Corrosion-resistant or non-corrodible units; weather-resistant, tamperproof, vandal- and theft-resistant, compatible, non-staining materials. Provide as required for protective covers and walkway assemblies, mounting, and secure attachment. Number as needed to comply with performance requirements and to maximize appearance; evenly spaced.
      1. Provide exposed fasteners with heads matching color of prefinished panels by means of plastic caps or factory-applied coating. (Not applicable at mill or clear anodized aluminum panels.)

   C. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187 or alternate pre-approved corrosion-resistant treatment coating or membrane. (Building felt not acceptable.)

2.3 FABRICATION
   A. Smoothly round corners, edges, and exposed fasteners to eliminate snagging and pinching hazards. Form exposed sheet metal with flat, flush surfaces, true to line and level, and without cracking and grain separation. Perform welding by operators and processes complying with AWS requirements.

2.4 POST-SUPPORTED COVERED WALKWAY
   A. General: Provide manufacturer’s standard prefinished metal roofing covered walkway system fabricated to comply with requirements indicated. Provide all roof deck, fascia, and frames (“bents”) consisting of beams and columns with integral (internal) rainwater drainage system. Include all accessories, closure and trim pieces, anchors and connection devices required for complete assembly.
      1. Frame Height: As indicated on Drawings.

   B. Support Structure: All structural fabrication shall be extruded aluminum sections made of 6063–T6 aluminum alloy, and having a minimum wall thickness of 0.125 inches. Provide
frames (“bents”) fabricated from beams and columns as either all-welded rigid frames or mechanically joined sections as determined by manufacturer (fabricator) and in accordance with final shop drawings. Provide column sleeves or Styrofoam blockouts for presetting into concrete foundation structure.

1. Provide High-Performance Organic Finish: Two-coat fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers’ written instructions.

2. Provide frame configuration indicated for installation, including those required for angled or corner conditions.

3. Provide extruded aluminum wall angle for wall supported applications as indicated.

C. Extruded Aluminum Deck: Provide interlocking structural deck system fabricated of anodized 6063–T6 aluminum alloy and having a minimum wall thickness of 0.065 inches. All splices shall occur at supports; splices in other locations will not be permitted.

1. Provide manufacturer’s standard standing seam deck section for corrugated soffit profile. Design depth of deck as required for structural spacing indicated.

2. Provide manufacturer’s standard extruded, high-performance organic finish aluminum fascia of profile indicated.

D. Metal Roofing and Roof Deck Finish: Provide factory applied 2-coat, thermocured coating system (“Kynar”) composed of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; conforming to AAMA 2605. Finish color will be selected from manufacturer’s standard offerings.

E. Hardware: All connections shall be made with standard corrosion resistant fasteners.

2.5 BUILDING MOUNTED CANOPIES

A. General: Provide aluminum canopy system fabricated to comply with requirements indicated. Provide roof deck, support frames, accessories, closure and trim pieces, anchors and connection devices required for complete assembly.

B. Support Structure: All structural fabrication shall be extruded anodized aluminum sections made of 6063–T6 aluminum alloy, and having a minimum wall thickness of 0.125 inches. Provide frame members fabricated from extrusions as either all-welded rigid frames or mechanically joined sections as determined by manufacturer (fabricator) and in accordance with final shop drawings. Provide mounting anchors and accessories.

1. Provide framing and bracket configuration indicated for installation.

2. Provide threaded anchors at canopy and hanger rod attachment points, extending anchors fully through exterior wall. Provide integral eyebolt or manufacturer standard clevis at rod attachment anchors. At all through anchors, provide galvanized steel compression sleeves to suit wall system depth and construction and as needed to prevent transferring structural loads to veneers/claddings. All loads shall transfer to the structural “backup” wall.

   a. Structural system above is per the Basis-of-Design product indicated. Manufacturer may submit an alternate, pre-engineered structural system, provided the system complies with other requirements of this section and is capable of supporting loads from the primary wall structure.

3. Provide standard “J” extruded fascia, nominal 8-inch tall by 3-inch width.

C. Extruded Aluminum Roof Deck: Provide interlocking structural deck system fabricated of anodized 6063–T6 aluminum alloy and having a minimum wall thickness of 0.125 inches. All splices shall occur at supports; splices in other locations will not be permitted.
1. Provide standing seam deck section for corrugated soffit profile. Design depth of deck as required for structural spacing indicated.

D. Concealed Drainage: Provide manufacturer’s standard trough/gutter drainage system, including downspouts at front or rear edge location as indicated; at rear (wall) edge if not indicated otherwise.

E. Hardware: Provide connections made with standard corrosion-resistive fasteners.

F. Flashing: Provide prefinished canopy-to-wall flashing and sealant.

G. Provide High-Performance Organic Finish: Two-coat fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers’ printed instructions. Provide high-performance organic finish on all canopy components, color shall be selected by the Architect from manufacturer’s entire line.

2.6 FOUNDATIONS FOR COVERED WALKWAYS:

A. Concrete foundations specified in Division 03 Section, “Cast-in-Place Concrete.”

B. Provide concrete foundations complying with criteria specified on Structural Drawings. Footings for the bent frame assembly shall provide sufficient bearing area at the bottom to support all loads of the covered walkway. Footing design is based on 3,000 PSF allowable soil pressure unless otherwise instructed in the soil data, such as, but not limited to, adverse soil conditions, high water table, underground obstructions and other conditions, to permit bidders reasonable evaluation of the site conditions. Foundation concrete shall attain minimum working strength of 3,000 pounds per square inch at twenty-eight (28) days.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for supporting members, blocking, inserts, installation tolerances, and other conditions affecting performance.

1. Establish accurate locations of building lighting system for light fixtures and accessories mounted to protective covers or integrated with protective cover framing module.

2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. General: Install protective covers at locations and in position indicated, securely connected to supports, free of rack, and in proper relation to adjacent construction. Use mounting methods of types described and in compliance with Shop Drawings and fabricator’s written instructions.

B. Install protective covers to comply with manufacturer’s instructions and final shop drawings. Provide accessories indicated and anchors, fasteners, inserts, and other items required for installation of units and permanent attachment of units to adjoining construction.

C. Post Supported Walkway: Adjust frames prior to anchoring to ensure matching alignment at abutting joints. Install posts at spacing indicated, or if not indicated, as required by design loadings. Plumb posts in each direction. Secure posts and wall angles to building construction as follows:
1. Anchor columns in concrete by means of column sleeves or Styrofoam blockouts preset and anchored into concrete. Insert columns into sleeves or Styrofoam blockouts, and fill annular space between columns and concrete solid with non-shrink nonmetallic grout, mixed and placed to comply with anchoring material manufacturer’s directions. Leave anchorage joint exposed, wipe off surplus anchoring material, and leave 1/8-inch build-up, sloped away from post. For installations exposed on exterior, or to flow of water, seal anchoring material to comply with grout manufacturer’s directions.

D. Hanger Rod Protective Cover: Secure threaded anchor assemblies through exterior wall with devices sufficient to support loading from primary structural wall element.

E. Anchoring to In-Place Construction: Use anchors, fasteners, fittings, hardware, and installation accessories where necessary for securing protective covers to structural support and for properly transferring load to in-place construction.

F. Corrosion Protection: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with a barrier material capable of providing protection against galvanic corrosion, or by separating surfaces with waterproof gaskets. a heavy coat of bituminous paint.

G. Coordinate protective cover installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed exterior wall and roof assemblies.

3.3 CLEANING AND PROTECTION

A. Clean protective cover surfaces after installation, according to manufacturer’s written instructions.

B. Touchup Painting: Immediately after erection, clean field welds, connections, and abraded areas. Paint uncoated and abraded areas with same or compatible material as used for shop-applied finish painting.

1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

C. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that protective covers are without damage or deterioration at time of Substantial Completion.

D. Replace damaged protective covers that cannot be repaired, in a manner approved by Architect, before time of Substantial Completion.

END OF SECTION 107300
SECTION 107500 - FLAGPOLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 PERFORMANCE REQUIREMENTS
A. Structural Performance: Flagpole assemblies, including anchorages and supports, shall withstand design loads indicated within limits and under conditions indicated.
   1. Wind Loads: Determine according to building code in effect for this Project or NAAMM FP 1001, whichever is more stringent. Design wind speed for Project is indicated on Structural Drawings.
   2. Base flagpole design on maximum standard size flag suitable for use with flagpole or flag size indicated, whichever is more stringent.

1.3 SUBMITTALS
A. Product Data: For each type of flagpole required. Include installation instructions.
B. Shop Drawings: Show general layout, jointing, grounding method, and anchoring and supporting systems.
   1. Include details of foundation system for ground-set poles.

1.4 QUALITY ASSURANCE
A. Source Limitations: Obtain each flagpole as a complete unit from a single manufacturer, including fittings, accessories, bases, and anchorage devices.

1.5 DELIVERY, STORAGE, AND HANDLING
A. General: Spiral wrap flagpoles with heavy kraft paper or other weathertight wrapping and enclose in a hard fiber tube or other protective container.

PART 2 - PRODUCTS

2.1 MANUFACTURERS
A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. American Flagpole.
   2. Baartol Co., Inc.
   3. Concord Industries, Inc.
   4. Eagle Mountain Flag and Flagpole.
   5. Eder Flag Manufacturing Co., Inc.
   6. Pole-Tech Co., Inc.

2.2 FLAGPOLES
A. Pole Construction, General: Construct poles and ship to Project site in one piece, if possible. If more than one piece is necessary, provide snug-fitting precision joints with self-aligning, internal splicing sleeve arrangement for weathertight, hairline field joints.
B. Exposed Heights:
   1. Three Poles: 2 at 25-feet and 1 at 30-feet.
   1. Provide cone-tapered aluminum flagpoles.

D. Foundation Tube: Galvanized corrugated-steel foundation tube, 0.0635-inch minimum wall thickness, sized to suit flagpole and installation. Provide with 3/16-inch steel bottom plate and support plate; 3/4-inch-diameter, steel ground spike; and steel centering wedges all welded together. Galvanize steel parts, including foundation tube, after assembly. Provide loose hardwood wedges at top of foundation tube for plumbing pole.  
   1. Provide flashing collar of same material and finish as flagpole.

2.3 FITTINGS

A. Finial Ball: Manufacturer’s standard flush-seam ball, sized as indicated or, if not indicated, to match pole-but diameter.  
   1. 0.063-inch spun aluminum, finished to match flagpole.

B. External Halyard: Ball-bearing, non-fouling, revolving truck assemblies of cast metal with continuous 5/16-inch-diameter, braided polypropylene halyards and 9-inch cast-metal cleats with fasteners. Finish exposed metal surfaces to match flagpole.  
   1. Provide 2 halyards and 2 cleats at each flagpole.

C. Halyard Flag Snaps: Provide 2 swivel snap hooks per halyard, as follows:  

2.4 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 ASTM C 94.

B. Non-shrink, Non-metallic Grout: Factory-packaged, non-staining, non-corrosive, non-gaseous grout complying with ASTM C 1107.

C. Sand: ASTM C 33, fine aggregate.

D. Elastomeric Sealant: Comply with requirements of Division 07 Section “Joint Sealants.”

E. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

2.5 FINISHES

A. Comply with NAAMM’s “Metal Finishes Manual for Architectural and Metal Products” for recommendations relative to applying and designating finishes.

B. Aluminum: Finish designations prefixed by AA conform to the system established by the Aluminum Association for designating aluminum finishes.  
   1. Natural Satin Finish: Provide fine, directional, medium satin polish (AA-M32); buff complying with AA-M20.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, including foundation; accurate placement, pattern, orientation of anchor bolts, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.
3.2 PREPARATION
A. Prepare in-ground flagpoles by painting below-grade portions with a heavy coat of bituminous paint.
B. Excavation: For foundation, excavate to neat clean lines in undisturbed soil. Remove loose soil and foreign matter from excavation and moisten earth before placing concrete.
C. Provide forms where required due to unstable soil conditions and for perimeter of flagpole base at grade. Secure forms, foundation tube, fiberglass sleeve, or anchor bolts in position, braced to prevent displacement during concreting.
D. Place concrete immediately after mixing. Compact concrete in place by using vibrators. Moist-cure exposed concrete for not less than 7 days or use a 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 base perimeter.

3.3 FLAGPOLE INSTALLATION
A. General: Install flagpoles where shown and according to Shop Drawings and manufacturer’s written instructions.
B. Foundation-Tube Installation: Install flagpole in foundation tube, seated on bottom plate between steel centering wedges. Plumb flagpole 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 sealant and cover with flashing collar.

END OF SECTION 107500
SECTION 108113 - BIRD CONTROL DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 SUBMITTALS
   A. Product Data: All product information available from manufacturer.
   B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other Work.
   C. Samples: Of specified bird control model or models, not less than 6-inch length.

PART 2 - PRODUCTS

2.1 PRODUCTS
   A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
      1. Bird Barrier America, Inc.; “Bird-Flite.”

2.2 MATERIALS
   A. Bird Control Strips:
      1. Product Description: Provide bird control strips. Flexible, spring-tempered 316 stainless steel wire spikes spaced at 120 per foot and positioned at varying ankles and extending out from flexible stainless steel or polycarbonate mounting base.
      2. Finish: Natural stainless steel finish.
      3. Size: Furnish in 8-inch widths designed to deter pigeons as well as other birds.

PART 3 - EXECUTION

3.1 EXAMINATION
   A. Verify that mounting surfaces are ready for installation. Do not proceed until all unsatisfactory conditions have been corrected.

3.2 PREPARATION
   A. Clean all installation surfaces thoroughly.

3.3 INSTALLATION
   A. Locate and place bird control devices at indicated locations in alignment with adjacent work as shown on Drawings.
   B. Install bird control devices in accordance with manufactures written installation procedures.
   C. Cover the entire specified installation surface, not just the outer edges. Bird control strips must follow all angles and contours closely. Cut strips where necessary to fit the surface properly. Gaps in the bird control coverage not permitted.
   D. Fasten bird control strips to the surface with the mounting hardware or adhesive as recommended by the manufacturer for the application and surfaces indicated.
E. Inspect finished installation and make adjustments as necessary to conform to manufacturer’s recommendations.

3.4 CLEANING
   A. Clean and repair adjacent surfaces soiled or damaged by installation operations.
   B. Remove debris and waste materials from Project site.

END OF SECTION 108113
SECTION 111413 - OPTICAL TURNSTILES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 SUBMITTALS
   A. Product Data: Manufacturer’s detailed product data for each product specified.
   B. Shop Drawings: Drawn to scale and including plans, elevations, details of installation, including details and methods of attachments to other items or construction.
      1. Shop drawings shall clearly indicate coordination and interfaces with Division 28 Section “Electronic Safety and Security.”
   C. Samples: For each type of exposed finish and in each color and texture required. Prepare samples from same material to be used for the Work.

1.3 COORDINATION
   A. Coordinate with Division 28 fire alarm to initiate emergency operation and for connection to barrier controllers.

1.4 WARRANTY
   A. Special Warranty: Written warranty, executed by manufacturer, agreeing to repair or replace products or component parts that fail in materials and workmanship within five years from date of Substantial Completion for the following products:

PART 2 - PRODUCTS

2.1 SECURITY OPTICAL BARRIER TURNSTILE
   A. Basis-of-Design Product/Manufacturers: Optical turnstile design is based on Speedlane Swing Series as manufactured by Boon Edam or equivalent products by one of the following:
      1. Alvarado, Inc.
      2. Controlled Access.
      3. Hayward Turnstiles, Inc.
      4. Perey Turnstiles, Inc.
   B. Product Description:
      1. Cabinet: Outer shell, 304 stainless steel, No. 4 satin finish.
         a. Top Plate: Black tempered glass in a stainless-steel casing.
         b. Door Wing: 10 mm flat, transparent, tempered glass.
      2. Drive System: Electromechanical drive system mounted inside the cabinet(s) together with all of the controls. The drive system may allow for bi-directional or one-way traffic. Requires 110-240 VAC, 1 Phase, 13 A service from below.
      3. Locking Device: The locking device is activated in the closed position and will withstand up to 120Nm pushing force.
      4. Power Loss: In the event of power loss, barriers can open manually for egress.
5. Controls: Factory installed, purpose-built microcontroller platform with embedded software.
6. Power Saving Mode/Sleep Mode: Barrier will go into sleep or power saving mode after pre-set time, wake-up detection by sensors in the leading face.
7. Inputs: Accommodate up to 6 programmable inputs plus a dedicated input for fire alarm.
8. Outputs: 6 programmable outputs. Contact state is Normally Open.
9. Sensors: Manufacturer’s standard to detect individuals in the field of travel and 2 at each entry and exit of the cabinet at a mid- and low height.
10. Jump Over Sensors: Sensors located on top of the cabinets to detect individuals attempting to go over the cabinet without entering the field of travel.
11. Control Panel: Universal control panel that can operate up to 6 different security access solutions from a reception desk or security desk.
12. Low Object Sensors: Provide sensors to detect objects or individuals (e.g. Service animals, roller bags, etc.) that remain in the field of travel but cannot be detected by the top sensors nor have reached the sensors at the exit of the lane.

2.2 SECURITY EQUIPMENT
A. Refer to Division 28 Section “Electronic Safety and Security.”

2.3 TURNSTILE ACCESSORIES
A. Inserts and Anchorage Devices: Furnish inserts and anchoring devices that must be set in concrete or built into masonry for installation of units. Coordinate delivery of inserts and anchoring devices with other work to avoid delaying installation.
B. Fasteners: Provide screws, bolts, and other exposed fastening devices of the same material as the items being fastened. Fasteners for application on the exterior and exposed to the weather may be hot-dip galvanized, stainless steel, or aluminum. Provide types, gages, and lengths to suit installation conditions. Use theft-proof fasteners where exposed to view.

PART 3 - EXECUTION

3.1 EXAMINATION
A. Examine substrates and installation conditions for compliance with requirements for installation tolerances, and other conditions affecting performance of work.
B. Verify recessed junction box (of empty conduit system specified in Division 26) is mounted at +48” AFF in required location. Mount pedestrian control devices to conceal junction box. Allow for electrical service wiring & hook-up.

3.2 INSTALLATION
A. Turnstiles:
1. Install turnstiles in locations indicated in accordance with manufacturer’s Shop Drawings and written installation instructions. Coordinate exact location with Owners designated security personnel.
2. Demonstrate proper operation of turnstile to Owner’s maintenance and security personnel.

A. END OF SECTION 111413
SECTION 111900 - DETENTION EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 SUMMARY

A. Detention Equipment Contractor (DEC):
   1. Provide the Detention Equipment indicated on the Drawings, in schedules and as specified in this section.
   2. Types of Detention Equipment:
      a. Detention Mirror, Single & Double
      b. Detention Stool, floor-mounted
      c. Detention Swing Stool, wall-mounted
      d. Hopper Pass
      e. Tilt Drawer Pistol Locker, Surface Mount
      f. Recessed Toilet Paper Roll Holder
      g. Stainless Steel Counters and Work Shelves (for Visitation, Holding, etc.)
      h. Detention Grab Bars, Anti-Ligature
      i. Wall Embed Plates for detention grab bars
      j. Prisoner containment cage, door, and hardware in prisoner elevator cab (Elevator No. 4).
      k. Security Steel Bar Grillage
      l. Key Cabinet is specified in Section 111960
   3. Furnish to the General Contractor, for installation, all embedded anchors for Detention Equipment.
   4. Coordinate installation of the embedded items and the actual detention equipment with the appropriate Contractors.
   5. Coordinate with the Security Control System Contractor (SCSC), as described in Section 285000.

B. General Contractor:
   1. Install embedded anchors for Detention Equipment in accordance with manufacturer's and detention equipment subcontractor’s shop drawings.
   2. Coordinate installation of embedded items with the DEC.

1.3 QUALITY ASSURANCE

A. The Detention Equipment Contractor (DEC) shall provide all detention equipment, shop drawing submittals, testing reports, and samples as described in Specification Sections 111900, 111910, 111950, and 111960. The DEC shall coordinate the work of all these specification sections with his various equipment manufacturers, fabricators, installers, and, also, with work by others. Questions on the security/detention equipment must be directed to the DEC before being directed to the General Contractor, Architect, or Owner.
B. Available Detention Equipment Contractors (DEC):

1. Cornerstone Detention
Decatur, AL 35601
2. Bruner Detention & Security
Harrisonburg, VA 22802

3. Pauly Jail Building Company
Noblesville, IN 46062
4. Montgomery Technology Systems
(formerly CCC Group)
San Antonio, TX 78219

5. Detention Equipment Service, Inc.
(DESI)
Landenberg, PA 19350/
Pendergrass, GA 30567
6. JAILS Correctional Products
Minster, OH 45865

7. Noah Detention Construction, LLC
Niceville, Florida 32578

1.4 DETENTION EQUIPMENT CONTRACTOR’S (DEC) QUALIFICATIONS

A. It is critical that the Detention Equipment meets the requirements of the Contract Documents and that the equipment and/or systems be properly installed and functioning correctly by the Time of Completion specified.

B. A specialty DEC is required for this project. Refer to Sections 111900, 111910, 111950, and 111960 for scope of work.

C. It is not, however, the intent of the Owner or Architect to unfairly restrict competition. Other equally competent DECs who meet the ‘qualification criteria’ specified herein shall be added to the list of ‘Available Detention Equipment Contractors (DEC)’ by addendum.

D. All competent non-listed DECs may request to be listed by submitting the data requested in the Qualification Criteria, a minimum of fifteen (15) days prior to bid receipt date.

E. All other competent DECs will be listed in an addendum. Verbal approval will not satisfy this requirement. Grounds for disqualification shall exist if, in the opinion of the Architect, the information submitted is inaccurate or does not comply with the requirements of this specification. There will be no exceptions.

F. QUALIFICATION CRITERIA FOR THE DEC: It is critical that the Detention Equipment meets the requirements of the Contract Documents and that the equipment and systems be properly installed and functioning correctly by the Time for Completion specified for the project. Therefore, the DEC must meet the following qualification criteria:

1. Perform at least 50 percent of the Work (on-site installation) with its employees. Submit payroll record of executing project installation labor with a minimum of 50 percent of labor performed by direct employees of the DEC Company.

2. Provide a narrative of the history of the company from inception; including history of ownership, partnership, incorporation and/or other organizational information. Include information on the growth of the firm over time to include number of employees, relocation(s) of the firm, major production equipment purchases and replacements. Use only the current corporate/business entity, intending on bidding and performing the work.

3. Provide a statement that the firm has been in business under its current name for minimum of ten (10) continuous years.
4. Provide a list of all employees in supervisory positions stating their area of responsibility and their years of experience in that position.
   a. Number of years as a full-time employee of the DEC
   b. Number of years of jail experience
   c. Completed training program for iron workers (if involved in equipment installation)
5. Submit a complete list of all projects completed under the DEC’s current name. Specifically highlighting projects completed in NC, SC and VA, including:
   a. Project Name, Owner, Contact Name, Address, and Phone Number
   b. Architect/Engineer of Record Name, Address, and Phone Number
   c. General Contractor or Construction Manager Name, Address, and Phone Number
   d. Total Amount of the DEC’s Contract and Completion Date
6. Submit a listing of all jobs in which the DEC is presently and has been involved in litigation and the status thereof.
7. Provide a list of all jobs that your firm has been involved in liquidated damages or delay damages were filed against your firm.
8. Submit a letter of intent to test each detention door as described in Section 111910.
9. Submit for approval the name of the detention equipment manufacturers you intend to purchase from. Submit a current letter from the detention hardware manufacturer stating that the DEC is factory trained, fully authorized distributor and installer of their complete line of products.
10. Provide signed statement that DEC has not been found guilty of charges relating to conflicts of interest or to any criminal activity relating to construction methods, bidding, bid rigging, or bribery in the past five years.
11. Provide signed statement that DEC has not been found guilty of charges relating to employment of illegal aliens on construction projects in the last five (5) years.
12. Provide a letter from ‘A’ rated surety company that your company will be able to provide a 100 percent Performance/Payment bond for this project if awarded the project, but not less than $3 million dollars.
13. Provide a financial statement for the most recent fiscal year.

1.5 ACTION SUBMITTALS

A. A shop drawing submittal review meeting shall be held and coordinated by the General Contractor within two weeks after submittal. All participants should have at least two (2) weeks’ worth of review of this first Shop Drawing submittal and be prepared to comment on its appropriateness for their assigned job efforts. The meeting shall last no longer than two (2) eight-hour days. A qualified representative from each of the following entities shall be present at the meeting:
   1. Owner
   2. Architect
   3. General Contractor
   4. Detention Equipment Contractor
   5. Security Control System Contractor
   6. Security Hollow Metal Manufacturer
   7. Security Glazing Manufacturer
   8. Security Hardware Manufacturer
   9. Architectural Hardware Subcontractor
   10. Electrical Contractor
B. Failure to follow submittal criteria will constitute being non-compliant and will be reviewed as “Rejected/Resubmit”. The DEC must submit the indicated and necessary shop drawing criteria for each individual specification section as an entire section and for each subsequent re-submittal.

C. Required submittal packages shall be submitted as a complete package for each Division 11 specification section. Failure to do so will result in the submittal being “Rejected” and returned.

D. Manufacturer’s Data
   1. Submit one (1) reproducible (digital format) copy of manufacturer’s product specifications and installation instructions for each type of Detention Equipment.
   2. Provide product data for shop primer and factory-applied finish(es).

E. Product Schedule: For detention equipment. Indicate types, quantities, sizes, and installation locations by room of each accessory required. Use same designations indicated on Drawings.

F. Shop Drawings
   1. Submit one (1) reproducible (digital format) copy of all proposed and/or specified detention equipment.
   2. Include plan and elevation layouts, construction details, embed plate locations and details, material descriptions, fastener and anchorage details, inserts, dimensions of individual components, and finishes.

G. Samples
   1. Submit (upon the Owner’s or Architect’s request) one (1) each sample of any or all proposed and/or specified detention equipment items, to the Owner for his review and final approval. Coordinate with the Owner’s representative as to whom and where these samples are to be delivered.

H. Samples for Initial Selection: Manufacturer’s color charts showing the full range of colors available for factory-applied color finishes for detention equipment and furniture.
   a. Color selections will be made according to Section 013300.

1.6 PRODUCT HANDLING
A. Protect units and finishes from damage during shipping, storage, handling, installation, and construction of other work in the same area.

B. Wrap, crate, and label each item for protection from damage. Deliver pertinent items to be built-in to the General Contractor or trades in accordance with the construction progress schedule to prevent any delay.

C. Keys shall be sent directly to the person and address as directed by the Owner, via direct mail with restricted delivery and return receipt requested.

1.7 GUARANTEE
A. Upon final completion, the Manufacturer/Installer shall provide a written warranty covering the security / detention equipment against defective materials and workmanship, and guaranteeing satisfactory operation and performance for a period of one (1) year after Substantial Completion. The Manufacturer/Installer shall make necessary adjustments and replace any defective or broken parts caused by defective mechanical parts.
PART 2 - PRODUCTS

2.1 DETENTION EQUIPMENT

A. Acceptable Manufacturer of Detention Equipment:
   1. Southern Folger Detention Equipment Co.; San Antonio, TX
   2. Modern Detention Equipment; Cincinnati, OH
   3. Willo Products Co.; Decatur, AL
   4. JAILS Correctional Products; Minster, OH
   5. Viking Products; Orange, CA
   6. Bob Barker Company, Inc.; Fuquay-Varina, NC
   7. Majestic Solutions, Inc.; Madison, AL
   8. Trussbilt; Vadnais Heights, MN

B. Individual Detention Equipment Items:
   1. Detention Mirror, Single & Double: with Embedded Back Plate
      a. Acceptable Manufacturer:
         1) SS No. 432/Southern Folger Detention Equip Co.
      b. Construction:
         1) Mirrors:
            a) Mirror frame shall be 11-1/4 inches by 17-1/4 inches, fabricated from
               16 gauge cold finished steel, with 5/16 inch inner and outer flanges
               and having a tensile strength of not less than 53,000 pounds per
               square inch. Frame to have natural finish, chromium plated.
            b) Mirror opening shall be 10 inches by 14 inches, made of 0.031 inch
               sheet steel, polished to a high degree of reflectivity, and chromium
               plated.
            c) Include eight (8) chromium plated, security type, flat head machine
               screws, 1/4 inch diameter of proper length for use in backer plate.
         2) Embed Back Plates:
            a) Provide steel embed plates and 11 gauge anchor tabs as detailed
               and/or required by the mirror manufacturer (refer to details on
               Drawings).
   2. Detention Stainless Steel Floor-Mounted Stool:
      a. Acceptable Manufacturer:
         1) Floor Mounted Stool/ Viking (modified)
         2) MSI-FMS/ Majestic Solutions (modified)
         3) No. S671/Willo (modified)
         4) No. BB517SS / Bob Barker Co. (modified)
      b. Construction:
         1) Stool seat shall be 12 inches in diameter, with minimum 1 inch flange,
            fabricated of 16 gauge stainless steel, type 304 with No. 3 finish. The stool
            top shall be 1’-8” AFF.
         2) Seat support shall be constructed of a 2-1/2 inch diameter iron pipe, welded to
            a steel plate 6 inches by 11 inches by 1/4 inch for seat reinforcement. Finish
            paint support and plate with color(s) approved during shop drawing phase.
         3) Provide 12 inch by 12 inch by 1/2 inch thick anchor plate, to be field welded
            to pipe support.
         4) Provide anchorage devices and security head fasteners. Tack weld bolts.
3. **Detention Swing Stool, Wall-Mounted:**
   a. **Acceptable Manufacturer**
      1) Wall Mounted Stool / Willo
      2) No. BB518SS / Bob Barker Co. (modified)
      3) J-1-2528_25 / Jails Correctional Products (modified)
      4) Wall-mounted Stool (swing) / Trussbilt (modified)
   b. **Construction:**
      1) Stool seat shall be minimum 12 inches in diameter, with minimum 1 inch flange, fabricated of 16 gauge stainless steel, type 304 with No. 3 finish. Seat shall be attached to a minimum 1/4 inch thick steel seat reinforcement plate.
      2) Seat support shall be constructed of a 3/8 inch steel plate arm, welded to a 1 inch diameter steel swivel pin and to the seat reinforcement plate.
      3) Provide minimum 3/8 inch thick steel embed plate; seat swing arm shall be field welded to plate.
      4) Provide a non-removable hinge pin for locking the seat in place.
      5) The stool shall lock in the 90-degree position as well as in a position that allows for accessibility requirements.

4. **Hopper Pass:**
   a. **Acceptable Manufacturer:**
      1) Model PHE-1/Creative Industries Inc.; Indianapolis, IN.
      2) Hopper Pass / Safeguard Security Services, Inc.
   b. **Construction:**
      1) Size: 16 inches wide by 10-1/8 inches high by 7-3/4 inches deep
      2) Material: Stainless Steel
      3) Level I bullet-resistant
      4) Hopper locks on staff side with a turn latch knob.

5. **Tilt-Drawer Pistol Locker: (6 - Compartment Surface Wall Mounted)**
   a. **Acceptable Manufacturer:** (6-compartment)
      1) No. 605-6 / Southern/Folger Co.
      2) No. 770-6 / Willo Products
      3) No. TDGL 6C / Bob Barker
   b. **Construction:**
      1) 3/16 inch shell and doors.
      2) Compartments lined with 1/8 inch felt (Verify with Owner the exact compartment size dimensions that are required to hold their jurisdiction’s specific weapon type.)
      3) Compartment doors hung on continuous steel piano hinges.
      4) Provide each compartment with snap locks, each compartment individually keyed and master-keyed.
      5) Provide compartment keying labels and numbers (as per Owner's direction and requirements).
      6) Provide anchorage devices and security fasteners.
   c. **Size/Mounting:**
      1) Refer to Detail on Drawings for mounting.
   d. **Provide compartment numbering per Owner's direction and requirements.** Provide one of the following:
      1) Self-adhesive numbers or printed labels.
2) Laminated, black plastic tabs, engraved with compartment number and adhesively applied to face of compartment door.
3) At each location, number lockers consecutively from top to bottom in each column of lockers, unless otherwise instructed by Owner.

6. **Recessed Toilet Paper Roll Holder:**
   a. Acceptable Manufacturer:
      1) SA11/ Bradley Corporation (modified)
      2) RTH-1/Willoughby Industries, Inc. (modified)
      3) 1840/Acorn Engineering Co. (modified)
   b. Construction (refer to Detail on Drawing):
      1) Recessed holder shall be 5 inches inside diameter and 4-1/2 inches deep made of 14 gauge Type 304 Stainless Steel.
      2) The face trim rim shall be beveled so as to fit flush with the wall surface and have an architectural satin finish.
      3) Four (4) anchor angles, 1 inch by 2-1/2 inches by 1/4 inch (1 inch wide) shall be welded to the exterior walls of the recessed enclosure with the 2-1/2 inch angle leg extended.

7. **Stainless Steel Counters and Work Shelves:**
   a. Acceptable Manufacturer:
      1) (Custom fabricated)
   b. Construction (Refer to Details on Drawings):
      1) Provide stainless steel shelf as detailed on Drawings.
      2) Stainless steel shall be Type 304 with a No. 3 finish.
      3) Provide anchorage devices and security head fasteners.
      4) Field verify length prior to ordering

8. **Detention Grab Bars, Anti-Ligature:**
   a. Construction (refer to details on Drawings)

9. **Wall Embed Plates for detention grab bars:**
   a. Acceptable Manufacturer:
      1) (Custom fabricated)
   b. Construction (Refer to Detail on Drawings):
      1) Embed Weld Plates shall be 1/2 inch Stainless Steel plates dimensioned as indicated on the drawings with embedment anchor tabs.
      2) Grab Bars shall be bolted to these embed plates as noted on the Drawings.

10. **Prisoner Elevator Expanded Metal Cage:**
    a. Acceptable Manufacturer:
      1) (Custom fabrication)
    b. Construction (refer to details on Drawings):
      1) 2” square aluminum tubing framing.
      2) Through-bolt tube framing to elevator cab’s custom wall blocking (coordinate with elevator subcontractor).
      3) 3/4” expanded metal mesh.
    c. Hardware (refer to Drawings):
      1) One (1) Southern Folger 1300 sliding door track set.
      2) One (1) Southern Folger 1030A-1 automatic deadlock with six (6) keys per lock. Provide grating door mounting.
      3) One (1) Southern Folger loop pull 212C.
      4) All anchorage and fasteners to be security type (Torx-head).
11. **Security Steel Bar Grillage:**
   a. Acceptable Manufacturer:
      1) G-S Company, Baltimore, Maryland
      2) Maximum Security Products Corp.; Albany, NY
      3) Willo Products Co.; Decatur, AL
   b. Construction:
      1) Provide tool-resisting steel bar grille assembles as per manufacturer’s production practices and in accordance with ASTM A627-03 Standard Test Methods for Tool-Resisting Steel Bars, Flats, and Shapes for Detention and Correctional Facilities.
      2) Bar-grille assemblies shall consist of 7/8-inch diameter vertical double-ribbed bars spaced at 4 inches maximum on center, and 3/8 inch by 2-1/4 inch or 2-1/2 inch horizontal flat bars spaced at 12 inches on center. Perimeter framing shall be flat bars of same material and size as horizontal flat bars.
      3) Vertical ribbed bars shall be welded at the points they pass through the punched intermediate horizontal flat bars and surface welded to the face of perimeter framing.
      4) Fabricate cutouts and openings in bar-grille assemblies for penetrations of sizes and at locations indicated. Frame openings with flat bars of same material and size as horizontal flat bars.
      5) Frame connections with plates; use flat bars of same material and size as horizontal flat bars.
      6) Wall and Ceiling Anchorage: Weld framing to continuous angles with continuous welds. Anchor angles to embedded anchors by bolting.

12. All steel components shall be provided with one (1) shop coat of manufacturer's or fabricator's standard, fast-curing, lead- and chromate-free, universal primer selected for resistance to normal atmospheric corrosion, for compatibility with finish paint systems indicated, and for capability to provide a sound foundation for field-applied topcoats despite prolonged exposure, complying with performance requirements of FS TT-P-645.

2.2 DETENTION EQUIPMENT ACCESSORIES

A. Provide accessories, anchorage inserts and security fasteners for a complete tamperproof installation.

   1. Exposed Security Fasteners:
      a. Provide Torx-head (star with center reject pin) security fasteners for anchoring work in exposed security areas.
      b. Finish shall match that specified of the item anchored.

B. Provide tools for fastening devices.

**PART 3 - EXECUTION**

3.1 EXAMINATION

A. Examine the areas and conditions under which Security/Detention Equipment is to be installed. Notify the Contractor in writing of conditions detrimental to the proper and timely completion of the work. Proceed with installation only after unsatisfactory conditions have corrected.
3.2 INSTALLATION
   A. Comply with manufacturer’s printed installation instructions.
   B. Touch-up painting of factory finish or factory primed items is the installer’s responsibility.
   C. Do not paint stainless steel embed plates.
   D. Identify and coordinate the ‘Filling of all Voids’, by the General Contractor, between all materials of the Security/Detention Equipment, embeds and/or other physical construction items. Refer to specification Section 079200 – Joint Sealants and its article on “SECURITY SEALANTS” for types of sealants to be utilized.
   E. All expenses incurred by the Architect in troubleshooting Detention Equipment Work, caused by inadequate workmanship or other form of non-performance on the part of the subcontractor, shall be borne by that subcontractor.
   F. Coordinate installed equipment supplied to other contractors.

3.3 PROTECTION
   A. Protect equipment and finishes until Substantial Completion.
   B. Replace damaged equipment as directed by the Architect.

3.4 CLEANING
   A. Clean grout, mortar, and other bonding material off detention equipment immediately after installation.
   B. Touch-up Painting: Cleaning and touch-up painting of field welds, bolted connections and abraded areas of shop paint on miscellaneous metal is specified in Division 9 Section “Painting”.
   C. Field finish painting of all equipment (not supplied with factory finish) in this section shall be done in accordance with Division 9 Section “Painting”. All equipment shall be painted to match the color of its adjacent wall finish color, unless noted otherwise.
   D. Clean equipment thoroughly prior to Substantial Completion.

END OF SECTION 111900
SECTION 111910- CUSTOM / SECURITY HOLLOW METAL WORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 SUMMARY
   A. Detention Equipment Contractor (DEC):
      1. Provide the Custom/Security hollow metal doors, door frames, window frames, and any other security hollow metal (SHM) (also referred to as Detention Hollow Metal (DHM)) components indicated on the contract document drawings, schedules, and specifications.
      2. Provide all necessary embed plates and/or anchors.
         a. Provide galvanized steel embed plates at concrete construction for anchoring of SHM frames. Coordinate installation of embed plates and other anchorages. Furnish setting drawings, templates, diagrams, and instructions for items to be embedded. Deliver such items to Project site in time for installation in concrete.
      3. Coordinate requirements for manual and electric hardware, monitoring and control devices, and SHM manufacturer-provided raceway/cabling junction boxes.
      4. Coordinate all electrical requirements, by the Electrical Contractor, with the Security Control Systems Contractor (SCSC) and electrical contractor.
      5. Schedule installation of this work to coincide with erection of the masonry work on the project so that these contractors can grout fill the custom/security hollow metal frames as their work is erected. The DEC is responsible for providing grout and grout holes for any frames that cannot be delivered and erected by the erection contractors.
         a. Construction Schedule: Provide a separate line for Custom/Security Hollow Metal doors and frames, which shall include adequate time for shop drawing preparation, submittal review, fabrication and delivery of frames to the project site in time to meet above requirement and requirements of paragraph 3.2.B.2 in “Installation” article ahead. Coordinate with General Contractor.
      6. Provide on-site supervision of the delivery and installation of the custom/security hollow metal doors, frames and windows.

   B. General Contractor:
      1. Take delivery of the custom/security hollow metal doors, door frames, window frames, embedded plates/anchors and store per manufacturer's recommendations.
      2. Install custom/security hollow metal doors, door frames and interior/exterior window frames, as indicated.
      3. Install all embedded plates and/or anchors, provided by the DEC.

   C. Electrical Contractor:
      1. Coordinate electrical requirements with General Contractor and DEC.
      2. Coordinate this work with the control needs of the Security Control Systems Contractor (SCSC).

   D. Provide Custom/Security hollow metal work manufactured by a single firm specializing in the production of this type of work.
E. When a fire resistance classification is indicated or scheduled for steel doors and frames, provide fire-rated doors investigated and tested as a fire door assembly, complete with type of hardware to be used. Identify each fire door with recognized testing laboratory labels, indicating applicable fire rating of steel doors.

F. Due to security concerns, no physical U.L. Fire Resistance Labels are to be attached to the door/frame assemblies. Instead, provide die-stamped identification numbers on fire-rated doors and frames and a letter of certification recording these numbers to the Owner/user for his record and files.

G. Fire-Rated Door Assemblies: Provide door hardware for assemblies complying with the North Carolina Building Code and NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction.

1. Test Pressure: Test at positive pressure according to NFPA 252 or UL 10C. After 5 minutes into the NFPA 252 test, the neutral pressure level in furnace shall be established at 40 inches or less above the sill (per 2018 NC Building Code Section 716.5.1).

H. When a fire resistance classification is indicated or scheduled for steel doors and/or frames containing components that have not been tested as an assembly, the manufacturer shall construct the door and frame components of the assembly in accord with the resistance rating, and certify in writing to the Owner, Enforcing Authority, Contractor, and the Architect that the door and frame components have been constructed in accord with the testing laboratory requirements in lieu of label.

I. Door and Panel Construction

1. Field Examination:
   a. The Custom/Security hollow metal contractor shall include in his bid the cost to provide one (1) replacement security hollow metal door that is to be selected for field testing.
   b. When directed by the Architect, the Contractor shall destroy a randomly-selected security hollow metal door or panel by sawing it in half.
   c. When examination discloses door construction at variance with the details specified, the door manufacturer shall replace all doors shipped to the project, as of the date of inspection, with doors constructed in conformance with project specifications.
   d. Under conditions of nonconformity, the door manufacturer shall pay for the destroyed door and related labor.
   e. When examination proves that the door was constructed in conformance with specifications, the Detention Equipment Contractor (DEC) shall immediately proceed to provide the replacements for the destroyed door.

2. All detention doors and panels for this Contract shall be constructed as specified and to meet the following ASTM Testing.
   a. The following tests (ASTM F 1450 - 12, Grade 3) shall be conducted by an independent testing laboratory, upon doors with documentation attesting to compliance with the detention door construction required and indicated in this section.
   b. Doors for these tests shall utilize 14 gauge face sheets, 12 gauge frames, 3 feet by 7 feet (nominal size), not exceeding 225 lbs. in weight, and shall be fabricated as Door Type “DN” without a food pass (refer to Detention Door Types on Drawings).
1) Test A – Door Static Load Test:
   a) Door shall be end supported and loaded at quarter points by a total load of 11,000 pounds for a period of one (1) minute. Door shall deflect not more than 0.580 inch (14.73 mm) and shall rebound to within 0.100 inch (2.55 mm) of flatness after the loading is removed.

2) Test B – Door Rack Test:
   a) Door shall be secured at one short dimension and support at one other short dimension; unsupported corner shall be loaded for 30 seconds with a load of 5,500 pounds. Results should be as follows: Unsupported corner’s measured deflection shall not exceed 3.55 inches (90.52 mm). Rebound to within 1.40 inches (35.7 mm) of flatness with no visual signs of weld failure.

3) Test C - Door Assembly Impact Test:
   a) 3'-0" x 7'-0" door, frame, and hardware assembly shall be constructed and rigidly mounted in the vertical position such that the door and locking hardware are operable. The door shall swing on 1-1/2 pair of full mortised butt hinges, and shall be locked using a Southern Steel No. 1070, 1080 or 10120 series lock or equal, with bolt size not to exceed 2 inch high x 3/4 inch wide, and latch throw not to exceed 7/8 inch.
   b) A door ram pendulum system, capable of delivering consistent impacts of up to 200 feet lb., shall be constructed such that impacts may be delivered to any area of the assembly. The pendulum ram system shall be positioned opposite the door side of the assembly such that the door swings away from the ram. While hanging at rest, the ram shall be positioned such that the striking nose just touches the target area of the door. The striking nose shall be made from C1010-1020 low carbon steel, the striking surface area of which shall not exceed 4.0 square inches +/- 0.04 square inches.
   c) With the door closed and locked and the above testing arrangement secured, the following series of impact tests shall be performed from the push side of the assembly:

<table>
<thead>
<tr>
<th>Position and Order of Impacts</th>
<th>Number of Impacts</th>
<th>Impact Energy (ft. lbs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>On door at center line of bolt, 6&quot; from door edge</td>
<td>200</td>
<td>200</td>
</tr>
<tr>
<td>On door within 6&quot; of bottom hinge</td>
<td>75</td>
<td>200</td>
</tr>
<tr>
<td>On door within 6&quot; of center hinge</td>
<td>75</td>
<td>200</td>
</tr>
<tr>
<td>On door within 6&quot; of top hinge</td>
<td>75</td>
<td>200</td>
</tr>
<tr>
<td>On the glass within 1.6&quot; of the lower lock edge corner</td>
<td>100</td>
<td>200</td>
</tr>
</tbody>
</table>
   d) The door shall remain closed and locked throughout the testing procedure, and the assembly shall not be damaged such that forcible egress can be obtained. After testing is completed, the door shall be capable of being unlocked and operated such that normal egress can be obtained.
4) Test D - Door Edge Crush Test:
   a) Door shall be placed in test fixture, hinge side up. Apply pressure perpendicular to door edge until required loads are reached. Remove the door from the framework and place the door back into the test fixture, with the lock side up, and then repeat the test procedure. Required results: Both the hinge and lock edge shall support a load of at least 8,000 lbf with a deflection of less than 0.25 inch (6mm).

3. References:
   b. National Association of Architectural Metal Manufacturers (NAAMM)
   c. Hollow Metal Manufacturers Association (HMMA)
   d. Underwriters Laboratories (UL)

1.3 ACTION SUBMITTALS

A. Required submittal for Custom/Security Hollow Metal Work shall be submitted as a complete package. Failure to do so will result in the submittal being “Rejected” and returned.

B. Manufacturer’s Data
   1. Submit one (1) reproducible (digital format) copy of manufacturer’s product specifications and installation instructions.

C. Shop Drawings
   1. Submit one (1) reproducible (digital format) copy of all proposed and/or specified custom security/detention hollow metal work, and elevation layouts.
   2. Include dimensional construction details of each frame type, elevations of door and frame design types, conditions at openings, fastener, anchorage, and reinforcement details. Provide details of lock pockets and factory fabricated accessories, including, but not limited to, food passes and lockable paper passes, location & installation requirements of finish hardware & reinforcements, and details of joints and connections.
   3. Drawings shall use the same plan and elevation numbers as indicated on the contract document drawings.

D. Samples
   1. Submit to the Owner for review and final approval the following items. Coordinate with the Owner’s representative as to whom and where these samples are to be delivered.
      a. Partial door frame section at the Lock Pocket indicating grout stops, lock mounting plate, access cover plate and conduit placements.
      b. Partial door frame section at the jamb/head corner indicating the mitered weld joint condition.
      c. Partial door frame section indicating its hinge reinforcement.
      d. Partial door panel section indicating its hinge reinforcement.

E. Certificates:
   1. Manufacturer shall submit a certificate, individually dated and signed by hollow metal manufacturer, certifying that all materials meet specification requirements.
   2. Welder certificates signed by Contractor certifying that welders comply with requirements (Section 4 of ANSI/AWS D1.3) specified under “Quality Assurance” article.
F. Owner’s Tools
   1. Furnish five (5) security fastener tools for each different type security fastener, being utilized, at the time of Substantial Completion.

1.4 JOB CONDITIONS
   A. Hardware Coordination Conference: Refer to Finish Hardware and Security Hardware Specification Sections.

1.5 DELIVERY, STORAGE AND HANDLING
   A. Deliver, store, and handle hollow metal work per manufacturer’s requirements.

1.6 GUARANTEE
   A. Upon Final Completion, the Manufacturer/Installer shall provide a written warranty covering the custom / security hollow metal work against defective materials and workmanship and guaranteeing satisfactory operation and performance for a period of one (1) year after Final Completion. The Manufacturer/Installer shall make necessary adjustments and replace any defective or broken parts caused by defective mechanical parts.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS OF CUSTOM/SECURITY HOLLOW METAL:
   A. Manufacturers should submit evidence of successful detention facility experience within the last five years, and a list of projects of scope comparable to or larger than this project completed within the last five years, with Owner, Architect, and General Contractor contact names and telephone numbers.
   1. Slate Security dba Claborn Manufacturing Co.; Hartselle, AL
   2. Trussbilt (Trussbilt/American); Vadnais Heights, MN
   3. American Steel Products (Trussbilt/American); Swainsboro, GA
   4. Titan Steel Door, LLC; Gainesville, GA

2.2 MATERIALS
   A. FERROUS METALS
      1. Metal Surfaces, General: For hollow metal work exposed to view upon completion of the Work, provide materials selected for their surface flatness, smoothness, and freedom from surface blemishes. Do not use materials whose exposed surfaces exhibit pitting, seam marks, roller marks, rolled trade names, roughness, and, for steel sheet, variations in flatness exceeding those permitted by reference standards for stretcher-leveled sheet.
      2. Steel Plates, Shapes, and Bars: ASTM A 36.
      3. Uncoated Structural Steel Sheet:
         a. Provide sheet steel types (manufacturing method), quality, and grade, as follows:
            a) Cold-Rolled Structural Steel Sheet: ASTM A1008/ A1008M, or as noted or required for loading.
            b) Hot-Rolled Structural Steel Sheet: ASTM A1011/ A1011M, unless otherwise noted or required for design loading rolled.
5. Hot-Rolled Steel Sheet: ASTM A1011.
6. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, CS (Commercial Steel), Type B; with G60 (Z180) zinc (galvanized) or A60 (ZF180) zinc-iron-alloy (galvannealed) coating designation.
9. Brackets, Flanges and Anchors: Metal to match material and finish of supported rails, or as noted.
10. Concrete Inserts: Threaded or wedge type; galvanized ASTM A 47 malleable iron or ASTM A 27 cast steel castings. Provide ASTM A 153 hot-dip galvanized bolts, washers, and shims as required.
11. Welding Rods and Bare Electrodes: Select as per AWS specifications for the metal alloy to be welded.
12. Fasteners: General: Provide Torx–head (star design with center reject pin) security fasteners for anchoring work in exposed security areas. Provide one hundred (100) additional security glazing stop fasteners.
13. Shop Primer for Ferrous Metal (alkyd based): Manufacturer's or fabricator's standard, fast-curing, lead-free, universal modified alkyd primer selected for resistance to normal atmospheric corrosion, for compatibility with finish paint systems indicated, and for capability to provide a sound foundation for field-applied topcoats despite prolonged exposure complying with performance requirements of FS TT-P-645. If the Shop Primer described above is provided instead of the Phenolic-Phosphate based water primer described in item No. 13 below, then all interior surfaces of the hollow metal frame assembly’s jambs, heads and sills are to receive a coating of water based coating of Aqueous Automotive Corrosion Control Coating Terotex No. 895213 by Henkel Surface Technologies (or equal).
14. Shop Primer for Ferrous Metal: Interior doors and frames shall be thoroughly cleaned, degreased, bonderized and provided with one coat of North American Technologies No. 40-P-1802 (or equal) primer.

a. PRIMER Specifications:
1) Phenolic Water Based Primer
2) Product Number: 40-P-1802
3) Description: Phenolic-phosphate based water primer designed for use in extremely corrosive building applications.
4) Application: Apply by brush, roller, spray or dip.
5) Percent solids per weight: 50 percent +/- 2
6) Weight/Gallon: 8.93
7) PVC: 39 percent
8) Gloss 60 degree: 0 degree
9) Salt Spray: 200 hours @ 1.5m
10) Recommended Film Thickness: 0.8 – 1.5m
11) Color: Gray or Beige
12) Rust Inhibitive Pigment: Zinc Phosphate
13) Application Use: Primer shall be used over properly cleaned, rust free steel for proper rust inhibition. Steel should be stored in a dry environment, protected from damage to surface. Steel must be top coated within one (1)
month of arrival with any commercially available top coat, water based or solvent based.

2.3 FABRICATION

A. Form metal fabrications from materials of size, thickness, and shapes indicated but not less than that needed to comply with performance requirements indicated. Work to dimensions indicated or accepted on shop drawings, using proven details of fabrication and support. Use type of materials indicated or specified for various components of each metal fabrication.

B. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges.

C. Shear and punch metals cleanly and accurately. Remove burrs.

D. Ease exposed edges to a radius of approximately 1/32 inch, unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

E. Remove sharp or rough areas on exposed traffic surfaces.

F. Weld corners and seams continuously to comply with AWS recommendations 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 that no roughness shows after finishing, and contour of welded surface matches those adjacent.

G. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of type indicated or, if not indicated, Torx-head flat-head (countersunk) screws or bolts. Locate joints where least conspicuous.

H. Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and space anchoring devices to provide adequate support for intended use.

I. Shop Assembly:
   1. Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. 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. Cut, reinforce, drill and tap fabricated work as indicated to receive finish hardware, screws, and similar items.
   2. Fabricate steel door and frame units to be rigid, neat in appearance, and free from defects, warp or buckle. Accurately form metal to required sizes and profiles as indicated on drawings.
   3. After fabrication, interior and exterior doors and frames shall be thoroughly cleaned, degreased, bonderized and provided with one coat of North American Technologies No. 40-P-1802.
   4. Fabricate exterior doors, panels, and frames from galvanized sheet steel.
   5. Clean, treat, and paint exposed, galvanized surfaces of fabricated hollow metal units.
J. Finish Hardware and Security Items Preparation:
   1. Templates for all hardware attachments and security items shall be provided by the hardware suppliers to the Detention Equipment Contractor (DEC) for transmittal to the frame and door manufacturer.
   2. Fabricate frames with mitered corners, welded continuously and ground smooth. Frames and doors shall be mortised, reinforced, machined and prepared for all hardware.

2.4 HOLLOW METAL DOORS

A. Provide hollow metal doors of the types and styles indicated on the drawings and schedules. Furnish detailed accessory items such as food pass.

B. All hollow metal doors shall have a flush closed top edge and bottom edge.

C. Size/Thickness/Type: Refer to Detention Door Schedule and Detention Door Types.

D. Gauge: 14 gauge face sheets.

E. Coordinate electric hardware requirements to be integrally built into the door with the hardware requirements.

F. Internal Core Construction: Provide one of the following two (2) types:
   1. Steel-Stiffened Core: Steel stiffened by continuous vertically formed steel hat sections, which upon assembly, shall span the full thickness of the interior space between door faces. Stiffeners shall be 16 gauge (minimum) to meet the performance standards established in the quality control section of this specification, spaced such that the vertical interior webs shall be no more than 4 inches o.c. and securely fastened to both face sheets and together by spot welds spaced a minimum of 2-1/2 inches o.c. vertically. Spaces between stiffeners shall be filled with 3 lbs./cu. ft. fiberglass or mineral Rockwool batt-type material.
   2. Truss-Stiffened Core: Continuous, inner–reinforcement full height and width shall be true truss design with triangular form, the shape of which cannot be altered without changing the length of the sides. Flat apexes shall be resistance spot welded on 2-3/4 inch centers horizontally and 3 inch centers vertically. Each flute of reinforcement to be fire and sound insulated with 6 lbs./cu. ft. Rockwool batt-type material.

G. Top and Bottom Channels: The top and bottom edges shall be closed with a continuous channel, not less than 12 gauge, welded to both face sheets at a minimum of 4 inches o.c. Reinforce the 12 gauge closing end channel with a full width 3/16 inch plate continuously welded to the vertical edge of the door at all four corners.

H. Vertical Edges:
   1. All vertical edges shall be reinforced by a continuous steel channel, not less than 12 gauge, extending the full length of the door. Continuously weld and finish smooth edge seams without visible joints or seams on exposed faces or stile edges. Lock and hinge edges shall be beveled 1/8 inch in 2 inches.

I. Exterior Doors:
   1. Fabricate exterior doors of two outer, galvanized, stretcher-leveled, steel sheets. Construct doors with smooth, flush surfaces without visible joints or seams on exposed faces or stile edges, except around glazed or louvered panel inserts. Provide weep hole openings in the bottom of exterior doors to permit the escape of entrapped moisture.
J. Interior Doors.
   1. Fabricate interior doors of two outer, cold-rolled, stretcher-leveled, steel sheets. Construct doors with smooth, flush surfaces, without visible joints or seams on exposed faces or stile edges.

K. Finish Hardware Reinforcement:
   1. Hinges: Steel plate 3/16 inch thick by full height, secured by spot–welds 4 inches o.c.
   2. Mortise Locksets and Dead Bolts: 3/16 inch thick steel sheet, welded to inside of door on detention side (cell side) and 3/16 inch thick steel lock mounting plate, beveled at edges, applied to the surface of the door with security screws.
   3. Cylinder Locks: 12 gauge steel sheet, secured with not less than 2 spot–welds.
   4. Flush Bolts: 12 gauge steel sheet, secured with not less than 2 spot–welds.
   5. Surface–Applied Closers: 12 gauge steel sheet, secured with not less than 6 spot–welds.
   6. Push Plates and Bars: 16 gauge steel sheet (except when through bolts are indicated or specified), secured with not less than 2 spot–welds.
   7. Surface Panic Device: 14 gauge sheet steel (except when through bolts are indicated or specified), secured with not less than 2 spot–welds.
   8. Automatic Door Bottoms: Reinforce for mortise–type units with 12 gauge steel, and 16 gauge for surface–applied units.
   9. Vision Panels: 12 gauge steel sheet around perimeter, welded 3 inches o.c. field installed.

L. Removable glass stops shall consist of 10 gauge “Z”-type stops securely fastened to the door using Torx-head (star with center reject pin) security screws of the size, strength and spacing necessary to satisfy impact performance criteria.

2.5 HOLLOW METAL FRAMES

A. Provide custom/security hollow metal door frames of the types and styles indicated on the drawings or schedules, interior and exterior. Conceal all anchorage, unless noted otherwise.

B. Provide custom/security hollow metal frames for windows, transoms, side lites, borrowed lites, and other openings as indicated on the drawings, interior and exterior. Conceal all anchorage, unless noted otherwise.

C. Provide galvanized frames at exterior locations and as indicated in the Detention Door Schedule.

D. Fabricate frames with mitered corners continuously welded through head inside corner and miter ground smooth.

E. All frames shall be provided with approved jamb anchors (4 per jamb minimum), floor knees, plaster boxes (26 gauge steel minimum), removable angle spreaders, and door silencers (3 Glynn Johnson GJ64 silencers minimum per door) by the manufacturer. Continuous floor anchors below glazing shall be 12 gauge minimum with holes for fasteners at 12 inches on center.

F. Types: Refer to Detention Door Schedule and Detention Frame Elevations.

G. Gauge: 12 gauge.

H. Finish Hardware Reinforcement: Reinforce frames for required finish hardware, as follows:
   1. Hinges and Pivots: Hinge Reinforcing Steel plate 3/16 inch thick by 2 inches wide by 10 inches long welded to the inside of the frame and a Back-Up Angle 3/16 inch welded to
2. Hinge Reinforcement steel plate and to the frame at both its ends. Back-Up Angle shall be drilled and tapped to accommodate security screws to fasten the security hinges.

2. Strike Plate Clips: Steel plate 3/16 inch thick by 1-1/2 inches wide by 3 inches long.
3. Surface-Applied Closers: 12 gauge steel sheet, secured with not less than 6 spot-welds.
4. Provide lock pockets as indicated and required.

I. Removable glass stops shall consist of 10 gauge angles securely fastened to the frame using Torx–head (star with center reject pin) security screws of the size, strength and spacing necessary to satisfy impact performance criteria. During shipment of these assemblies non-security fasteners may be substituted to hold glass stops in place. The security fasteners shall be included in the same shipment but packaged separately for protection until used to stop in the required glazing.

J. Provide grout openings for all vertical or horizontal hollow metal frame sections that are not accessible for grouting due to steel lintels or other obstructions.

K. Provide separate conduit systems for door control, intercom, etc., within hollow metal frames.

2.6 ELECTRICAL REQUIREMENTS

A. Custom/security hollow metal fabricator shall furnish and install junction boxes and conduit between junction boxes in door frames for electric locks, door position switches, emergency release buttons, and intercom call stations; coordinate special hardware requirements with the Electrical Contractor and Security Hardware Subcontractor.

B. Refer to the Detention Door Schedules, Security Hardware Specification Section, and Details.

2.7 SECURITY/DETENTION EQUIPMENT ACCESSORIES

A. Provide accessories, anchorage inserts, and security fasteners for a complete, tamperproof installation.

B. Exposed Security Fasteners:
   1. Provide Torx–head (star design with center reject pin) security fasteners for anchoring work in exposed security areas. Provide one hundred (100) additional security glazing stop fasteners.
   2. Finish shall match that specified of the item anchored.
   3. Provide three (3) sets of tools for each type of security fastener used.

PART 3 - EXECUTION

3.1 EXAMINATION:

A. Examine the areas and conditions under which steel doors and frames are to be installed. Notify the Contractor in writing of any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.

3.2 INSTALLATION:

A. Install hollow metal units and accessories in accordance with final shop drawings and manufacturer's data, and as herein specified.
B. Placing Frames:
   2. Place frames prior to construction of enclosing walls and ceilings. Set frames accurately in position, plumbed and aligned (using metal shims), and braced securely until permanent anchors are set. After wall construction is completed, remove temporary braces and spreaders leaving surfaces smooth and undamaged.
   3. Identify and coordinate with the work of Section 07920 – Joint Sealants to assure the ‘Filling of all Voids’ around the perimeter of custom/security hollow metal frames. Refer to specification Section 07920 – Joint Sealants and its article on Security Sealants for types of sealants to be utilized.
   4. Install fire-rated frames in accordance with NFPA 80.
   5. Grout fill solid all custom/security hollow metal frame jambs, sill, and head sections. Provide grout openings in hollow metal frames where access for grout filling of frame sections may be restricted due to steel lintels or other obstructions. Prior to filling jamb, head and sill frame sections with grout, verify that the required Phenolic Water Based Primer (North American Technologies No. 40-P-1820 or equal) has properly coated all interior surfaces. If the primer coating is omitted or damaged, field apply a coating of the Phenolic Water Based Primer.
   6. If the supplied Shop Primer is a universal modified alkyd primer, instead of the Phenolic-Phosphate based water primer, below, then all interior surfaces of the hollow metal frame assembly’s jambs, heads and sills are to receive a coating of water based coating of Aqueous Automotive Corrosion Control Coating Terotex No. 895213 by Henkel Surface Technologies (or equal).
   7. Prior to filling intermediate frame sections with grout, verify that the required Phenolic Water Based Primer (North American Technologies No. 40-P-1820 or equal) has properly coated all interior surfaces. If the primer coating is omitted or damaged, field apply a coating of the Phenolic Water Based Primer.
      NOTE: If the supplied Shop Primer is a universal modified alkyd primer, instead of the Phenolic-Phosphate based water primer, below, then all interior surfaces of the hollow metal frame assembly’s jambs, heads and sills are to receive a coating of water based coating of Aqueous Automotive Corrosion Control Coating Terotex No.895213 by Henkel Surface Technologies (or equal).
   8. In masonry construction, locate four (4) wall anchors per jamb at hinge and strike levels. Setting of anchors and grout filling of frame jambs is specified in Division 4 Sections “Unit Masonry” and “Reinforced Unit Masonry” as applicable.

C. Door Installation:
   1. Fit custom/security hollow metal doors accurately in their respective frames with the following clearance tolerances or as indicated on the Detention Door Schedule (utilize clearances specified in S.D.I. 100 for applications not listed below):
      a. Jambs and Head: 3/32 inch
      b. Meeting Edges, Pair of Doors: 1/8 inch
      c. Bottom: 3/8 inch (when no carpet or threshold)
      d. Bottom: 1/8 inch (when having carpet or threshold)
   2. Install fire-rated doors per NFPA 80 (or per local applicable codes, if more stringent).
D. All expenses incurred by the Architect in troubleshooting the Custom / Security Hollow Metal Work, caused by inadequate workmanship or other form of non-performance on the part of the subcontractor, shall be borne by that subcontractor.

3.3 ADJUST AND CLEAN

A. Final Adjustments:
   1. Check and readjust operating finish hardware items in hollow metal work immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including detention doors or frames which are warped, bowed, or damaged or otherwise unacceptable.

B. Clean grout and other bonding material off detention doors and frames immediately after installation.

C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas, and repair galvanizing to comply with ASTM A 780/A 780M

D. Prime Coat Touchup:
   1. Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying primer. After finishing smooth field welds, apply air-drying primer.
   2. After finishing smooth field welds, apply air-drying primer.

END OF SECTION 111910
SECTION 111950 - SECURITY GLASS AND GLAZING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 SUMMARY
   A. Detention Equipment Contractor (DEC):
      1. Provide security glass and glazing work as indicated.
      2. Applications of security glass and glazing include the following:
         a. Security glazing of interior and exterior doors.
         b. Security glazing of interior and exterior hollow metal frames and miscellaneous interior security glazed frames.
         c. Security glazing at Security Desk in Lobby
   B. General Contractor:
      1. Coordinate efforts of security glazing with other glazing work and the installation of security hollow metal work.

1.3 GLAZING CRITERIA PERFORMANCE REQUIREMENTS
   A. Security Glass:
      1. Comply with multiple impact and high energy impact tests:
         a. UL 972.
         b. ASTM F 1233.
         c. ASTM F 1915.
   B. Bullet Resistant Glass:
      1. Comply with UL 752. Provide glazing, listed and labeled by UL for the required rating.
   C. Structural Performance: Glazing shall withstand the following design loads within limits and under conditions indicated:
      1. Design Wind Pressures: As indicated on Drawings.
   D. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with Safety Standard for Architectural Glazing Materials; 16 CFR Part 1201, Category II.
   E. Security Polycarbonate:
      1. Comply with ASTM F 1233 containment test body passage or contraband passage level as described in Security Glazing “Compositions” section.
      2. Comply with ASTM F 1915 containment test using pendulum impact having blunt, sharp and axe heads with heat/fire (torch) applied.
      3. Bullet resistant products shall be tested and listed by UL 752 or ASTM F 1233, whichever is applicable and certified to by the manufacturer of the security glazing.
      4. Maintenance serviceability test, all types:
         a. Products will not exhibit abrasion haze of more than 15 percent when tested to ANSI Z26.1. Taber Abrader test No. 17 for 100 cycles having a 500 gram load.
b. No extraordinary procedures shall be required for window cleaning. Manufacturer’s recommendations shall be followed.

F. Experience Criteria:
1. Minimum of five (5) years’ experience manufacturing specified item.
2. Minimum of five (5) years successful installations on detention and correctional facilities.
3. Security glazing manufacturer approval:
   a. No security glazing manufacturers will be approved after the bid date. All manufacturers must submit qualifications to the Architect for consideration no less than fifteen (15) days prior to bid date.

1.4 ACTION SUBMITTALS:
A. Required submittals for this section shall be submitted as one complete package. This shall include, but not be limited to, manufacturer’s data, shop drawings, and samples. Failure to do so will result in the submittal being “Rejected” and returned.

B. Manufacturer’s Data - Glass:
1. Submit one (1) reproducible (digital format) copy of manufacturer’s specifications and installation instructions for each type of glass, setting blocks, sealants, and gaskets required.
2. Include test data substantiating that glass complies with specified requirements.
3. Indicate by copy of transmittal that Glazier has received copy of handling and glazing instructions.

C. Manufacturer’s Data - Glazing Materials:
1. Submit one (1) reproducible (digital format) copy of manufacturer’s specifications and installation instructions for each type of glazing, sealant, tape, compound, gasket and associated miscellaneous material required. Include manufacturer’s published data, letter of certification, or certified test laboratory report indicating that each material complies with the requirements as is intended generally for the applications indicated.
2. Indicate by copy of transmittal that Glazier has received copy of each glazing component’s recommended installation instructions.

D. Shop Drawings:
1. Submit FULL SCALE hollow metal sill glazing installation detail drawings. Details shall indicate the actual glazing products being supplied (i.e. setting blocks, sealants, gaskets), their actual sizes, their placements/spacing and their dimensional relationships within the assembly.
   a. Provide details for fire-rated and non-fire glazing.

E. Security Glazing Schedule: List glazing types for each opening and location. Use same designations indicated on Drawings.

F. Shading Film product data and samples: Submit one (1) reproducible (digital format) copy of manufacturer’s data and two (2) sets of samples of interior-applied, shading “Films” being considered for glazing types indicated to receive it (refer to Security Glazing types).

G. Sample Warranties: For security glazing.
1.5 JOB CONDITIONS

A. Weather Conditions:
   1. Do not proceed with installation of liquid sealants under adverse weather conditions, or when temperatures are below or above manufacturer’s recommended limitations for sealant installation.

1.6 WARRANTY

A. Security Glass:
   1. Provide Owner a five (5) year guarantee for materials and labor from date of Substantial Completion for all security glazing.
   2. Guarantee shall include delamination.
   3. The guarantee shall be by the manufacturer, co-signed by the Installer and Detention Equipment Contractor.
   4. Manufacturer’s warranty on laminated polycarbonate:
      a. Provide written warranty by the manufacturer of mar-resistant laminated polycarbonate agreeing to supply replacement product, FOB point of manufacture, freight allowed to project site, in the event of material failure due to manufacturing defect. Defect shall be defined as edge separation, delamination, breakage or coating failure. Time period for said warranty shall be a minimum of five (5) years.

PART 2 - PRODUCTS

2.1 GLAZING TESTING CRITERIA

A. Security Glazings:
   2. Comply with and pass UL multiple impact test.
   3. Comply with and pass UL high energy impact test.

B. Security Polycarbonates:
   1. Types: Laminated or monolithic polycarbonate sheet shall be extruded sheet, UV stabilized, but when laminated uses a interlayer of 0.030 inch “LR” resin. Material layups will vary according to manufacturer’s requirements to meet constructions listed in Security Glazing Compositions section. Polycarbonate laminates shall have a flexural strength not less than 13,500 psi (ASTM D790, 180 degrees F continuous service temperature). Products must conform to the International Building Code (IBC) as an approved light transmitting plastic with a CC-1 flammability performance rating.

C. APPROVED MANUFACTURERS: (SUBJECT TO COMPLIANCE WITH PERFORMANCE)
   1. Global Security Glazing; Selma, Al.
   2. DLUBAK Corp; Blairsville, PA
   3. LTI Group; Pittsfield, MA
2.2 SECURITY GLAZING COMPOSITIONS

A. **Polycarbonate Sheet Glazing:**
   1. **Type SG-1P** – 3/4 inch nominal, multi-ply clear polycarbonate, ASTM F1915 Grade 1, 60 minute containment rated; Global Security Glazing RC 750 or approved equal.
   2. **Type SG-2P** – 1/2 inch nominal, multi-ply clear polycarbonate, ASTM F1915 Grade 2, 40 minute containment rated; Global Security Glazing MPC 500 or approved equal.
   3. **Type SG-3P** – 3/8 inch nominal, multi-ply clear polycarbonate, ASTM F1915 Grade 3, 20 minute containment rated; Global Security Glazing MPC 375 or approved equal.

B. **Glass Clad Polycarbonates:**
   1. **Type SG-10** – 1 inch nominal, 1/8 inch heat strengthened glass, 1/4 inch clear polycarbonate, 3/8 inch clear polycarbonate, 1/8 inch heat strengthened glass, Apply the shading “Film” on the glazing surface away from the inmate occupancy and after the building has received its Certificate of Occupancy. The shading “film” color is to be selected by the Owner under the supervision of the Architect. ASTM F1915 Grade 1, 60 minute containment rated; Global Security Glazing – Inferno-Lite ULTIMAX 45-SP028-G.
   2. **Type SG-11** – (not used)
   3. **Type SG-12** – (not used)
   4. **Type SG-13F** – 1-3/4” nominal thickness; Proprietary multi-layer construction comprised of glass-clad polycarbonate and fire-resistant glass laminate. Apply the shading “Film” on the glazing surface away from the inmate occupancy and after the building has received its Certificate of Occupancy. The shading “film” color is to be selected by the Owner under the supervision of the Architect. 45 minute fire rated, ASTM F1915 Grade 1; Global Security Glazing – Inferno-Lite ULTIMAX 45-SP028-G.
   5. **Type SG-14F** – 1-1/8 inch nominal, 1/4 inch wire glass, 1/8 inch clear polycarbonate, 3/8 inch clear polycarbonate, 1/8 inch clear polycarbonate, 1/4 inch wire glass. 45 minute fire rated, ASTM F1915 Grade 1; Global Security Glazing – ICGCP 2416WW.
   6. **Type SG-15F** – (not used).
   7. **Type SG-16F** – (not used).
   8. **Type SG-17F** – (not used).
   9. **Type SG-18F** – (not used).
   10. **Type SG-19F** – (not used).
   11. **Type SG-20** – 1-1/8” nominal, UL 752 Level 3 Bullet Resistant Glazing; Global Security Glazing – SP311.

C. “Shading Film” **Manufacturers:**
   1. **Madico Window Films** Madico, Inc.; St. Petersburg, FL (727) 327-2544 or (888)887-2022
   2. **Aegis Films, Inc.** Norcross, GA (770) 417-1281
   3. **LLumar Solar Control Window Film**; Bassett, VA (276) 629-1711
   4. **MaxPro Window Films; Whiteville, NC** (877) 573-3456
   5. **Sun Block, Inc.; Midlothian, VA** (804) 379-4123
   6. **X-RAYZ Window Tinting; Charlottesville, VA** (434) 296-0176
   7. **Vista Window Film/CP Films, Inc.; Martinsville, VA** (888) 273-4567
   8. **Film Technologies International, Inc.; St. Petersburg, FL** (727) 327-2544
2.3 GLAZING SEALANTS/COMPOUNDS

A. Basic Requirements:
   1. Provide black exposed glazing materials, unless another color is indicated, or unless another color is selected by Architect from manufacturer’s standard colors.
   2. Provide hardness of materials as recommended by the manufacturer for the required application and condition of installation in each case.
   3. Provide only compounds known (proven) to be fully compatible with surfaces contacted.
   4. Provide sealants recommended by manufacturer of glazing type specified.
   5. Provide silicone sealant bead along entire glazing perimeter, between glazing and stops (removable and non-removable), installed with a substantial “wash” away from security glazing, providing a watertight seal from detergents and cleaning solutions.

B. Silicone Rubber Glazing Sealant:
   1. Silicon rubber, one part elastomeric sealant, complying with FS TTS001543, Class A. Provide acid–type for porous channel surfaces, and provide non–acid type for porous channel surfaces (where any of the channel surfaces are porous).

C. Butyl Rubber Glazing Tape:
   1. Partly vulcanized, self–adhesive, non-staining, elastomeric butyl rubber tape, 98 percent solids, intended for 35 percent compression, non-appreciable deterioration for 3000 hour test in Atlas Weatherometer.

D. One Component Urethane Glazing Sealant:
   1. Solvent based, one component polyurethane; compounded specifically for glazing; complying with FS TT200230, Class A, Type 11.

E. Acrylic Latex Glazing Compound:
   1. Modified latex rubber and acrylic emulsion polymer, compounded specifically as a glazing sealant with permanent flexibility (non–hardening), non–staining, and non–bleeding.

F. Butyl Rubber Glazing Sealant:
   1. Polymerized butyl rubber compound with inert fillers and pigments, solvent based with 75 percent solids, non–sag, tack–free within twenty-four (24) hours, paintable, non–staining.

G. Preformed Butyl rubber Glazing Sealant:
   1. Tape or ribbon (coiled on release paper) of polymerized butyl, or mixture of butyl and polyisobutylene, compounded with inert fillers and pigments, solvent based with minimum of 95 percent solids, with thread or fabric reinforcement, tack–free within twenty-four (24) hours, paintable, non–staining.
   2. Provide combination type and encased continuous rubber shim, of approximately 50 durometer hardness.

2.4 GLAZING GASKETS

A. Provide glazing gaskets as recommended by manufacturer.

B. Structural Rubber Glazing Gaskets:
   1. Neoprene extrusions with injection molded corner units, fabricated into frames, with either integral or separate locking strips (zippers); comply with ASTM C542, black.
C. Molded Neoprene Glazing Gaskets:
   1. Molded or extruded neoprene gaskets of the profile and hardness required for watertight construction; comply with ASTM D 2000 designation 2BC 415 to 3BC 620, black.

D. Polyvinyl Chloride Glazing Gaskets:
   1. Extruded, flexible PVC gaskets of the profile and hardness shown, or as required for watertight construction; comply with ASTM D 2287.

E. Vinyl Foam Glazing Tape:
   1. Closed cell, flexible, self-adhesive, non-extruding, polyvinyl chloride foam tape; recommended by manufacturer for installation of glass, with only nominal pressure in the glazing channel; comply with ASTM D 1667.

F. Glazing Sealants - Materials specifically for polycarbonates:
   1. General
      a. Provide products and materials of the type indicated and approved for use with the specified security glass polycarbonate products.
      b. Comply with recommendations of the manufacturers of each type of glazing material for the storage, installation, and finishing of respective products.
   2. Compatibility
      a. Install using sealants of proven compatibility with the various surfaces in which they will come in contact with, including all submitted silicones, setting blocks, glazing tape, and edge block materials.
      b. Provide sealants of the color specified, or from manufacturer’s standard as chosen by the Architect.
   3. Materials
      a. Silicone sealants shall be single component elastomeric silicone complying with the following:
         1) FS TT-S-001543, Class A, non-sag
         2) ASTM C 920, Type S, Grade NS, Class 50, Use G for high modulus silicone
         3) Dow Corning/DOWSIL 995 Silicone Structural Glazing Sealant or equal.
      b. Glazing tape shall be pre-formed polyisobutylene butyl sealant, Tremco 440, Tremco Polyshim II, or equal.
      c. Setting blocks shall be neoprene or EPDM (70 to 90 durometer) 3 inches to 4 inches long.
      d. Edge blocks shall be neoprene, EPDM or silicone (40-50 durometers) and of a size and spaced as to prevent lateral movement.

2.5 MISCELLANEOUS GLAZING MATERIALS

A. Setting Blocks:
   1. Neoprene, 7090 durometer hardness, proven compatible with sealants used.

B. Spacers:
   1. Neoprene 4050 durometer hardness, with proven compatibility with sealants used.

C. Compressible Backer Rod:
   1. Closed cell or waterproof jacketed rod stock of synthetic rubber or plastic foam, proven to be compatible with sealants used, flexible and resilient, with 510 psi compression strength for 25 percent deflection.
D. Self-adhesive, Compressible Filler:
   1. Closed cell, polyvinyl chloride foam compressible filler, size 1/2 inch thick by full depth of intermediate composite tube section; color–black. Provide with pressure sensitive adhesive on one side for attachment to tube section. Compressible filler as manufactured by Tremco.

E. Cleaners, Primers, and Sealers:
   1. Type recommended by sealant or gasket manufacturer.

F. Exposed Security Fasteners:
   1. Provide Torx–head (star design with center pin) security fasteners for anchoring work in exposed security areas.
   2. Finish shall match that specified of the item anchored. (Do not paint Torx- heads.)
   3. Provide three (3) sets of tools for security fasteners.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine framing and glazing channel surfaces, backing, removable stop design, and the conditions under which the glazing is to be performed. Notify the Architect in writing of any conditions detrimental to the proper and timely completion of the work. Do not proceed with the glazing until unsatisfactory conditions have been corrected.

3.2 STANDARDS AND PERFORMANCE

A. Watertight and airtight installation of each piece of glass is required, except as otherwise shown. Each installation must withstand normal temperature changes, wind loading, impact loading (for operating sash and doors) without failure of any kind including loss or breakage of glass, failure of sealants or gaskets to remain watertight and airtight, deterioration of glazing materials and other defects in the work.

B. Protect glass from edge damage during handling, installation and operations of the building.

C. Glazing channel dimensions are intended to provide for necessary minimum bite on the glass, minimum edge clearance and adequate sealant thicknesses, with reasonable tolerances. The Glazier is responsible for correct size for each opening, with the tolerance and necessary dimensions established.

D. Comply with combined recommendations of glass manufacturer and manufacturer of sealants and other materials used in glazing, except where more stringent requirements are shown or specified, and except where manufacturer’s technical representatives direct otherwise.

E. Comply with “Glazing Manual” by Flat Glass Marketing Association except as shown and specified otherwise, and except as specifically recommended otherwise by the manufacturers of the glass and glazing materials.

F. Inspect each piece of glass immediately before installation and eliminate any which have observable edge damage or face imperfections.

G. Unify appearance of each series of lights by setting each piece to match others as nearly as possible. Inspect each piece and set with pattern, draw and bow oriented in the same direction as other pieces.
H. Cut and install colored (tinted) glass as recommended in “Technical Services Report No. 104” by PPG Industries.

I. All expenses incurred by the Architect in troubleshooting the Security Glass and Glazing work, caused by inadequate workmanship or other form of non-performance on the part of the subcontractor, shall be borne by that subcontractor.

3.3 PREPARATION FOR GLAZING

A. Clean glazing channels and other framing members to receive security glazing, immediately before glazing. Remove coatings not firmly bonded to substrates. Remove lacquer from metal surfaces wherever elastomeric sealants are used.

B. Apply primer or sealer to joint surfaces wherever recommended by sealant manufacturer.

3.4 GLAZING

A. Comply with glass, window, and frame manufacturer’s recommendations.

B. Install setting blocks, of proper size, at quarter points of sill rabbet. Set blocks in thin course of the heelbead compound, if any.

C. Glazing shall be set with equal bearing for entire width.

D. Provide spacers inside and out, and of proper size and spacing, for all glass sizes larger than 50 inches, except where gaskets are used for glazing. Provide 1/8 inch minimum bite of spacers on glass and use thickness equal to sealant width, except with sealant tape use thickness slightly less than final compressed thickness of tape.

E. Voids and Filler Rods:
   1. Prevent exudation of sealant or compound by forming voids or installing filler rods in the channel at the heel of jambs and head (do not leave voids in the sill channels) except as otherwise indicated, depending on light size, thickness and type of glass, and complying with manufacturer’s recommendations.

F. Do not attempt to cut, seam, nip or abrade glazing which is tempered, heat strengthened, or coated.

G. Force sealants into channel to eliminate voids and to ensure complete “wetting” or bond of sealant to glass and channel surfaces.

H. Provide silicone sealant bead along entire glazing perimeter, between glazing and stops (removable and non-removable), installed with a substantial “wash” away from the glass, providing a watertight seal from detergents and cleaning solutions.

I. Clean and trim excess glazing materials from the glass and stops or frames promptly after installation, and eliminate stains and discolorations.

J. Specific recommendations for polycarbonate glazing installation:
   1. Install setting blocks of proper size in sill rabbet, located one quarter of glass width from each corner, but with edge nearest corner not closer than 6 inches from corner unless otherwise required. Set blocks in thin course of sealant.
   2. Provide spaces inside and out, of correct size and spacing to preserve required face clearances, for glass sizes larger than 50 inches, except where gaskets or glazing tapes with continuous spacer rods are used for glazing. Provide 1/8 inch minimum bite of spacers on
glass and use thickness equal to sealant width, except with sealant tape use thickness slightly less than final compressed tape thickness.

3. Setting blocks, edge blocks, silicone cap beads, glazing tapes/filler rod installation shall comply with GANA (Glass Association of North America) 2008 Edition standards.

4. Tapes and gaskets are to be installed slightly protruded so as to eliminate dirt and moisture pockets. Exposed sealants shall form a wash away from the glazing.

5. Polycarbonate glazing edge engagements shall generally be 1 inch, unless otherwise approved by the Architect and confirmed by the manufacturer.

6. Expansion allowances for polycarbonate shall generally be 1/16 inch per 12 inches, per 100 degrees F changes in temperature or as approved by the Architect per manufacturer’s recommendations.

7. Polycarbonate installation and fabrication shall comply with the written recommendations of the polycarbonate manufacturer. Copies of aforementioned recommendations shall be furnished to the Architect.

8. Install all polycarbonates as late as possible in the construction of the facility. Masking should be removed approximately 1 to 2 inches from the edges so as to allow the glazing tape/silicone to come in contact with the polycarbonate.

9. All polycarbonate lites, exposed to direct sunlight, shall have the masking entirely removed and then securely covered with polyethylene taped to the frames. Failure to remove the masking at this time may result in adhesion of the masking preventing later removal.

10. Where wedge shaped gaskets are driven into one side of the channel to pressurize the sealant or gasket on the opposite side, provide adequate anchorage to ensure that gasket will not “walk” out when subjected to dynamic movement. Anchor gasket to stop with matching ribs, or by proven adhesive, including embedment of gasket tail in cured heel bead.

11. Glaze units at the building site.

K. Gasket Glazing:

1. Miter cut and bond ends together at corners where gaskets are used for channel glazing, so that gaskets will not pull away from corners and result in voids or leaks in the glazing system.

3.5 CURE, PROTECTION AND CLEANING

A. Cure glazing sealants & compounds in compliance with manufacturer’s instructions and recommendations, to obtain high early bond strength, internal cohesive strength and surface durability.

B. Protect glass from breakage immediately upon installation, by attaching crossed streamers to framing held away from glass. Do not apply markers of any type to surfaces of glass.

C. Remove and replace glass which is broken, chipped, cracked, abraded, or damaged in other ways during the construction period, including natural causes, accidents and vandalism.

D. Maintain glass in a reasonably clean condition during construction so that it will not be damaged by corrosive action and will not contribute (by wash off) to the deterioration of glazing materials and other work.

E. Polycarbonate materials shall be cleaned using a mild detergent (such as Formula 409) and lukewarm water. Use a clean, soft cloth or sponge, rinse well with clean water.
F. Paint splashes can be removed using VM&P Naphtha, isopropyl alcohol or butyl cellosolve. Do not use butyl cellosolve in direct sunlight.

G. DO NOT use abrasives, paint scrapers, razor blades, or squeegees on polycarbonate. Benzene, gasoline, acetone or carbon tetrachloride should not be used on either polycarbonate or mar resistant polycarbonate.

H. Cleaning instruction coordination shall be the responsibility of the general contractor. The glazier manufacturer, painter, and other trades shall be informed of all cleaning instructions.

I. Wash and polish glass on both faces not more than four (4) days before date scheduled for inspections that establish date of Substantial Completion. Comply with security glazing manufacturer’s cleaning recommendations. These washing and polishing efforts shall be done by a professional cleaning/custodial firm.

END OF SECTION 111950
SECTION 111960 - SECURITY HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 SUMMARY:
   A. Detention Equipment Contractor (DEC):
      1. Provide security hardware as indicated in the schedules and as specified herein.
      2. Refer to Detention Door Schedule and door details; Custom/Security Hollow Metal Work Section 111910, and Security Control System Section 285000.
      3. Coordinate Security Hardware installation with electrical requirements provided by the Electrical Contractor.
      4. Make final electrical control hookups at door and control panels.
      5. Coordinate all Security Hardware and electrical control needs required with other subcontractors and their equipment to have it function properly from the remote Security Control Consoles (e.g. overhead doors, architectural passage doors).
      6. Furnish to the General Contractor any security hardware required for installation on Architectural Hollow Metal doors and frames. Provide necessary templates, etc. for installation.

   B. General Contractor:
      1. Coordinate installation of security hardware with DEC, Security Control System Contractor (SCSC) and Electrical Contractor.
      2. Install on Architectural doors and frames any required security hardware being provided by the Security Control System Contractor (SCSC).

   C. Electrical Contractor:
      1. Coordinate electrical requirements with General Contractor, DEC and SCSC.
      2. Provide all security control wiring, conduit, fittings, back boxes and junction boxes, as directed by Security Control System Subcontractor.
      3. Provide all power wiring, conduit, fittings and mortar boxes as required for equipment described within this section.

1.3 ACTION SUBMITTALS
   A. Required submittal for Security Hardware shall be submitted as a complete package. Failure to do so will result in the submittal being “Rejected” and returned.

   B. Manufacturer’s Data:
      1. Submit one (1) reproducible (digital format) copy of product specifications, fabrication and installation instructions for each hardware item used.

   C. Shop Drawings:
      1. Shop drawings submittals for Security Hardware shall be submitted as an entire section.
      2. Submit one (1) reproducible (digital format) copy of a horizontal hardware schedule, including all miscellaneous items. Give openings by door number and location,
manufacturer’s names, catalog numbers, keying information, materials, and finish in the scheduling sequence and format as recommended by security hardware manufacturer.

3. The Architect’s approval of the hardware schedule will not relieve the Contractor or Supplier of responsibility for errors or omissions that it might contain.

4. A Security Hardware Coordination Conference shall be held and coordinated by the General Contractor after the first Shop Drawing submittal of the Security Hardware. All participants should have at least one (1) week worth of review of this first Shop Drawing submittal and be prepared to comment on its appropriateness for their assigned job efforts.

5. All security keying shall be reviewed with the Owner and approved during the Shop Drawing submittal review meeting.

D. Samples:
1. The Architect will, upon the Owner’s direction, have the DEC and his security hardware supplier submit the following samples showing functions, finishes and design of the proposed hardware items. All samples will remain the supplier’s property and will be returned to him prior to Project completion.

2. Possible samples to be submitted to the Owner for review and final approval:
   a. One (each) of all lock types listed.
   b. One (each) of all door hardware and accessories listed.
   c. One (each) of all door hardware security fasteners.

E. Samples and Templates:
1. Furnish to manufacturer of hollow metal doors and frames as required for proper reinforcement and preparation of their work.

2. If required, the Hardware Supplier shall furnish physical hardware and backboxes to the door and frame manufacturer for inclusion into door and frame fabrications.

F. Security Keying Chart/ Schedule:
1. Submit a Keying Chart schedule after both the Architect and Owner/User have approved the security keying shop drawings. Refer to articles titled “Cylinders, Keys, and Keying” and “Key Control” near the end of this Section.

G. Maintenance Manual
1. Submit two (2) bound Maintenance and Repair Manuals, complete with detailed parts drawings, for all manual and energized security hardware products supplied in this section.

2. Provide on-site review of these manuals and spare parts with the Owner’s designated representative during training period. Refer to Article 1.6 “Training” ahead.

H. Refer to Specification Section 111900 for additional submittal requirements.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver all items in manufacturer’s original packaging. Individually package and carefully mark each item for intended opening and use. Each item complete with all necessary screws, bolts, keys, instructions, and where necessary, installation templates.

B. Storage: Store items off floor in dry area of building out of way of other work in progress. Provide maximum protection against loss and damage.

C. Handling: Handle all items in a manner as to prevent damage.
1.5 GUARANTEE
A. Upon Final Completion, the Manufacturer/Installer shall provide a written warranty covering the security hardware against defective materials and workmanship and guaranteeing satisfactory operation and performance for a period of one (1) year after Final Completion. The Manufacturer/Installer shall make necessary adjustments and replace any defective or broken parts caused by defective mechanical parts.

1.6 TRAINING
A. Provide two (2) eight-hour days for training of Owner personnel for maintenance and repair of all security hardware. Training shall be at Owner’s convenience prior to Final Completion.
B. Training class and agenda shall include hands-on teaching of repair and maintenance. Contractor shall provide all equipment and tools necessary to conduct training for Owner’s personnel.
C. Training shall be conducted by employee of security hardware manufacturer or factory-authorized service representative with over five years of experience maintaining/repairing locks of the type installed in this facility.

PART 2 - PRODUCTS

2.1 MANUFACTURER
A. Catalog numbers of the first manufacturer listed have been used to establish the quality required. Other manufacturers seeking approval shall do so in writing per General Requirements and shall list exact catalog numbers and description of the items he proposes to furnish:

<table>
<thead>
<tr>
<th>ITEM</th>
<th>Manufacturer 1</th>
<th>Manufacturer 2</th>
<th>Manufacturer 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Hinges</td>
<td>Southern/Folger</td>
<td>Airteq</td>
<td>Stanley</td>
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<tr>
<td>2. Stops</td>
<td>Airteq</td>
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<td>Northwest</td>
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<tr>
<td>3. Holders, Surface Bolts</td>
<td>Glynn–Johnson</td>
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<td>Yale</td>
</tr>
<tr>
<td>4. Push, Pull</td>
<td>Southern/Folger</td>
<td>Airteq</td>
<td>Brink</td>
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<tr>
<td>5. Thresholds</td>
<td>Pemko</td>
<td>Reese</td>
<td>Zero</td>
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<tr>
<td>6. Weatherstrip</td>
<td>Pemko</td>
<td>Reese</td>
<td>Zero</td>
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<tr>
<td>7. Security Locks</td>
<td>Southern/Folger</td>
<td>Airteq</td>
<td>Brink</td>
</tr>
</tbody>
</table>

B. Designations: Following abbreviations identify listed manufacturers:
1. Southern/Folger Southern/Folger Co.; San Antonio, TX
2. Airteq Cornerstone Detention; Montgomery AL
3. Brink R.R. Brink Lock Systems, Inc.; Shorewood, IL
5. Hager Hager Hinge Co.; St. Louis, MO
6. Ives H. B. Ives Div.; New Haven, CT
7. LCN LCN-Allegion
8. NGP National Guard Products
9. Northwest Northwest Specialty Hdwr Inc.; Clackamas, OR
12. Reese Reese Enterprises; Rosemount, MN
13. Rockwood Rockwood Manufacturing Co.; Rockwood, PA
14. Stanley
   Stanley Black & Decker; New Britain, CT
15. Zero
   Zero Weatherstripping; Bronx, NY

2.2 MATERIALS

A. Screws, Fasteners, and Tools:
   1. Provide exposed fasteners to match material/finish of item being fastened. Make fastener of the same metal as item fastened, except use plated brass or stainless steel for all aluminum items. Provide twenty (20) spares of each type of fastener used for anchoring hardware.
   2. Provide Torx-head (with center reject pin) security fasteners for exposed fasteners on all security hardware, regardless of manufacturer. Furnish six (6) tool holders and six (6) bits for each different size screw. Holders and bits shall be left at the project after fastener installation and become the property of the user.
   3. Provide two (2) alignment tools for medium security locks.

B. Hinges:
   1. Heavy Duty, 4 1/2 FM – ICS:
      a. Series/Manufacturer:
         1) 204 FMSS / Southern Steel Co.
         2) 604 FMCS / Airteq
         3) No.4 1/2"-ICS Prison / Brink
      b. Description:
         1) 4 1/2 x 4 1/2, 3/16" thick leaves.
         2) Cast stainless steel leaves, non-removable stainless steel pins, stainless steel ball bearings, three knuckle with "HT" hospital tips.
         3) Provide with a 1/2" long steel stud on each leaf.
      c. Provide quantities as follows:
         1) Doors less than 5 feet high - one pair.
         2) Doors over 5 feet to 7 feet 6 inches high - 1-1/2 pairs.
         3) Doors over 7 feet 6 inches high - 2 pair
         4) Doors 3 feet 6 inches wide and over - 2 pairs.
         5) Doors 4 feet 6 inches wide and over – 2-1/2 pairs.
   2. Continuous Hinge (Plain Surface Type):
      a. Series/Manufacturer:
         1) 4000 Series / Braun Mfg. Co., Inc. (www.hinge1.com)
         2) Approved Equal
      b. Description:
         1) Hinge Leaf material - Cold Rolled Steel
         2) Hinge Pin material - Steel
         3) Shapes and lengths and gauges to be custom modified as required and/or as indicated on drawings.
         4) Provide quantities as indicated on the drawings and hardware sets.
         5) Provide USP primed.

C. Door Position Switches:
   1. Magnetic Switch:
      a. Series/Manufacturer:
         1) 200 MRS TB/Southern Steel Co.
b. Mortise installation overhead mounting with switch contacts housed in the door frame and actuating magnet mortised into the top of the door.

D. Security Locks:

1. Maximum Security – Solenoid Operation:
   a. Series/Manufacturer:
      1) 10120AE-2/Southern Steel Co.
      2) 9912S/Airteq
      3) 5026S x MCLH-M/Brink
   b. Frame mounted 115 VAC, continuous duty solenoid actuated.
   c. Bolt is retracted by an energized solenoid valve by a push-button at the control panel and remains retracted until door is opened.
   d. Bolt is retracted manually by key from outside and inside or outside only.
   e. Provide galvanized at exterior installations.
   f. Provide interlock feature as required.
   g. Internal switches monitor status of bolt.
   h. Provide key cylinder extension.

2. Maximum Security - Motor Operation:
   a. Series/Manufacturer:
      1) 10120AM/Southern Steel Co.
      2) 9912M/Airteq
      3) 5026M x MCLH-M/Brink
   b. Frame mounted 120 VAC, continuous duty motor actuated.
   c. Bolt is retracted by energized motor by a push-button at control panel and remains retracted until door is opened.
   d. Bolt is retracted manually by key from outside and inside or outside only.
   e. Provide galvanized at exterior installations.
   f. Provide interlock feature as required.
   g. Internal switches monitor status of bolt.
   h. Provide key cylinder extension.

3. Medium Security - Motor Operation:
   a. Series/Manufacturer:
      1) 10300M/Southern Steel Co.
      2) 9424/Airteq
      3) 3520M x ____/Brink
   b. Frame mounted 24 VDC high torque gear motor.
   c. Latchbolt retracts when motor is energized and remains retracted until the door is opened.
   d. Mechanically unlocked by key outside and inside.
   e. Provide keeper with built-in limit switch; internal switches to monitor status of deadlock.
   f. Provide interlock features as required.
   g. Provide key cylinder extension.
4. **Maximum Security - Mechanical Operation:**
   a. **Series/Manufacturer:**
      1) 1080A-2/Southern Steel Co.
      2) 5086-K2/Airteq
      3) 7086/Brink
   b. Door mounted, deadbolt.
   c. Lever tumbler, key outside and inside.
   d. Supply with hollow metal lock mounting, escutcheons, and security screws.
   e. Provide keeper with built-in limit switch where scheduled.
   f. Provide 3/4-inch throw latchbolt
   g. Provide galvanized at exterior/wet locations.

5. **Medium Security - Mechanical Operation:**
   a. **Series/Manufacturer:**
      1) 1017AM/Southern Steel Co.
      2) 5017M/Airteq
      3) 7017M/Brink
   b. Keyed outside only.
   c. Reverse bolt bevel at food pass locations. Refer to details on Drawings.

6. **Medium Security - Mechanical Operation:**
   a. **Series/Manufacturer:**
      1) 1017AM/Southern Steel Co.
      2) 5017M/Airteq
      3) 9025/Brink
   b. Keyed outside only.
   c. Refer to details on Drawings

E. **Closers:** (Recess Mounted)
1. **Series/Manufacturers:**
   a. 2210 Series with DPS/LCN
   b. 7970 Series with DPS/Norton
2. **Description:**
   a. Provide recessed door head closers unless noted otherwise.
   b. All door closers shall be by one manufacturer and carry a five (5) year warranty, except electrical components, which will carry a two year warranty. All door closers shall be inspected, after installation, by a factory representative to insure their proper adjustments and operations.
   c. Spring power shall be adjustable. Spring power shall provide an opening force range of 8 to 15 pounds from 0 degrees to 90 degrees.
   d. Closers shall have separate adjustments for latch speed, general speed, and back check.
   e. Provide accessories required to insure a proper installation.
   f. Provide closer with door position switch, unless noted otherwise (refer to Security Hardware Sets).

F. **Pull Loop:**
1. **Series/Manufacturers:**
   a. 212-C/Southern Steel Co.
   b. 612/Airteq
   c. 300021/Brink
2. Stainless steel. Overall length 8-3/4” x 1-1/2” clearance. Fasteners shall be 2-3/8” - 6 x 3/4” stainless steel Torx-head security screws with center reject pin.

G. Pull Flush:
1. Series/Manufacturer:
   a. 214-S/Southern Steel Co.
   b. 614/Airteq
   c. 300011/Brink
2. Stainless steel, 4” wide, 1/8” thick x 5” high. Fasteners shall be 1/4” 20 x 5/16” stainless steel Torx-head security screws with center reject pin.

H. Door Stops:
1. Series/Manufacturer:
   a. 650/Airteq (wall or floor)
   b. 606S/Northwest (wall or floor)
   c. 3001/ Stanley (floor); 3002/ Stanley (wall)
   d. 462/Rockwood (wall); 463/Rockwood (floor)
2. Silicone rubber body, 2” diameter. 2-1/2” (3-1/2”) high.
3. 5/8” x 2-1/2” diameter mounting shank.
4. Embedded in wall or floor with epoxy resin adhesive.

I. Thresholds: (at no floor transition)
1. Series/Manufacturer:
   a. 271A - 5” x 1/4”/Pemko
   b. S405A - 5” x 1/4”/Reese
   c. 545 - 5” x 1/4”/Zero
2. Set the aluminum threshold into a full bedding of mastic and secured with stainless steel Torx-head security screws with center reject pin.

J. Thresholds: (Anti-Pass)
1. Series/Manufacturer:
   a. 950/NGP
   b. Pemko
   c. Reese
   d. Zero
2. Provide anti-pass thresholds as indicated in the Sill column of the Detention Door Schedule.
3. Set the aluminum threshold into a full bedding of mastic and secured with stainless steel Torx-head security screws with center reject pin.
4. Threshold shall be ADA compliant
5. Threshold shall prevent the passing of paper or other contraband under the door.

K. Weatherstripping/Sound Seals:
1. Series/Manufacturer:
   a. 305CR x 315CN/Pemko
   b. DS70C x 362/Reese
   c. 50 x 339 (modified to receive a sweep)/Zero
2. Extruded anodized aluminum with neoprene seal, secured with stainless steel Torx-head security screws with center reject pin.
L. **Door Bottom Sweep:**
   1. **Series/Manufacturer:**
      a. 345A (9/16” projection x 1-1/2” H)/Pemko
      b. R199/Reese
      c. 17/NGP
      d. 11/Zero
   2. Extruded anodized aluminum, secured with stainless steel Torx-head security screws with center reject pin.

M. **Automatic Door Bottom:**
   1. **Series/Manufacturer:**
      a. 420ASL/Pemko
      b. 372/Reese
      c. 360/Zero
   2. Mortised type, cam-actuated drop down silicone seal, with spring mechanism return.

N. **Kickplates:**
   1. **Series/Manufacturer:**
      a. 194S/Hager
      b. K1050/Rockwood
   2. Kickplates shall be 0.050” stainless steel with eased edges. 10” high (except reduce height 1/2” less than bottom rail when required) x 2” less than door width on singles and 1” less on pairs. Fasteners shall be full threaded, oval, undercut, metal screw; Torx-head security screws with center reject pin.

O. **Door Silencers:**
   1. **Series/Manufacturer:**
      a. GJ-64/Glynn-Johnson
      b. 608/Rockwood
      c. SR64/Ives
   2. Provide three (3) silencers per door. Silencer design forms an air pocket to absorb shock and reduce noise of door closing. Once installed, the silencers should be tamper-proof and eliminate door rattle.

P. **Security Hardware Finishes:**

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<tr>
<td>3. Locks and Pulls</td>
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<td>6. Door Pulls</td>
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<tr>
<td>7. Escutcheons</td>
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</table>

2.3 **CYLINDERS, KEYS, AND KEYING**

A. The security locks will incorporate three (3) keying systems, one for pin tumbler (mogul cylinder) locks, one for lever tumbler (paracentric) locks, and one for builder’s hardware high security six-pin tumbler cylinder locks. Dye stamp each keying system’s keys for identification, corresponding to the final/approved Keying Chart.

1. Review all security keying with Owner for final approval during submittal phase.
2. Provide a system of keys and matching locks that are color-coded and marked for identification by touch to comply with “sight and touch” requirements in 2018 International Fire Code (IFC) Section 403.8.3.4 and 10A NCAC 14J.0405.
3. Key Food Pass locks alike and provide ten (10) keys with dye stamp identification marking.
4. Key Paper Pass locks alike & provide ten (10) keys with dye stamp identification marking.
5. Master key mogul cylinder locks as indicated in Detention Door Schedule and as confirmed with the Owner during the Keying Meeting.
6. Provide two (2) keys in each Key Cabinet for all individual key designations.
7. Provide three (3) keys in each Key Cabinet for each Master key designation.
8. Provide a complete, detailed, schematic Keying Chart of the Security Keying System’s individual key designations.
   a. Two (2) copies of this Keying Chart, overlaid on an architectural floor plan print, shall be turned over to the Owner/User at the completion of the project. The cost for Keying Chart shall be included with the cost of materials at the time of bidding.

B. Key Control:
1. Provide one (1) Key Cabinet in Control Room 014. Coordinate exact location with Owner and other equipment to be wall-mounted in the control room.
2. Key Cabinet (wall mounted, surface):
   a. Key Control system shall be furnished with a capacity of 1.75 times the number of individual key designations and shall be a complete dual tag system.
   b. Key Cabinet shall have concealed-type hinge and rounded sides.
   c. Panels must have individual hooks and label pockets formed as an integral part of the panel, for each key type, as required. (i.e. paracentric, P-; mogul, M-; builders hardware, B-).
   d. Key Tags of two (2) types shall be provided, one tag to attach to the individual key designations that permanently stays in the key cabinet and one tag to attach to the individual key designation that is loaned out.
   e. Indexing shall be provided to record information concerning locks and keys alphabetically.
   f. Permanent Loan Registry shall be furnished to protect identity of key borrowers while Receipt Tabs shall be supplied for temporary loan.
3. Keys shall not leave the manufacturer’s custody without prior arrangements for delivery and authorization from the Owner.

2.4 SECURITY HARDWARE SETS FOR SECURITY/DETENTION DOORS

A. Provide security hardware equal to items scheduled. Verify electrical devices are appropriate for models indicated. Electrical control connections are included in work of Section 285000 “Security Control System.”
1. Smoke seals and automatic door bottoms shall be added to all doors in smoke barriers as required to meet smoke and fire ratings per UL 1784.
2. Food Pass
   a. All doors indicated with food passes in the Options column of the Detention Door Schedule shall have the following additional hardware:
      1. Braun Hinge – 4807-E
      1. Food Pass Lock, Southern Steel 1017AM
### B. Security Hardware Sets Schedule:

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#### SH8 (Roof Hatch)

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### C. Security Spare Locks and Lock Parts:

1. Provide the following for the Owner's stock:
   - 1 Lock 10120AE
   - 1 Lock 10120AM
   - 1 Lock 10300M
   - 2 Mogul Cylinders
   - 2 Builders Cylinders
2. One each repair parts kit for each lock series, containing springs, micro switches, screws, nuts and washers.
3. One parts kit containing an assortment (minimum 25) of all hardware security screws used on this project.
4. One complete set of hardware security screwdrivers for all sizes of hardware security screws used on this project.
5. One repair parts list and assembly drawings bound in a manual for all security products supplied in this section.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION
A. Examine doors, frames and hardware for damage, defects, and suitability for intended use. Restore all parts or items found damaged, defective, or inadequate, or replace with good material before installation.

3.2 INSTALLATION

A. Mounting Heights:
   1. Heights given are centerline heights up from finish floor unless noted otherwise; heights given "Number to Number" indicate that all shall be at one consistent height within limits given. Where heights of items are not listed, mount per recommendations of DHI.
      a. Bottom hinge 10 to 13 inches
      b. Top hinge 6 to 8 inches down from head
      c. Intermediate hinges Equally spaced
      d. Door knobs 36 to 40 5/16 inches
      e. Door pull 42 to 48 inches
      f. Deadlocks 54 inches floor to centerline

B. Fitting:
   1. Fit all hardware accurately and properly.
   2. Remove exposed parts until after painter's finishing is completed. Then reinstall.
   3. Securely fasten all fixed parts.
   4. Fit faces of mortised parts snug and flush.
   5. Ensure operating parts move freely and smoothly without binding, sticking, or excessive clearances.

C. Adjusting and Finishing:
   1. After work has been otherwise completed, examine all hardware for complete and proper installation.
   2. Lubricate bearing surfaces of moving parts
   3. Adjust latching and holding devices to proper function
   4. Adjust door closer devices for proper speed and power.
   5. Test keys for conformance to approved Keying Chart system.
   6. Clean all exposed surfaces, check for surface damage and then polish.

D. Thresholds:
   1. Install in one continuous piece, full width of opening. Set in full bed of sealant and fasten with countersunk anchors at 6 inches on center with Torx-head security screws with center reject pin.

3.3 DEFECTIVE WORK

A. Where hardware is found defective in materials or installation; rework, restore, replace or otherwise correct as directed.

B. The following will be considered as defective materials:
   1. Unauthorized substitutions.
   2. Items delivered with missing, broken, damaged or defaced parts.
   3. Items of incorrect hand or function.

C. The following will be considered as defective installation:
   1. Items broken, damaged, or defaced after delivery.
   2. Items incomplete, misaligned or incorrectly located.
D. All expenses incurred by the Architect in troubleshooting the Security Hardware Work, caused by inadequate workmanship or other form of non-performance on the part of the subcontractor, shall be borne by that subcontractor.

END OF SECTION 111960
SECTION 115213 - PROJECTION SCREENS

PART 1 – GENERAL

1.1 SUMMARY
   A. Section Includes: This Section specifies electrically operated front projection screens and accessories.

1.2 RELATED SECTIONS
   A. Division 1 General Requirements
   B. Section 26 05 00 - Common Work Results for Electrical: Power supply, conduit and wiring.
   C. Section 27 41 00 – Audio Visual Systems

1.3 DEFINITIONS
   A. Gain: Indication of screen’s luminance or brightness, measured perpendicular to screen center and relative to magnesium carbonate block, which serves as standard for 1.0 gain. Higher numbers indicate greater brightness.
   B. Viewing Angle: Horizontal angle from perpendicular center of screen at which gain or brightness decreases by 50%.
   C. Format: Proportion of projection screen viewing area expressed as a ratio of width/height. 1. 16:10 Wide.

1.4 REFERENCES
   A. International Code Council (ICC):
   B. Society of Motion Picture and Television Engineers (SMPTE):
   C. Underwriters Laboratories Inc. (UL).
   D. Underwriters’ Laboratories of Canada (ULC).
   E. InfoComm

1.5 ACTION SUBMITTALS
   A. General: Submit listed action submittals in accordance with Contract Conditions and Section
   B. Product Data: Submit product data, including manufacturer’s technical product data sheet, for specified products.
      1. Material Safety Data Sheets (MSDS).
   C. Shop Drawings: Indicate dimensions, fabrication and installation details.
      1. Include electric wiring diagrams.
D. Samples: Submit [2] samples of screen finish material having dimensions of [6 inches × 6 inches (152 × 152 mm)].

1.6 INFORMATION SUBMITTALS
A. Quality Assurance:
   1. Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.
   2. Certificates: Product certificates signed by manufacturer certifying that materials comply with specified performance characteristics, criteria and physical requirements.
   3. Manufacturer’s installation instructions.

1.7 CLOSEOUT SUBMITTALS
A. Operation and Maintenance Data: Submit for products in accordance with Section. Include:
   1. Manufacturer’s instructions detailing maintenance requirements.
   2. Parts catalog that includes complete list of repair and replacement parts, with cuts and identifying numbers.

1.8 QUALITY ASSURANCE
A. Qualifications:
   1. Worker experienced in performing work of this section who has specialized in work similar to that required of this project.
B. Pre-installation Meetings: Conduct pre-installation meeting to verify project requirements and manufacturer’s instructions.

1.9 DELIVERY, STORAGE & HANDLING
A. Storage and Protection: Store electric projection screens in a dry, ventilated area, protected from exposure to harmful weather conditions, at a temperature less than 80 degrees F (27 degrees C).
B. Handling: Handle electrically operated projection screen materials with care in order to prevent damage.
C. Delivery: Deliver materials in manufacturer’s original, unopened, undamaged containers with identification labels intact.
D. Waste Management and Disposal

1.10 PROJECT AMBIENT CONDITIONS
A. Project Location: Perform electrically operated projection screen work when temperatures are greater than 40 degrees F (4 degrees C).

1.11 SEQUENCING
A. Sequence with Other Work: Comply with projection screen manufacturer’s written recommendations for sequencing construction operations.

1.12 WARRANTY
A. Project Warranty: Refer to Contract Conditions for project warranty provisions.
B. Manufacturer’s Warranty: Submit, for Owner’s acceptance, manufacturer’s standard warranty document executed by authorized company official. Manufacturer’s warranty is in addition to, and does not limit, other rights Owner may have under Contract Documents.
C. Warranty: Commencing on date of acceptance by Consultant.

1.13 MAINTENANCE MATERIALS
A. Use standard product line parts produced by manufacturer of electrically operated projection screens.

PART 2 – PRODUCTS

2.1 MANUFACTURERS
A. Ensure manufacturer has minimum [5] years experience manufacturing components similar to or exceeding project requirements.
B. Manufacturer:
   1. Da-Lite Screen Company, Inc. (Basis of Design)
   2. Draper
   3. Stewart
   4. DNP

2.2 PROJECTION SCREEN SYSTEMS
A. Electrically Operated Projection Screen Systems.
   1. Screen Operation: Electrically operated, UL and ULC listed, retractable, with rigid metal roller and tab guide cable screen tensioning system.
   2. Motor: Housed inside metal roller. Includes automatic thermal overload protection, integral gears, capacitor and electric brake to prevent coasting, and preset, adjustable limit switches to automatically stop viewing surface in the UP or DOWN positions.
      a. Type: 3-wire, permanently lubricated, reversal type designed for mounting inside roller and to suit project requirements.
      b. Voltage, Frequency: 115 V, 60 Hz
   3. Electric Controls: Wall mounted switch with integral junction box incorporated into screen housing.
      a. Switch: 3 position type with cover plate for UP, DOWN and STOP functions.
   4. Screen Mounting: As shown on drawings.
      a. Include mounting hardware and roller mounting brackets that adjust to allow centering or offsetting of the screen within the case.
   5. Screen Case: Designed to receive mounting hardware and sized to suit projection screen.
      a. Per projection screen schedule.
   6. Acceptable Screen Surface Material:
      a. Tab Guide Cable Tensioned Screen Material:
1) Front projection, flame retardant, mildew resistant vinyl, with black backing and with standard black borders, easily cleaned with mild soap and water solution.

2) Include tab and cable guide on each side of fabric to maintain even, lateral tension and hold viewing surface flat.

3) Bottom end of fabric to be inserted into a custom aluminum slat bar with added weight to provide vertical tension on the screen surface.

4) Slat ends to be protected by heavy-duty plastic caps enclosing a preset adjustable mechanism for screen tensioning.

5) Seamless in all sizes.

b. Non-Tensioned Screen Material:

1) Front projection, flame retardant, mildew resistant fiberglass, black backing with standard black borders, easily cleaned with mild soap and water solution.

2) Bottom of fabric to form a pocket holding a metal rod.

3) Seams: Seamless when both screen dimensions do not exceed 8 feet.

c. Viewing Surface:

1) Per projection screen schedule

2.3 ACCESSORIES

A. Screen Drop: Extra drop

1. Per projection screen schedule

B. Low Voltage Control (LVC) System:


C. Serial Control Board:


D. Installation Hardware: Fasteners and other components of type, size and spacing recommended by manufacturer for complete, functional and secure installation of electric screen.

2.4 PRODUCT SUBSTITUTIONS

A. Substitutions: [In accordance with Section 01 25 13 - Product Substitution Procedures]

PART 3 – EXECUTION

3.1 INSTALLERS

A. Provide experienced and qualified technicians to install electrically operated projection screens.

3.2 MANUFACTURER’S INSTRUCTIONS

A. Compliance: Comply with manufacturer’s written data, including product technical bulletins, product catalog installation instructions, product carton installation instructions, and technical data sheets.

3.3 EXAMINATION

A. Site Verification of Conditions:
1. Verify that conditions of substrates previously installed under other sections or contracts are acceptable with electrically operated projection screen installation.

2. Ensure electrical power supply is installed to meet electric projection screen requirements in accordance with Section 26 05 00 - Common Work Results for Electrical.
   a. Verify type and location of power supply.

3. Inform Owner/Architect/Consultant of unacceptable conditions immediately upon discovery.

4. Proceed with installation only after unacceptable conditions have been corrected.

3.4 COORDINATION
A. Coordinate electric projection screen placement with placement of other ceiling and wall mounted components.

3.5 INSTALLATION
A. Install electric projection screens in accordance with reviewed shop drawings at locations and heights indicated.

B. Install screen housing and make electrical connections [prior to] [in conjunction with] installation of ceiling system.
   1. Verify locations with Owner/Architect/Consultant prior to installation.

C. Install viewing surface and drive assembly in housing [only after interior construction is substantially complete].

D. Securely install screens plumb and level to supporting substrate.

3.6 FIELD QUALITY CONTROL
A. Manufacturer’s Field Services: Have manufacturer’s technical representative schedule site visits to review work as follows:
   1. When preparatory work for which work of this Section depends is complete, but before installation begins.
   2. Upon completion of work, after cleaning is carried out.

B. Testing and Inspection: Operate each screen 20 times to ensure viewing surfaces extend and retract through full range of motion.
   1. Verify controls, limit switches, [automatic doors] and other components function as designed and meet project requirements.
   2. Ensure viewing surface raising operation fully engages and lifts screen closure door into closed position.
   3. Adjust motors, controls and components to allow for smooth, unobstructed screen operation.

3.7 FINAL CLEANING
A. Perform cleanup in accordance with Section 01 74 00 - Cleaning and Waste Management.

B. Upon completion, remove surplus materials, rubbish, tools and equipment.
3.8 PROTECTION
   A. Protect electrically operated projection screens from damage during construction in accordance with Section 01 76 00 Protecting Installed Construction.
   B. Repair damage to adjacent materials caused by electrically operated projection screen work.

3.9 MAINTENANCE
   A. Perform work during regular trade working hours satisfactory to Owner.

END OF SECTION 11 5213
SECTION 122413 - ROLLER WINDOW SHADES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 SUBMITTALS
A. Product Data: For each type of product indicated. Include styles, material descriptions, construction details, dimensions of individual components and profiles, features, finishes, and operating instructions.
B. Shop Drawings: Show location and extent of roller shades. Include elevations, sections, details, and dimensions not shown in Product Data. Show installation details, mountings, attachments to other work, operational clearances, and relationship to adjoining construction.
C. Coordination Drawings: Reflected ceiling plans and sections, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:
1. Ceiling suspension system members and attachment to building structure.
2. Adjacent ceiling-mounted or penetrating items including light fixtures, air outlets and inlets, speakers, sprinklers, recessed shades, and other junctures of acoustical ceilings with adjoining construction.
3. Shade mounting assembly and attachment.
4. Size and location of access to shade operators and adjustable components.
5. Minimum Drawing Scale (Plans): 1/4 inch = 1 foot
6. Minimum Drawing Scale (Sections – if required): 1-1/2 inch = 1 foot
D. Samples for Initial Selection: For each colored component or light-reducing shade type indicated.
1. Include similar Samples of accessories involving color selection.
E. Samples for Verification:
1. Complete, full-size operating unit not less than 16 inches wide for each type of roller shade indicated.
2. For the following products:
   a. Shade Material: Not less than 12-inches square, with specified treatments applied. Mark face of material. Mark top and face of material.
   b. Ceiling Recessed Shade Pocket: Full-size unit, not less than 12 inches long. Include closure plate and edge trim to receive acoustical ceiling panel system.
F. Window Treatment Schedule: For each roller shade assembly, identify each shade unit to correspond with designations indicated on Drawings.
G. Product Certificates: For each type of roller shade, signed by product manufacturer.
H. Qualification Data: For Installer.
I. Product Test Reports: For each type of roller shade.
J. Maintenance Data: For roller shades to include in maintenance manuals. Include the following:
1. Methods for maintaining roller shades and finishes.
2. Precautions about cleaning materials and methods that could be detrimental to fabrics, finishes, and performance.
3. Operating hardware.

1.3 QUALITY ASSURANCE
A. Installer Qualifications: Fabricator of products.
B. Source Limitations: Obtain roller shades through one source from a single manufacturer.
C. Fire-Test-Response Characteristics: Provide roller shade band materials with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
D. Product Standard: Provide roller shades complying with WCMA A 100.1.

1.4 DELIVERY, STORAGE, AND HANDLING
A. Deliver shades in factory packages, marked with manufacturer and product name, and location of installation using same designations indicated.

1.5 PROJECT CONDITIONS
A. Environmental Limitations: Do not install roller shades until construction and wet and dirty finish work in spaces, including painting, is complete and ambient temperature and humidity are maintained at 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 operable glazed units’ operation hardware throughout the entire operating range. Notify Architect of discrepancies. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1.6 WARRANTY
A. Roller Shade Hardware, Chain and Shadecloth: Provide manufacturer’s twenty-five (25) year limited warranty.

PART 2 - PRODUCTS

2.1 VERTICAL ROLLER SHADES
A. Products: Subject to compliance with requirements, provide one of the following:
   1. CACO, Inc; “Serenity Roller Shades”.
   2. Castec, Inc.
   3. Crown Shade Company; “Rollease”.
   4. DFB Sales Inc.
   5. Draper Inc.; “FlexShades CL” and “LightBlock FlexShades.”
   6. Draper Inc.; “FlexShades XD” and “LightBlock FlexShades.”
   8. Lutron Shading Solutions; “SheerShade” and “Blackout.”
   9. MechoShade Systems, Inc.; “MechoShade”
   10. WT Shade; “HeliaRise.”
B. Shade Band Material: PVC-coated fiberglass.
C. For Offices: Shade Band Material – 3% OF Solar Shade: PVC-coated fiberglass.
   1. Manufacturer, Style and Pattern:
a. “SheerShade Fiberglass Basketweave 2” SP12-90-3 by Lutron.
b. “SheerWeave” Style 2410 by Phifer
c. “E Screen 7503” by 3G Mermet Corp USA
d. “EuroTwill 6000 Series” by MechoShade

2. Fabric Width: 96 inches and as required to align with centers of mullions of continuous fixed glazing applications.
3. Color: As selected by Architect from manufacturer's full range,
4. Material Openness Factor: OF 3%
5. Bottom Hem: Straight

D. **For Conference, Training, or Meeting Rooms**: Shade Band Material – Black-Out Shade: PVC laminated fiberglass with PVC backing

1. Manufacturer, Style and Pattern:
   a. “Standard 1” BN-903-0 or “Standard 2” BH-100-0 by Lutron.
   b. “SheerWeave” Style 7100 Blackout Fabric by Phifer
   c. “SunBlock” Series SB9000/9100 by Draper
   d. Equinox 0700 Series by MechoShade

2. Fabric Width: 96 inches and as required to align with centers of mullions of continuous fixed glazing applications.
3. Color: As selected by Architect from manufacturer's full range.
4. Material Openness Factor: OF 0%
5. Bottom Hem: Straight

E. Rollers: Electrogalvanized or epoxy primed steel or extruded-aluminum tube of diameter and wall thickness required to support and fit internal components of operating system and the weight and width of shade band material without sagging; designed to be easily removable from support brackets; with manufacturer’s standard method removable spline fitting integral channel in tube for attaching shade material. Provide a single roller shade band per roller. Coordinate direction of roll with headbox design.

1. Shadeband-to-Roller Attachment: Manufacturer's standard method.

F. Mounting Brackets: Galvanized or zinc-plated steel.

G. Fascia (for applications indicated): L-shaped, formed-steel sheet or extruded aluminum; long edges returned or rolled; continuous panel concealing front and bottom of shade roller, brackets, and operating hardware and operators. Removable design for access.

H. Pocket-Style Headbox (for applications indicated): U-shaped, formed-steel sheet or extruded aluminum; long edges returned or rolled; with a bottom cover consisting of slot opening of minimum dimension to allow lowering and raising of shade and a removable or an openable, continuous metal access panel concealing shade roller, brackets, and operating hardware and operators within.

I. Bottom Bar: Steel or extruded aluminum. Provide internal type bottom bar concealed, by pocket of shade material with concealed weight bar as required for smooth, properly balanced shade operation.

J. Shade Operation: Manual; with continuous-loop bead-chain, clutch, and cord tensioner and braccke lift operator.

1. Position of Clutch Operator: Right side of roller, as determined by hand of user facing shade from inside, unless otherwise indicated.
2. Clutch: Capacity to lift shade size and weight; sized to fit roller or provide adaptor.
3. Loop Length: Full length of roller shade.
5. Operating Function: Stop and hold shade at any position in ascending or descending travel.

2.2 ROLLER SHADE FABRICATION

A. Product Description: Roller shade consisting of a roller, a means of supporting the roller, a flexible sheet or band of material carried by the roller, a means of attaching the material to the roller, a bottom bar, and an operating mechanism that lifts and lowers the shade.

B. Concealed Components: Non-corrodible or corrosion-resistant-coated materials.
   1. Lifting Mechanism: With permanently lubricated moving parts.

C. Unit Sizes: Obtain units fabricated in sizes to fill window and other openings as follows, measured at 74 deg F:
   1. Shade Units Installed between (Inside) Jambs: Edge of shade not more than 1/4 inch from face of jamb. Length equal to head to sill dimension of opening in which each shade is installed. Provide unless indicated otherwise.
   2. Shade Units Installed Outside Jambs: Width and length as indicated, with terminations between shades of end-to-end installations at centerlines of mullion or other defined vertical separations between openings. Provide for applications indicated.

D. Installation Brackets: Designed for easy removal and reinstallation of shade, for supporting headbox, roller, and operating hardware and for hardware position and shade mounting method indicated.
   1. Install in headbox for applications indicated.
   2. Shade pocket, by Division 9 Section “Gypsum Board Assemblies,” includes space for possible future installation of a second roller shade assembly

E. Installation Fasteners: No fewer than two fasteners per bracket, fabricated from metal non-corrosive to shade hardware and adjoining construction; type designed for securing to supporting substrate; and supporting shades and accessories under normal use conditions.

F. Exposed Aluminum Finish: For front fascia components or exposed headbox, provide satin finish clear anodized aluminum finish, AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.

G. Color-Coated Finish: For metal components exposed to view, apply manufacturer's standard baked finish complying with manufacturer's written instructions for surface preparation including pretreatment, application, baking, and minimum dry film thickness.

H. Colors of Metal and Plastic Components Exposed to View: As selected by Architect from manufacturer's full range or custom color, unless otherwise indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, operational clearances and other conditions affecting performance.
   1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 ROLLER SHADE INSTALLATION

A. Install roller shades level, plumb, and aligned with adjacent units according to manufacturer's written instructions, and located so shade band is not closer than 2 inches to interior face of glass.
3.3  ADJUSTING
   A. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.

3.4  CLEANING AND PROTECTION
   A. Clean roller shade surfaces after installation, according to manufacturer's written instructions.
   B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that roller shades are without damage or deterioration at time of Substantial Completion.
   C. Replace damaged roller shades that cannot be repaired, in a manner approved by Architect, before time of Substantial Completion.

3.5  DEMONSTRATION
   A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain roller shades for a period of 12 months following date of Substantial Completion. Refer to “Demonstration and Training” article of Division 1 Section “Closeout Procedures.”

END OF SECTION 122431
SECTION 126113 - FIXED UPHOLSTERED JURY SEATING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 SUBMITTALS
   A. Product data for each type of product specified. Include installation methods for each type of substrate.
   B. Shop drawings showing seating layout, chair sizes, and aisle widths.
   C. Samples for initial selection purposes in the form of manufacturer's color charts or samples of materials showing the full range of standard colors, finishes, patterns, and textures available for each exposed material.
   D. Samples for verification purposes of each exposed material from which seating units and accessories are composed, in each color, finish, pattern, and texture indicated. Include samples of the following:
      1. Upholstery Fabric: Full-width sample, not less than 36 inches long, with specified treatments applied. Show complete pattern repeat. Mark top and right side.
      2. Baked Enamel Finishes: Manufacturer's standard size unit, not less than 3 inches square.
   E. Maintenance data for seating to include in the “Operating and Maintenance Manual” article of Division 1 Section “Closeout Procedures” specified in Division 1.
      2. Precautions for cleaning materials and methods that could be detrimental to finishes and performance.

1.3 QUALITY ASSURANCE
   A. Installer Qualifications: Engage an experienced Installer who is certified in writing by the seating manufacturer as qualified to install manufacturer's seating.
   B. Fire-Test-Response Characteristics of Upholstered Chairs:
      1. Fabric: Class 1 according to DOC CS 191 and 16 CFR 1610.61, tested according to California Technical Bulletin 117.
   C. Single-Source Responsibilities: Obtain each type of seating, including accessories and mounting components, from one source of a single manufacturer.
   D. Seating Layout: As indicated. Comply with ADA Rules and Regulations.

1.4 COORDINATION:
   A. Coordinate installing electrical wiring with seating layout to ensure that floor junction boxes for aisle lights are located inboard of aisle light standards with no exposed conduit.

1.5 PROJECT CONDITIONS
   A. Environmental Conditions: Do not install seating until space is enclosed and weatherproof, wet-work in space is complete and nominally dry, installation of finishes including painting is complete, and work above the ceiling is complete. Do not install seating until ambient temperature and humidity conditions are continuously maintained at final occupancy values.
B. Field Measurements: Check seating layout by field measurements before fabrication; show recorded measurements on shop drawings. Coordinate fabrication schedule with construction progress to avoid a delay in the Work.

PART 2 - PRODUCTS

2.1 PRODUCTS/MANUFACTURERS

A. Subject to compliance with requirements, provide one of the following:

2.2 JURY CHAIRS

A. General: Provide jury base and 18-inch seat height.
   2. Swivel Mechanism: Provide limited swivel rotation of 45 degrees with self-return to center feature.
   3. Upholstery Fabric: Provide Price Grade 10 fabric, as selected by Architect. Should a lesser grade fabric be used a credit shall be provided to the Owner.

B. Construction: Interior frame - molded engineered plywood, open arm, fully Upholstered seat and back. Provide manufacturer’s standard foam padding density and thickness at seat and back.

C. Hinges: Self-lubricating, compensating type, with noiseless self-rising seat mechanism passing ASTM F 851 and operating as indicated below and positive internal stops cushioned with rubber or neoprene. Provide with forward fulcrum knee-tilt.

D. Jury Base: Tubular steel standard securely welded to steel mounting plate, with seat connections welded to tubing. Provide manufacturer’s standard baked-on black enamel finish. Provide a clearly-labeled can of matching paint for jobsite touch-up.

2.3 FERROUS METAL FINISHES

A. Surface Preparation: Clean surfaces of dirt, grease, and other contaminants followed by a conversion coating of type suited to organic coating applied over it.

B. Baked Enamel Finish: Immediately after cleaning and pretreatment, apply manufacturer's standard two-coat, baked-enamel finish.

C. Color and Gloss: As selected by Architect from manufacturer's standard options.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for construction tolerances, material properties as they affect anchors and fasteners, and location of junction boxes.
B. Do not proceed until unsatisfactory conditions have been corrected.

3.2 INSTALLATION
A. Install rows of Jury seating in location immediately in front of cross aisles as indicated on Drawings and mounted on tiered floors so that back heights of seats are not less than 26 inches, measured from walking surface of cross aisle immediately behind seating:
B. Follow manufacturer's printed instructions for installation.
C. Standards: Anchor through base plate with quantity and type anchoring devices recommended by seat manufacturer for substrate.
D. Install chairs using manufacturer's recommended hardware and fasteners.
E. Verify moving components operate smoothly and quietly.

3.3 ADJUSTING
A. Adjust self-centering mechanisms to ensure seats in each row are aligned when unoccupied.
B. Repair minor abrasions and imperfections in painted finishes with a coating that matches the factory-applied finish.
C. Replace upholstery fabric damaged during installation.

END OF SECTION 126113
SECTION 126724 - COURTROOM BENCH SEATING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 SUBMITTALS
A. Product data for each type of bench seating.
B. Shop drawings prepared from Architect’s drawings and from field measurements indicating layout of seating units, aisle widths, end panel construction and attachment.
C. Samples for verification purposes of each exposed material from which wood bench seating & accessories are composed, in each color, finish, pattern, & texture indicated. Include samples of wood veneer plywood and cap molding, the following:
   1. Fabric
D. Product certificates signed by manufacturers of bench seating certifying their products meet specified requirements.
E. Qualification data to demonstrate Installer’s capabilities and experience. Include list of completed projects with project name, addresses, names of Architects and Owners.

1.3 SUBSTITUTIONS
A. Manufacturers seeking consideration as an acceptable alternative to the specified courtroom seating and wood benches must submit samples, detailed, technical materials and fabrication specifications and performance criteria to the Architect a minimum of 30 days after award of Contract in accordance with the General Conditions and Supplementary Conditions of the Contract and Division 1 Section “Product Requirements”. Materials not meeting all product, technical and performance criteria will not be considered.

1.4 QUALITY ASSURANCE
A. Installer Qualifications: Engage a manufacturer-approved, locally based, experienced Installer who regularly installs and services courtroom and theater seating similar in kind, quality, and extent to that indicated for Project.
B. Fire Performance Characteristics of Upholstered Seating: Provide upholstered courtroom chairs in compliance with California C-117, Flammability Standards, BIFMA F-1, sponsored by the Business and Institutional Furniture Manufacturer’s Association, based on testing of chairs representative of those required for Project, and certified accordingly.
C. Single Source Responsibility: Obtain bench seating from a single manufacturer, including accessories, mounting and installation components.
D. Seating Layout: Design and install seating to conform with Project requirements in manner that produces seating layout with standards spaced laterally in each row so that end standards are in alignment from first to last row.
E. Coordination of Work: Coordinate installation of electrical wiring with seating layout to ensure that floor junction boxes for sound system at media seating area are located between seats.

1.5 DELIVERY, STORAGE, AND HANDLING
A. Deliver seating in manufacturers unopened cartons labeled with manufacturers name and contents.
B. Store seating in dry location protected from damage and soiling under environmental conditions acceptable to manufacturer.
C. Handle seating in a manner to prevent damage.

1.6 PROJECT CONDITIONS
A. Environmental Conditions: Do not install seating until space is enclosed and weatherproof, wet-work in space is complete and nominally dry, installation of finishes including painting is complete, other units of Work above ceiling are complete; and ambient temperature and humidity conditions will be continuously maintained at values near those indicated for final occupancy.
B. Concrete Slabs: Reference Division 3 Section, “Cast-In-Place Concrete” for psi rating of new concrete slabs. Provide anchors designed for concrete type indicated.

PART 2 - PRODUCTS

2.1 MANUFACTURERS
A. Spectator (Bench) Seating Available Manufacturers: Subject to compliance with requirements, provide wood benches manufactured by one of the following: – Note: No substitutions will be considered after award of Contract:
1. Sauder Manufacturing Company (Basis of Design)
2. New Holland Custom Woodwork (subject to specified requirements)
3. Ratigan-Schottler Mfg. Co. (subject to specified requirements)

2.2 MATERIALS
A. Gray Iron Castings: ASTM A48-64, Class 25.
B. Steel Plates, Shapes, and Bars: ASTM A 36.
C. Electrolytic Zinc-Coated Steel Sheet: ASTM A 591, commercial and drawing quality, Coating Class C, chemically treated for final finish; 0.0396 inch minimum thickness unless otherwise indicated.
D. Exposed Metal Finishes: 2.0–2.5 mil thickness thermoset epoxy powder finish
E. Drilled-In Expansion Anchors: Expansion anchors complying with FS FF-S-325, Group VIII (anchors, expansion (nondrilling), Type 1 (internally threaded tubular expansion anchor); and machine bolts complying with FS FF-B-575, Grade 5, with type and size selected by manufacturer to suit substrate and installation conditions indicated.
F. Wood Screws: Flat head carbon steel; FS FF-S-111; length as selected by seating manufacturer to suit substrate and installation conditions indicated.
G. Lumber End Cap: Match Courtroom woodwork; i.e. plain sawn designated species with stained transparent finish.
H. Exposed Hardwood Veneer Plywood: Panel materials at seat backs to match Courtroom woodwork; i.e. plain sawn designated species with stained transparent finish.
I. Concealed Plywood: Hardwood plywood complying with ANSI/HPMA HP or softwood plywood complying with ANSI/VOL. PROD. STD. PS 1, as standard with manufacturer. Provide veneer-core plywood; particleboard-core plywood is not acceptable.
J. Medium Density Fiberboard: ANSI A208.2.
K. Molded Polyurethane Foam Padding: ASTM D 3770; complying with ASTM D 3453, for Dynamic Fatigue Performance Grade AD (heavy duty use) for seats and BD (normal duty use) for arm rests and seat backs, and, for load bearing and general physical properties, of
grade which is standard with manufacturer for kind of seat construction and fabric covering indicated.

L. Fabric: For bid purposes, price CF Stinson product listed. Provide full range of samples for seating manufacturer’s 100% nylon product (“Bedford III”) for Architect’s consideration in lieu of CF Stinson fabric with a cost credit to the Owner. Color, pattern & texture to be selected by Architect from manufacturer’s full range of colors, patterns and textures available.
   1. C.O.M. CF Stinson; Pattern: “Silicone-Avail” (Basis of Design)
   2. C.O.M. International Fabrics; Pattern: “Interwood Grospoint” Telephone 1-800-334-7399
   3. Manufacturer’s 100% nylon woven fabric with latex backing; pattern: Bedford III. Color, pattern & texture to be selected by Architect from manufacturer’s full range of colors, patterns and textures available.

2.3 FABRICATION, GENERAL
   A. Fabricate Courtroom seating units in contoured form for maximum comfort, using materials that are carefully selected to be free of defects, objectionable projections, or irregularities. Smoothly round corners, edges, and exposed fasteners, to present least possible snagging and pinching hazards.

2.4 SPECTATOR SEATING
   A. Wood bench with (standard species) maple veneered high pressure laminated core construction and lumber molding, equal to Sauder Manufacturing Co. Pew Body #301-4016 (contour back, non upholstered curved seat).
      1. Pew End: or #2201 (Endless) as indicated.
      2. Provide formed veneer-core plywood construction panel material for seat and back construction. Solid lumber or particleboard seat and back construction will not be considered.
      3. Provide screwed back-to-seat construction in which screws penetrate back to engage solid lumber (within laminated seat or to continuous “lock block” under seat).
      4. New Holland Custom Woodwork Ltd. pew body 50-LS subject to provision of “apron” trim piece at rear underside of caprail, and provision of a like design pew end, provided in wood species and construction specified, is acceptable for use in this Project.
   B. Wood bench with upholstered seat and (standard species) maple veneered high pressure laminated core construction and lumber molding, equal to Sauder Manufacturing Co. Pew Body #301-4026 (contour back, upholstered curved seat).
      1. Pew End: or #2201 (Endless) as indicated.
      2. Provide formed veneer-core plywood construction panel material for seat and back construction. Solid lumber or particleboard seat and back construction will not be considered.
      3. Provide screwed back-to-seat construction in which screws penetrate back to engage solid lumber (within laminated seat or to continuous “lock block” under seat).
      4. New Holland Custom Woodwork Ltd. pew body 50-LS subject to provision of “apron” trim piece at rear underside of caprail, and provision of a like design pew end, provided in wood species and construction specified, is acceptable for use in this Project.
   C. Provide maple veneers & lumber for all applications.
   D. Provide wood benches with transparent stain finish to match Architect’s sample.
PART 3 - EXECUTION

3.1 EXAMINATION
   A. Examine substrates and conditions, with Installer present, for compliance with requirements for construction tolerances, material properties as they affect anchors and fasteners, and location of junction boxes. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION
   A. Comply with seating manufacturer’s printed installation instructions applicable to products and application indicated.
   B. Locate seating in locations indicated on approved shop drawings, with required clearances, elevations, and sight lines.
   C. Install spectator (bench) seating directly over carpet.
      1. Do not install seating until carpet installation has been completed and approved.
      2. Provide installation methods that will not tear, unravel or otherwise damage the carpet.
      3. Repair or replace carpet damaged by work of this section to original condition.
      4. Protect carpet & other finishes during seating installation.

END OF SECTION 126724
SECTION 142100 - ELECTRIC TRACTION MACHINE-ROOMLESS ELEVATORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. Provisions of the Contract and the Contract Documents apply to this Section.

1.2 DEFINITIONS
A. Definitions in ASME A17.1/CSA B44 apply to work of this Section.
B. Service Elevator: A passenger elevator that is also used to carry freight.

1.3 ACTION SUBMITTALS
A. Product Data: Include capacities, sizes, performances, operations, safety features, finishes, and similar information. Include product data for car enclosures, hoistway entrances, and operation, control, and signal systems.
   1. Provide description of operational sequence of elevator under emergency status, particularly when fire alarm is activated.
   2. Identify electrical characteristics of motor; horsepower, power supply voltage. Confirm these are compatible with electrical provisions. Verify mechanical ventilation of elevator hoistway included in the Contract Documents is sufficient for the heat dissipation required for elevator motor size supplied.
B. Shop Drawings:
   1. Include plans, elevations, sections, and large-scale details indicating service at each landing, controller closet layout, coordination with building structure, relationships with other construction, and locations of equipment.
   2. Include large-scale layout of car-control station and standby power operation control panel.
   3. Indicate maximum dynamic and static loads imposed on building structure at points of support, and maximum and average power demands.
   4. Shop Drawings shall clearly indicate coordination and interfaces with the following:
      a. Division 21 “Fire Suppression”
      b. Division 26 “Electrical.”
      c. Division 27 “Communications”.
      d. Division 28 Section “Electronic Safety and Security.”
C. Samples for Initial Selection: For finishes involving color selection.
D. Samples for Verification: For exposed car, hoistway door and frame, and signal equipment finishes; 3-inch-square Samples of sheet materials; and 4-inch lengths of running trim members.

1.4 INFORMATIONAL SUBMITTALS
A. Qualification Data: For Installer.
B. Manufacturer Certificates: Signed by elevator manufacturer certifying that hoistway, pit, and control closet layout and dimensions, as shown on Drawings, and electrical service including standby power generator, as shown and specified, are adequate for elevator system being provided.
C. Sample Warranty: For special warranty.
1.5 CLOSEOUT SUBMITTALS
A. Operation and Maintenance Data: For elevators to include in emergency, operation, and maintenance manuals.
B. Inspection and Acceptance Certificates and Operating Permits: As required by authorities having jurisdiction for normal, unrestricted elevator use.

1.6 QUALITY ASSURANCE
A. Installer Qualifications: Elevator manufacturer or an authorized representative who is trained and approved by manufacturer.

1.7 DELIVERY, STORAGE, AND HANDLING
A. Deliver, store, and handle materials, components, and equipment in manufacturer’s protective packaging. Store materials, components, and equipment off of ground, under cover, and in a dry location.

1.8 COORDINATION
A. Coordinate installation of sleeves, block outs, elevator equipment with integral anchors, and other items that are embedded in concrete or masonry for elevator equipment. Furnish templates, sleeves, elevator equipment with integral anchors, and installation instructions and deliver to Project site in time for installation.
B. Coordinate locations and dimensions of other work relating to electric traction elevators including pit ladders; sumps and floor drains in pits; entrance subsills; electrical service; and electrical outlets, lights, and switches in hoistways, and pits.
C. Coordinate elevator car subfloors with finish flooring indicated.
D. Coordinate with the Division 11 Detention Equipment Contractor (“DEC”) to incorporate security enclosure (“cage”) fabrication in the cab for transport of detainees.
E. Coordinate with Division 27 voice and data communication cabling system for telephone service to elevators.
F. Coordinate with Division 28 fire alarm system for smoke detectors in elevator lobbies to initiate emergency recall operation, for heat detectors in shafts to disconnect power from elevator equipment before sprinkler activation, and for connection to elevator controllers.
G. Coordinate with the Division 28 “Security Control System” subcontractor to incorporate appropriate CCTV camera video cable, intercom cable and card access reader cable in cable bundling from elevator equipment room to hoistway to cab. The Division 28 “Security Control System” subcontractor shall supply video cable to the Elevator subcontractor, who is responsible for the video cable installation from point to point.
H. The Contractor, Owner, elevator manufacturer, fire protection subcontractor, and electrical sub-contractor shall coordinate with each other to ensure that all elements from the several sources are provided, coordinated and compatible for functional and code-compliant elevator installations.
I. Elevator installer shall coordinate and cooperate with tests, inspections and approvals required by the building code, including but not limited to inspections by fire marshal and elevator inspector. The elevator installer shall attend and assist with any and all tests, inspections and approvals required by the building code at no additional cost to the Owner.
1.9 WARRANTY

A. Manufacturer’s Special Warranty: Manufacturer agrees to repair, restore, or replace elevator work that fails in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, operation or control system failure, including excessive malfunctions; performances below specified ratings; excessive wear; unusual deterioration or aging of materials or finishes; unsafe conditions; need for excessive maintenance; abnormal noise or vibration; and similar unusual, unexpected, and unsatisfactory conditions.
   2. Warranty Period: One year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design Product: The design of the elevator is based on the "Monospace 500" electric traction elevator by KONE.
   1. If submitting a product by one of the manufacturers below, the elevator manufacturer shall provide Contractor with any required changes to indicated requirements, including but not limited to hoistway dimensions, pit depth, overhead height, hoist beam size, location, and configuration, electrical characteristics, motor size, and disconnects, controller and valve box locations, and rated load and speed. The Contractor shall coordinate any changes with other affected subcontractors (for example, masonry and electrical subcontractors). Changes to work due to submittal of product other than the basis-of-design shall be accommodated at no additional cost to the Owner.

B. Available Manufacturers: Subject to compliance with requirements, submit basis-of-design product above or comparable product by one of the following:
   1. Fujitec America, Inc.
   2. KONE Inc.
   4. Otis Elevator Co.
   5. Schindler Elevator Corp.

C. Source Limitations: Obtain elevators from single manufacturer.
   1. Major elevator components, including driving machines, controllers, signal fixtures, door operators, car frames, cars, and entrances, shall be manufactured by single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with ASME A17.1-13/CSA B44.

B. Accessibility Requirements: Comply with Section 407 in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and with ICC A117.1

2.3 ELEVATORS

A. Elevator System, General: Manufacturer’s standard elevator systems. Unless otherwise indicated, manufacturer’s standard components shall be used, as included in standard elevator systems and as required for complete system.
B. Elevator Finishes, General: See Architectural Drawings A3.0.1 to A3.0.3 for cab finish selections.

C. Elevator No. 1 (Judicial Staff) Description: Five (5) stops in-line, front entrance, service elevator, single-speed center entrance.
1. 480V, 3 Phase per Kone “MonoSpace” basis of design. Coordinate an alternate motor size with electrical work. Provide changes to panelboards, disconnects & other electrical work to accommodate an alternate motor size at no additional cost to Owner.
2. Machine Location: Hoistway; no machine room is provided.
3. Rated Load: 4000 lb.
6. Auxiliary Operations:
   a. Standby power operation.
7. Security Features:
8. Car Enclosures:
   a. Inside Width: 68 inches from side wall to side wall.
   b. Inside Depth: 93 inches from back wall to front wall (return panels).
   c. Inside Height: 100 inches to underside of ceiling.
   d. Door Sills: Aluminum, mill finish.
   e. Ceiling: Wall washer LED spotlights, Satin stainless steel, No. 4 finish.
   f. Handrails: 1/2 by 2 inches rectangular brushed stainless steel, No. 4 finish, as indicated.
   g. Floor recessed and prepared to receive porcelain tile (specified in Division 09 Section “Tiling”).
9. Hoistway Entrances:
   a. Type: Single-speed center opening.
   b. Frames: Satin stainless steel, No. 4 finish.
   c. Doors: Satin stainless steel, No. 4 finish.
   d. Sills: Aluminum, mill finish.
11. Additional Requirements:
   a. Provide inspection certificate in each car, mounted under acrylic cover with frame made from satin stainless steel, No. 4 finish.

D. Elevator No. 2 (Maintenance Staff) Description: Five (5) stops in-line, front entrance, service elevator, single-speed center entrance.
1. 480V, 3 Phase per Kone “MonoSpace” basis of design. Coordinate an alternate motor size with electrical work. Provide changes to panelboards, disconnects & other electrical work to accommodate an alternate motor size at no additional cost to Owner.
2. Machine Location: Hoistway; no machine room is provided.
3. Rated Load: 4000 lb.
6. Auxiliary Operations:
   a. Standby power operation.
7. Security Features:
   b. CCTV in cab by Division 28.

8. Car Enclosures:
   a. Inside Width: 68 inches from side wall to side wall.
   b. Inside Depth: 93 inches from back wall to front wall (return panels).
   c. Inside Height: 100 inches to underside of ceiling.
   d. Door Sills: Aluminum, mill finish.
   e. Ceiling: Wall washer LED spotlights, Satin stainless steel, No. 4 finish.
   f. Handrails: 1/2 by 2 inches rectangular brushed stainless steel, No. 4 finish, as indicated.
   g. Floor recessed and prepared to receive porcelain tile (specified in Division 09 Section “Tiling”).

9. Hoistway Entrances:
   a. Type: Single-speed center opening.
   b. Frames: Satin stainless steel, No. 4 finish.
   c. Doors: Satin stainless steel, No. 4 finish.
   d. Sills: Aluminum, mill finish.


11. Additional Requirements:
   a. Provide inspection certificate in each car, mounted under acrylic cover with frame made from satin stainless steel, No. 4 finish.
   b. Provide hooks for protective pads and one complete set(s) of full-height protective pads.

E. Elevator No. 3 (Public/Jury) Description:
   Six (6) stops, 5 front entrance stops, 1 rear entrance stop at connector on Level 3, service elevator, single-speed center entrances.
1. 480V, 3 Phase per Kone “MonoSpace” basis of design. Coordinate an alternate motor size with electrical work. Provide changes to panelboards, disconnects & other electrical work to accommodate an alternate motor size at no additional cost to Owner.
2. Machine Location: Hoistway; no machine room is provided.
3. Rated Load: 4000 lb.
6. Auxiliary Operations:
   a. Standby power operation.

7. Security Features:
   b. CCTV in cab by Division 28.

8. Car Enclosures:
   a. Inside Width: 68 inches from side wall to side wall.
   b. Inside Depth: 93 inches from back wall to front wall (return panels).
   c. Inside Height: 100 inches to underside of ceiling.
   d. Door Sills: Aluminum, mill finish.
   e. Ceiling: Wall washer LED spotlights, Satin stainless steel, No. 4 finish.
   f. Handrails: 1/2 by 2 inches rectangular brushed stainless steel, No. 4 finish, as indicated.
g. Floor recessed and prepared to receive terrazzo (specified in Division 09 Section “Resinous Matrix Terrazzo Flooring”).

9. Hoistway Entrances:
   a. Type: Single-speed center opening.
   b. Frames: Satin stainless steel, No. 4 finish.
   c. Doors: Satin stainless steel, No. 4 finish.
   d. Sills: Aluminum, mill finish.


11. Additional Requirements:
   a. Provide inspection certificate in each car, mounted under acrylic cover with frame made from satin stainless steel, No. 4 finish.
   b. Provide hooks for protective pads and one complete set(s) of full-height protective pads.

F. Elevator No. 4 (Detainee) Description: Five (5) stops in-line, front entrance, passenger elevator, single-speed side entrance.
   1. 480V, 3 Phase per Kone “MonoSpace” basis of design. Coordinate an alternate motor size with electrical work. Provide changes to panelboards, disconnects & other electrical work to accommodate an alternate motor size at no additional cost to Owner.
   2. Machine Location: Hoistway; no machine room is provided.
   6. Auxiliary Operations:
      a. Standby power operation.
   7. Security Features:
      a. Keyswitch operation.
      b. CCTV in cab by Division 28.
   8. Car Enclosures:
      a. Inside Width: 68 inches from side wall to side wall.
      b. Inside Depth: 93 inches from back wall to front wall (return panels).
      c. Inside Height: 100 inches to underside of ceiling.
      d. Door Sills: Aluminum, mill finish.
      e. Ceiling: Wall washer LED spotlights, Satin stainless steel, No. 4 finish.
      f. Handrails: 1-1/2 inches round brushed stainless steel, No. 4 finish, as indicated.
      g. Floor prepared to receive rubber tile (specified in Division 09 Section “Resilient Floor Tile”).
   9. Hoistway Entrances:
      a. Type: Single-speed center opening.
      b. Frames: Satin stainless steel, No. 4 finish.
      c. Doors: Satin stainless steel, No. 4 finish.
      d. Sills: Aluminum, mill finish.
   11. Additional Requirements:
      a. Provide detention enclosure/cage complete with door and hardware as detailed on Drawing A7.4.1 and referenced in Division 11 Section “Detention Equipment.” Coordinate with Detention Equipment Contractor.
b. Provide inspection certificate in each car, mounted under acrylic cover with frame made from satin stainless steel, No. 4 finish.

G. Elevators No. 5 and 6 (Public) Description: Five (5) front entrance stops, service elevator, single-speed center entrances.
   1. 480V, 3 Phase per Kone “MonoSpace” basis of design. Coordinate an alternate motor size with electrical work. Provide changes to panelboards, disconnects & other electrical work to accommodate an alternate motor size at no additional cost to Owner.
   2. Machine Location: Hoistway; no machine room is provided.
   3. Rated Load: 4000 lb.
   5. Operation System: Group automatic operation.
   6. Auxiliary Operations:
      a. Standby power operation.
   7. Security Features:
      b. CCTV in cab by Division 28.
   8. Car Enclosures:
      a. Inside Width: 68 inches from side wall to side wall.
      b. Inside Depth: 93 inches from back wall to front wall (return panels).
      c. Inside Height: 100 inches to underside of ceiling.
      d. Door Sills: Aluminum, mill finish.
      e. Ceiling: Wall washer LED spotlights, Satin stainless steel, No. 4 finish.
      f. Handrails: 1/2 by 2 inches rectangular brushed stainless steel, No. 4 finish, as indicated.
      g. Floor recessed and prepared to receive terrazzo (specified in Division 09 Section “Resinous Matrix Terrazzo Flooring”).
   9. Hoistway Entrances:
      a. Type: Single-speed center opening.
      b. Frames: Satin stainless steel, No. 4 finish.
      c. Doors: Satin stainless steel, No. 4 finish.
      d. Sills: Aluminum, mill finish.
   11. Additional Requirements:
      a. Provide inspection certificate in each car, mounted under acrylic cover with frame made from satin stainless steel, No. 4 finish.

2.4 TRACTION SYSTEMS
A. Elevator Machines: Variable-voltage, variable-frequency, ac-type hoisting machines and solid-state power converters.
B. Inserts: Furnish required concrete and masonry inserts and similar anchorage devices for installing guide rails, machinery, and other components of elevator work. Device installation is specified in another Section.
C. Machine Beams: Provide framing to support elevator hoisting machine and deflector sheaves from the building structure. Comply with Division 05 Section “Metal Fabrications” for materials and fabrication.
D. Car Frame and Platform: Bolted- or welded-steel units.
E. Guides: Roller guides or polymer-coated, nonlubricated sliding guides. Provide guides at top and bottom of car and counterweight frames.

F. Suspension Ropes: Elevator suspension media shall be FT-1 rated. 9.5mm minimum diameter complying with NCBC and ASME A17.1, or a modification approved by the AHJ to use an alternate size verified by engineering analysis.

2.5 OPERATION SYSTEMS

A. General: Elevator controller shall be solid-state microprocessor based for dispatch and motor control. CPSM 6.14.2
   1. Single car (selective-collective operation)
   2. Two-car groups (group automatic operation)

B. Auxiliary Operations: In addition to primary operation system features, provide the following operational features for elevators where indicated:
   1. Single-Car Battery-Powered Lowering: If power fails and car is at a floor, it remains at that floor, opens its doors, and shuts down. If car is between floors, it is lowered to the next floor below, opens its doors, and shuts down. System includes rechargeable battery and automatic recharging system.
   3. Nuisance Call Cancel: When car calls exceed a preset number while car load is less than a predetermined weight, all car calls are canceled. Preset number of calls[<>] can be adjusted.
   4. Loaded-Car Bypass: When car load exceeds 80 percent of rated capacity, car responds only to car calls, not to hall calls.

C. Security Features: Provide the following security features, where indicated. Security features shall not affect emergency firefighters’ service.
   1. Card-Reader Operation: System uses card readers at car-control stations and hall push-button stations to authorize calls. Security system determines which landings and at what times calls require authorization by card reader. Provide required conductors in traveling cable and panel in controller closet for interconnecting card readers, other security access system equipment, and elevator controllers. Allow space as indicated for card reader in car.
      a. Security access system equipment is specified in Division 28 Section "Access Control System."
   2. Keyswitch Operation: Push buttons are activated and deactivated by security keyswitches at TBD. Key is removable only in deactivated position.

2.6 DETAINEE ELEVATOR CONTROL

A. The elevator manufacturer/installer shall coordinate all indications and control with the Security Control System Contractor (SCSC). Coordinate all wiring requirements for elevator status, intercoms, card readers and cameras in the cab of the elevator.

B. An Elevator Control tab on the side of the interface screen shall provide for a Programmable Logic Controller (PLC) dry contact interface between the Security Control System and the elevator control system. Provide the functions CALL TO FLOOR, AUTOMATIC MODE, SECURE MODE, SEMI-SECURE MODE, OPEN DOOR, AND CLOSE DOOR.
   1. AUTOMATIC MODE – When the elevator is operating in automatic mode, the VGUI shall provide indication only of the operation of the elevator. The elevator shall operate in its normal programmed mode.
2. **SECURE MODE** – When the elevator is operating in secure mode, all floor call buttons inside and outside the elevator cab shall be disabled. The VGUI shall control the destination floor of the elevator. When the elevator arrives at the designated floor, the elevator doors shall remain closed until the OPEN DOOR function is activated by the VGUI. The elevator doors shall remain open until the CLOSE DOOR function is activated by the VGUI.

3. **SEMI-SECURE MODE** – When the elevator is operating in SEMI-SECURE MODE, all floor call buttons inside and outside the elevator cab shall be disabled. The VGUI shall control the destination floor of the elevator. When the elevator arrives at the designated floor, the elevator doors shall automatically open and remain open until the CLOSE DOOR function is activated by the VGUI.

C. Provide an interface (inputs and outputs) with the ability for security to control and monitor the following:
   1. Status of door (Open or Closed).
   2. Floor status for ALL floors (Where is elevator).
   3. Floor selection (where to send elevator – ALL floors).
   4. Close and Open door (capable of keeping door open if desired).

2.7 **DOOR REOPENING DEVICES**

A. **Infrared Array**: Provide door reopening device with uniform array of 36 or more microprocessor-controlled, infrared light beams projecting across car entrance. Interruption of one or more light beams shall cause doors to stop and reopen.

B. **Nudging Feature**: After car doors are prevented from closing for predetermined adjustable time, through activating door reopening device, a loud buzzer shall sound and doors shall begin to close at reduced kinetic energy.

2.8 **CAR ENCLOSURES**

A. **General**: Provide steel-framed car enclosures with nonremovable wall panels, with suspended ceiling, trim, access doors, car and hoistway doors, power door operators, sills, lighting and ventilation.
   1. Provide standard railings complying with ASME A17.1/CSA B44 on car tops where required by ASME A17.1/CSA B44.

B. **Materials and Finishes**: Manufacturer’s standards, but not less than the following:
   1. **Subfloor**: Exterior, underlayment grade plywood, not less than 5/8-inch (15.9-mm) nominal thickness.
   2. **Floor Finish**: As indicated.
   3. **Stainless-Steel Wall Panels**: Flush, hollow-metal construction; fabricated from stainless-steel sheet.
   4. **Fabricate car with recesses and cutouts for signal equipment.**
   5. **Fabricate car door frame integrally with front wall of car.**
   6. **Stainless-Steel Doors**: Flush, hollow-metal construction; fabricated from stainless-steel sheet or by laminating stainless-steel sheet to exposed faces and edges of enameled cold-rolled steel doors using adhesive that fully bonds metal to metal without telegraphing or oil-canning.
   7. **Sight Guards**: Provide sight guards on car doors.
   8. **Sills**: Extruded metal, with grooved surface, 1/4 inch thick.
   9. **Metal Ceiling**: Flush panels, wall washer LED lighting with each panel.
   10. **Handrails**: Manufacturer’s standard handrails, of shape, metal, and finish indicated.
2.9 HOISTWAY ENTRANCES
   A. Hoistway Entrance Assemblies: Manufacturer’s standard horizontal-sliding, door-and-frame hoistway entrances complete with track systems, hardware, sills, and accessories. Frame size and profile shall accommodate hoistway wall construction.
   1. Where gypsum board wall construction is indicated, frames shall be self-supporting with reinforced head sections.
   B. Fire-Rated Hoistway Entrance Assemblies: Door and frame assemblies shall comply with NFPA 80 and be listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction based on testing at as close-to-neutral pressure as possible according to NFPA 252 or UL 10B.
   1. Fire-Protection Rating: As indicated.
   C. Materials and Fabrication: Manufacturer’s standards, but not less than the following:
   2. Stainless-Steel Doors: Flush, hollow-metal construction; fabricated from stainless-steel sheet or by laminating stainless-steel sheet to exposed faces and edges of enameled cold-rolled steel doors using adhesive that fully bonds metal to metal without telegraphing or oil-canning.
   4. Sills: Extruded metal, with grooved surface, 1/4 inch thick.
   D. Plug Lock (all hoistway doors): Provide elevator hoistway door safety plug lock utilizing Medeco high security cylinder with chrome finish; with non-copiable key. This design is based on Tri-Lok #1750Q. Provide lock and one key for each hoistway entrance door. Deliver keys to Owner.

2.10 SIGNAL EQUIPMENT
   A. General: Provide hall-call and car-call buttons that light when activated and remain lit until call has been fulfilled. Fabricate lighted elements with long-life lamps and acrylic or other permanent, non-yellowing translucent plastic diffusers or LEDs.
   B. Elevator Emergency Power Signal: Provide illuminated signal marked “ELEVATOR EMERGENCY POWER” in the elevator lobby at the designated level to indicate that the normal power supply has failed and the emergency or standby power is in effect.
   C. Car-Control Stations: Provide manufacturer’s standard recessed car-control stations. Mount in return panel adjacent to car door unless otherwise indicated.
   1. Mark buttons and switches for required use or function. Use both tactile symbols and Braille.
   2. Provide “No Smoking” sign matching car-control station, either integral with car-control station or mounted adjacent to it, with text and graphics as required by authorities having jurisdiction.
   D. Emergency Communication System: Two-way voice communication system, with visible signal, which dials preprogrammed number of monitoring station and does not require handset use. System is contained in flush-mounted cabinet, with identification, instructions for use, and battery backup power supply.
   E. Car Position Indicator: Provide illuminated, digital-type car position indicator, located above car door or above car-control station. Also, provide audible signal to indicate to passengers
that car is either stopping at or passing each of the floors served. Include travel direction arrows if not provided in car-control station.

F. Hall Push-Button Stations: Provide one hall push-button station at each landing.
   1. Provide units with flat faceplate for mounting with body of unit recessed in wall.
   2. Equip units with buttons for calling elevator and for indicating desired direction of travel.

G. Hall Lanterns: Units with illuminated arrows; but provide single arrow at terminal landings. Provide the following:
   1. Manufacturer’s standard wall-mounted units, for mounting above entrance frames.

H. Annunciator: Audible signals indicating car arrival and direction of travel. Signals sound once for up and twice for down.

I. Standby Power Elevator Selector Switches: Provide switches, as required by ASME A17.1/CSA B44, where indicated. Adjacent to switches, provide illuminated signal that indicates when normal power supply has failed. For each elevator, provide illuminated signals that indicate when they are operational and when they are at the designated emergency return level with doors open.

J. Fire-Command-Center Annunciator Panel: Provide panel containing illuminated position indicators for each elevator, clearly labeled with elevator designation; include illuminated signal that indicates when elevator is operational and when it is at the designated emergency return level with doors open. Provide standby power elevator selector switch(es), as required by ASME A17.1/CSA B44, adjacent to position indicators. Provide illuminated signal that indicates when normal power supply has failed.

K. Emergency Pictorial Signs: Fabricate from materials matching hall push-button stations, with text and graphics as required by authorities having jurisdiction, indicating that in case of fire, elevators are out of service and exits should be used instead. Provide one sign at each hall push-button station unless otherwise indicated.

2.11 FINISH MATERIALS

A. General: Provide the following materials for exposed parts of elevator car enclosures, car doors, hoistway entrance doors and frames, and signal equipment as indicated.

B. Cold-Rolled Steel Sheet: ASTM A 1008, commercial steel, Type B, exposed, matte finish.

C. Hot-Rolled Steel Sheet: ASTM A 1011, commercial steel, Type B, pickled.

D. Stainless-Steel Sheet: ASTM A 240, Type 304.

E. Stainless-Steel Bars: ASTM A 276, Type 304.

F. Stainless-Steel Tubing: ASTM A 554, Grade MT 304.

G. Aluminum Extrusions: ASTM B 221, Alloy 6063.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine elevator areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work. Examine hoistways, hoistway openings, pits, and controller closets as constructed; verify critical dimensions; and examine supporting structure and other conditions under which elevator work is to be installed.
1. Verify that requirements included in ASME A17.1 Rule 102.2 are met regarding sprinkler service in the shaft and controller closet. Verify sprinkler OS & Y valves and interconnects to fire alarm system and power supply shut-off, and required devices are installed and acceptable to building officials for the installation.

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. Comply with manufacturer’s written instructions.

B. Welded Construction: Provide welded connections for installing elevator work where bolted connections are not required for subsequent removal or for normal operation, adjustment, inspection, maintenance, and replacement of worn parts. Comply with AWS standards for workmanship and for qualifications of welding operators.

C. Sound Isolation: Mount rotating and vibrating equipment on vibration-isolating mounts to minimize vibration transmission to structure and structure-borne noise due to elevator system.

D. Lubricate operating parts of systems, including ropes, as recommended by manufacturers.

E. Alignment: Coordinate installation of hoistway entrances with installation of elevator guide rails for accurate alignment of entrances with car. Where possible, delay final adjustment of sills and doors until car is operable in shaft. Reduce clearances to minimum, safe, workable dimension at each landing.

F. Leveling Tolerance: 1/8 inch, up or down, regardless of load and travel direction.

G. Set sills flush with finished floor surface at landing. Fill space under sill solidly with nonshrink, nonmetallic grout.

H. Locate hall signal equipment for elevators as follows unless otherwise indicated:
   1. For groups of elevators, locate hall push-button stations between two elevators at center of group or at location most convenient for approaching passengers.
   2. Place hall lanterns either above or beside each hoistway entrance.
   3. Mount hall lanterns at a minimum of 72 inches above finished floor.

3.3 FIELD QUALITY CONTROL

A. Acceptance Testing: On completion of elevator installation and before permitting elevator use (either temporary or permanent), perform acceptance tests as required and recommended by ASME A17.1/CSA B44 and by governing regulations and agencies.

B. Acceptance Testing: As a part of final acceptance of the project and in accordance with the General Conditions, the Contractor shall have a Qualified Elevator Inspector (QEI) conduct a full Acceptance Inspection and Test in accordance with ASME/ANSI A17.1 before final acceptance by the Owner. The Contractor shall obtain from the elevator contractor and/or manufacturer and furnish to the Owner all data affecting the elevator installation or modification, including ‘as-installed’ circuit and control wiring diagrams and maintenance manuals.

C. Advise Owner, Architect, and authorities having jurisdiction in advance of dates and times that tests are to be performed on elevators.
3.4 PROTECTION
   A. Temporary Use: Limit temporary use for construction purposes to one elevator. Comply with the following requirements for elevator used for construction purposes:
      1. Provide car with temporary enclosure, either within finished car or in place of finished car, to protect finishes from damage.
      2. Provide strippable protective film on entrance and car doors and frames.
      3. Provide padded wood bumpers on entrance door frames covering jambs and frame faces.
      4. Provide other protective coverings, barriers, devices, signs, and procedures as needed to protect elevator and elevator equipment.
      5. Do not load elevators beyond their rated weight capacity.
      6. Engage elevator Installer to provide full maintenance service. Include preventive maintenance, repair or replacement of worn or defective components, lubrication, cleanup, and adjustment as necessary for proper elevator operation at rated speed and capacity. Provide parts and supplies same as those used in the manufacture and installation of original equipment.
      7. Engage elevator Installer to restore damaged work, if any, so no evidence remains of correction. Return items that cannot be refinished in the field to the shop, make required repairs and refinish entire unit, or provide new units as required.

3.5 DEMONSTRATION
   A. Engage a factory-authorized service representative to train Owner’s maintenance personnel to operate, adjust, and maintain elevator(s).
   B. Check operation of each elevator with Owner’s personnel present before date of Substantial Completion and again not more than one month before end of warranty period. Determine that operation systems and devices are functioning properly.

A. END OF SECTION 142100
SECTION 144219 - COURTROOM PLATFORM LIFTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 REFERENCES

1.3 SUBMITTALS
   A. Product Data: For lift type indicated. Include rated capacities, operating characteristics, dimensions, electrical characteristics, safety features, and controls. Include the following:
      1. Preparation instructions and recommendations.
      2. Storage and handling requirements and recommendations.
      3. Installation methods.
   B. Shop Drawings: For each lift. 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. Wiring Diagrams: For power, signal, and control wiring.
   C. Samples: (Not required.)
   D. Qualification Data: For qualified Installer.
   E. Manufacturer Certificates: Signed by lift manufacturer certifying that runway, ramp or pit, and dimensions as shown on Drawings and that electrical service as shown and specified are adequate for lift being provided.
   F. Inspection and Acceptance Certificates and Operating Permits: As required by authorities having jurisdiction for normal, unrestricted use of lifts.
   G. Operation and Maintenance Data: For each type of lift to include in operation and maintenance manuals. In addition to items specified in Division 01 Section “Operation and Maintenance Data,” include the following:
      1. Parts list with sources indicated.
      2. Recommended parts inventory list.
   H. Warranty: Sample of special warranty.
   I. Initial Maintenance Agreement: Provide written service agreement, per requirements of this Section.

1.4 QUALITY ASSURANCE
   A. Installer Qualifications: Manufacturer’s authorized representative who is trained and approved for installation of units required for this Project.
   B. Regulatory Requirements: In addition to requirements of authorities having jurisdiction, comply with ASME A18.1, “Safety Standard for Platform Lifts and Stairway Chairlifts.”
C. Courtroom platform lifts shall comply with ASME A18.1 standard for lifts in public installations. Courtroom platform lifts shall be ADA-compliant, customized assemblies, specifically designed for use in courtrooms facilitate mobility-impaired judges and clerks. The lift assemblies shall raise and lower the platform within the confines of stationary millwork walls and the closed entrance/exit doors attached thereto.

D. Permit: Prior to installation, Contractor is required to obtain a Permit from authority having jurisdiction. Owner will pay the cost of such permit.

E. Installer Qualifications: A company regularly engaged in the business of manufacturing, installing and servicing courtroom platform lifts of the type specified, and shall have a history of successful installations acceptable to the Architect.

1.5 COORDINATION

A. Coordinate installation of courtroom lifts with installers of other items related to courtroom platform lifts to ensure proper clearances, cutouts, and integration of the surrounding materials and construction with that of the platform lift assembly, including, but not limited to the following:

1. Provide adequate clear space under the upper landing and adjacent to the lift platform for the lift drive mechanism motor, electronics and main power disconnect.
2. Provide a service hatch in upper landing floor, adjacent to lift and of size sufficient to access main power disconnect and to facilitate maintenance.
3. Provide cutout reliefs in woodwork enclosure as required for lift frame clearance and operational lift elements.
4. Provide smooth interior architectural wood paneling at enclosure that is removable to facilitate lift maintenance and adjustment.
5. Provide running clearance of not less than 3/8-inch or more than 3/4-inch between platform edges and adjacent millwork surfaces.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer’s unopened packaging until ready for installation.

1.7 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer’s absolute limits.

1.8 WARRANTY

A. Special Warranty: Manufacturer’s standard form in which manufacturer agrees to repair or replace components of lifts that fail in materials or workmanship within specified warranty period.

1. Warranty Period: One year from date of Substantial Completion.

1.9 MAINTENANCE SERVICE

A. Initial Maintenance Service: Beginning at Substantial Completion, provide 12 months’ full maintenance by skilled employees of lift Installer. Include quarterly preventive maintenance and repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper lift operation at rated speed and capacity. Provide parts and supplies the same as those used in the manufacture and installation of original equipment.
PART 2 - PRODUCTS

2.1 COURTROOM VERTICAL PLATFORM LIFTS

A. Courtroom Vertical Platform Lifts: Manufacturer's standard pre-engineered lift systems as indicated. Assembly incorporates an indirect plunger-cylinder unit with electric pump-tank-control system.

1. Basis-of-Design Product: Subject to compliance with requirements, provide “The Invisible Lift” as manufactured by T.L. Shield. www.tlshield.com: Subject to compliance with requirements, provide the named Basis-of-Design product, or submit a substitution request for one of the following manufacturers (submit in accord with Division Section "Product Requirements," a minimum of 10 days prior to the receipt of bids):
   a. Ascension, Division of AGM www.wheelchairlift.com
   b. Florlift of New Jersey, Inc.
   c. Butler Mobility Products.

2. Platform Size: Platform(s) as indicated on Drawings. The top of platform in lower position, above recess pit for mechanism, shall align with adjacent floor of the Courtroom.

3. Platform Lift Side Guards: The architectural sidewalls and safety gate(s) shall provide full perimeter side guarding of height indicated, but not less than 36-inches.
   a. Lift sidewalls and safety gates shall be clad in wood veneer under requirements of Division 06 Section “Interior Architectural Woodwork”.

4. Rated Load: Minimum rated capacity shall be 500 lbs with a weight safety factor of not less than 5 based upon the rated load. For platform areas greater than 18 SF, rated load shall be 1050 lbs.

5. Speed: Vertical platform speed shall be 8 feet per second, nominal.

6. Maximum travel is 24 inches. The indirect plunger-cylinder design lift mechanism is mounted in recessed pit below the platform. The drive motor and electronics are mounted below upper landing platform with an access door. Include mechanical travel limiting stops at top and bottom.

7. Mechanical and electrical mechanisms shall be totally enclosed and protected from the elements.

8. Power requirements: Dedicated breaker-protected 115 VAC, 3-wire, 15 amp, single-phase service supplied from building power source and provided under requirements of Division 26.

B. Construction: Courtroom lift shall be constructed of welded or bolted, steel or aluminum structural frame.

C. Operation: Courtroom lift shall be operated by low voltage (24 VDC), constant-pressure control switches, designed so it can be easily operated by persons with limited dexterity.

1. Controls: Courtroom lift shall be equipped with controls at the top, bottom landing and platform. Provide key-operated security lockout switch to prevent unauthorized use.

2. Emergency Stop Button: Courtroom lift shall have an emergency stop button on each control panel.

3. Limit Switches: Courtroom lift shall be equipped with redundant upper and lower limit switches.

4. Battery Back-up: Not required (lifts are on emergency generator).
5. Manual Lowering Device: Courtroom Lift shall include a device to manually lower or raise the platform.

D. Emergency Operation: Provide connection to indicated standby (emergency) power to raise or lower units in case of malfunction or power loss.

E. Self-Supporting Units: Support vertical loads of units only at base, with lateral support only at landing levels.

F. Platform: Galvanized-steel sheet with carpeting.

G. Platform Enclosure and Door: Division 06 Section “Interior Architectural Woodwork.”

H. Courtroom Lift Enclosure Hardware: Platform lift manufacturer shall furnish the following hardware items to Division 6 “Interior Architectural Woodwork” subcontractor to incorporate in casework and gate assembly associated with platform lift.

1. Electric Strike Latch: No. 4 brushed stainless-steel finish.
2. Spring Bolt: No. 4 brushed stainless-steel finish.
3. Concealed self-closing gate hinges, sized for weight of gate, and magnetic latch shall be provided by Division 06 “Interior Architectural Woodwork” subcontractor.

2.2 FINISHES

A. Courtroom lift assembly is concealed by other construction. Provide corrosion resistant coating to courtroom lift components.

1. Visible surfaces are covered with decorative panels as specified in Division 06 Section “Interior Architectural Woodwork.”
2. Platform is covered with commercial flooring surfaces as specified in Division 09 Section “Tile Carpeting.”

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, critical dimensions, and other conditions affecting performance.

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

3.2 INSTALLATION

A. General: Install in accordance with manufacturer’s instructions and in strict accordance with the approved shop drawings and all pertinent regulations and codes.

B. Wiring Method: Conceal conductors and cables within housings of units or building construction. Do not install conduit exposed to view in finished spaces. Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer’s limitations on bending radii.

C. Coordinate woodwork enclosure at judge’s bench assembly, specified in Division 06 Section “Interior Architectural Woodwork” with installation of courtroom lift.

1. Coordinate runway doors with platform travel and positioning, for accurate alignment and minimum clearance between platforms, runway doors, sills, and door frames.
2. Coordinate platform doors with platform travel and positioning.

D. Adjust stops for accurate stopping and leveling at each landing, within required tolerances.

1. Leveling Tolerance: 1/4 inch up or down, regardless of load and direction of travel.

E. Lubricate operating parts of lift, including drive mechanism, guide rails, hinges, safety devices, and hardware.
F. Test safety devices and verify smoothness of required protective enclosures and fascias

3.3 FIELD QUALITY CONTROL
A. Acceptance Testing: On completion of lift installation and before permitting use of lifts, perform acceptance tests as required and recommended by ASME A18.1 and authorities having jurisdiction.
B. Operating Test: In addition to above testing, load lifts to rated capacity and operate continuously for 30 minutes between lowest and highest landings served. Readjust stops, signal equipment, and other devices for accurate stopping and operation of system.
C. Advise Owner, Architect, and authorities having jurisdiction in advance of dates and times tests are to be performed on lifts.

3.4 DEMONSTRATION
A. Engage a factory-authorized service representative to train Owner’s maintenance personnel to adjust, operate, and maintain lifts. Include a review of emergency systems and emergency procedures to be followed at time of operational failure and other building emergencies.
B. Check operation of lifts with Owner’s personnel present and before date of Substantial Completion. Determine that operating systems and devices are functioning properly.
C. Check operation of lifts with Owner’s personnel present not more than one month before end of warranty period. Determine that operating systems and devices are functioning properly.

3.5 MAINTENANCE SERVICE
A. Initial Maintenance Service: Beginning at Substantial Completion, provide 12 months’ full maintenance by skilled employees of lift Installer. Include quarterly preventive maintenance and repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper lift operation at rated speed and capacity. Provide parts and supplies the same as those used in the manufacture and installation of original equipment.

END OF SECTION 144219