ARCHITECTURAL / MECHANICAL / ELECTRICAL

FARLEY MUNICIPAL BUILDING
206 1ST STREET N., FARLEY, IOWA 52046

CITY OF FARLEY
114 1ST STREET N., FARLEY, IOWA 52046

PROJECT MANUAL

ARCHITECT PROJECT NUMBER: I1728.01

ARCHITECT: Martin Gardner Architecture, P.C.
CIVIL ENGINEER: MSA Professional Services, Inc.
STRUCTURAL: Hooting Coyote, LLC
MECHANICAL/ELECTRICAL ENGINEER: West Plains Engineering

May 7, 2019
**SPECIFICATIONS:**
Farley Municipal Building
206 1st Street N., Farley, Iowa 52046
ARCHITECT PROJECT #I1728.01

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206 1st Street N.
Farley, Iowa 52046

Owner: City of Farley
114 1st Street N.
Farley, Iowa 52046

Architect: Martin Gardner Architecture, P.C.
Architect’s Project Number: I1728.01
Website: www.MartinGardnerArch.com

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Strawberry Point, Iowa 52076
Telephone: 563-9333-4712
Fax: 319-377-1175

Marion Office
700 11th Street, Suite 200
Marion, Iowa 52302
Telephone: 319-377-7604
Fax: 319-377-1175

I hereby certify that the portion of this technical submission described below was prepared by me or under my direct supervision and responsible charge. I am a duly registered architect under the laws of the state of Iowa.

KYLE D. MARTIN, AIA, PRESIDENT
Printed or typed name

Signature Date

Registration expires Date issued

Pages or sheets covered by this seal:

Seal
SPECIFICATIONS:  Farley Municipal Building
206 1st Street N., Farley, Iowa 52046
ARCHITECT PROJECT #I178.01

Structural Engineer:   Hooting Coyote LLC.
1553 West Morley Road
Elizabeth, Illinois 61028
815.858.5514

Civil Engineer:    MSA Professional Services, Inc.
400 Ice Harbor Drive
Dubuque, Iowa 52001
563.584.2883

Mechanical Engineer:  West Plains Engineering
215 Second Avenue SE, Suite 200
Cedar Rapids, Iowa 52401
319.365.0030

Electrical Engineer:   West Plains Engineering
215 Second Avenue SE, Suite 200
Cedar Rapids, Iowa 52401
319.365.0030
NOTICE OF PUBLIC HEARING AND LETTING OF BIDS FOR THE CITY OF FARLEY, hereafter referred to as the Owner.

Notice is hereby given that the Owner, located at 114 First Street N., Farley Iowa invites contractors to submit bids for this project and that a public hearing will be held on the project.

Project Description: The proposed project consists of a new 8,000 square foot municipal city building. Construction will be slab on grade, wood framing with brick veneer. Project consists of interior wood framing, gypsum drywall, aluminum window systems, hollow metal and wood doors with frames, flooring and casework finishes. Full electrical, HVAC and plumbing systems are included. Project will have full exterior site development including parking lots and sidewalks.

Bid Type: One lump sum contract will be awarded at the appointed time and place.

Pre-Bid Conference: A pre-bid meeting for all General Contractors will be held at the Farley Memorial Hall, 202 1st Street N, Farley Iowa on May 22nd, 2019 at 2:00 pm local time. Following the meeting, the meeting will be continued at the project site, weather permitting.

Project Access: The building site is available for inspection at any time.

Documents: Plans and specifications governing construction of the proposed project have been prepared by Martin Gardner Architecture P.C., Marion, Iowa as Architect. All materials and procedures shall be in strict accordance with said plans and specifications referred to and defining said proposed improvements and are hereby made a part of this Advertisement and of the proposed contract by reference, and that the contract shall be executed in compliance therewith.

Document Availability: Plans and specifications and proposed contract documents may be examined at the offices of the Architect, and other locations as outlined in the Construction Documents. Copies of the plans and specifications, form of contract and bid form may be obtained from Martin Gardner Architecture, P.C., 700 11th Street, Suite 200, Marion, IA 52302 or 11502 390th Street, Strawberry Point, IA 52076, 319-377-7604. The Architect's office will issue plans to all Contractors. A maximum of two sets of Construction Documents will be provided to each General Contractor upon delivery of a $250 per set refundable deposit to the office of the Architect. All other Subcontractors and Suppliers may obtain one set of Construction Documents upon delivery of a $250 per set refundable deposit to the office of the Architect. The drawings and specifications are available at the architect's website www.MartinGardnerArch.com. Plans and specifications to be viewed are in Adobe .pdf format and may be downloaded and printed. Be aware that no warranty as to the compatibility of your computer software or hardware with the files provided is made. Variations between the printed files provided above by the Architect and these electronic files may exist. In the event that a conflict does exist, the printed documents issued by the Architect will take precedence over the downloaded files.

Bid Forms: All bids shall be on the forms provided in the specifications for project. The provided forms of proposal shall be submitted at the time required for bids.
Bid Security: Each bid shall be accompanied by a bid bond, certified check, cashier’s check or credit union certified share draft, in a separate sealed envelope in an amount equal to five percent (5%) of the total amount of the bid. If bid bond is submitted, it must be on an approved AIA bid bond form. The certified check or cashier’s check shall be drawn on a bank in Iowa or a bank chartered under the laws of the United States of America; certified share draft shall be drawn on a credit union chartered under the laws of the United States. Bid security should be made payable to the Owner as security that if awarded a contract the bidder will enter into a contract at the prices bid and furnish the required Contractor’s Bonds, Certificate of Insurance, and other materials as may be required in the contract documents. The certified check, cashier’s check, or certified share draft may be cashed, or the Bid Bond forfeited, and the proceeds retained as liquidated damages if the Bidder fails to execute a contract and file acceptable Certificate of Insurance within ten (10) days after the acceptance of the proposal by the Owner. No bidder may withdraw a proposal within forty-five (45) days after the date set for opening bids.

Project Bonding: The successful bidder shall be required to furnish a Contractor’s Performance and Labor and Material Payment Bond on an approved AIA form in an amount equal to one hundred percent (100%) of the contract price. The bonds are to be issued by responsible surety, approved by the Owner, and shall guarantee the faithful performance of the contract and the terms and conditions therein contained and shall guarantee the prompt payment for and of all materials and protect and save harmless the Owner from all claims and damages of any kind caused by the operation of the Contractor, and shall guarantee the work contracted for a period of one (1) year from the date of final acceptance of the improvements by the Owner.

Sales Tax: The said project is a tax exempt project. The Owner will issue exemption certificates from the Iowa Department of Revenue, as specified in the 701 Iowa Administrative Code, Chapter 19, Rule 19.12. These certificates shall be used by the successful bidder when purchasing materials or the completion of the project.

Bid Filing: All bids must be filed at the Farley Memorial Hall, 202 1st Street N., Farley Iowa, before 2:00 pm local time, May 29, 2019. Bids received after this time will not be accepted.

Bid Opening: Bids will be opened and publicly read aloud at 2:00 pm local time, on May 29, 2019, at the Farley Memorial Hall, 202 1st Street N., Farley Iowa.

Notice of Public Hearing: Notice is hereby given that the Farley City Council will meet in the lower level of the Farley Memorial Hall located at 202 1st Street N., Farley Iowa on June 3rd, 2019 at 6:00 pm local time at which time and place a hearing will be held on the proposed drawing, specifications, budget, and form of contract for the Farley Municipal Building. Any interested party may appear to be heard. At the said time and place, the Farley City Council will also consider BIDS for said construction that were previously opened at the time and place noted.

Award of Contract: Notice is hereby given that the Owner will meet at the location and time designated above at which time and place the Owner will consider bids for said construction.
**SPECIFICATIONS:**

**Farley Municipal Building**

206 1st Street N., Farley, Iowa 52046

ARCHITECT PROJECT # I1728.01

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**Progress Payments:** Payment to the Contractor will be made in monthly estimates and one final payment. Monthly estimates will be equivalent to ninety-five percent (95%) of the contract value of the work completed during the preceding calendar month. Such payments will in no way be construed as an act of acceptance for any of the work partially or totally completed.

**Final Payment:** Final payment to Contractor will be made no earlier than forty-five (45) days from and after final acceptance of work by the Owner, subject to the contract conditions and in accordance with the provisions of Iowa Code chapters 26 and 573.

**Project Construction Schedule:** The work under the contract shall commence on or before the date specified in the written ‘Notice of Proceed’ or if lieu of the notice to proceed, the execution of the contract for construction and shall be Substantially Completed on or before the date indicated by the awarded contractor on the submitted bid, but no later than July 31, 2020, and fully completed and ready for acceptance no later than 30 calendar days after said date.

**Iowa Preference:** By virtue of statutory authority, preference will be given to products and provisions grown and produced within the State of Iowa and to Iowa domestic labor.

The Owner hereby reserves the right to reject any or all bids and to waive informalities and irregularities and to accept the lowest responsive and responsible bid.

Published upon order of the City of Farley

Jeff Simon, Mayor

By________________________________

Attest:_____________________________
1.1 DESCRIPTION OF WORK
   A. The proposed project consists of a new 8,000 square foot municipal city building. Construction will
      be slab on grade, wood framing with brick veneer. Project consists of interior wood framing,
      gypsum drywall, aluminum window systems, hollow metal and wood doors with frames, flooring and
      casework finishes. Full electrical, HVAC and plumbing systems are included. Project will have full
      exterior site development including parking lots and sidewalks.
   B. Bid Type: Single Prime Fixed Cost Bid
   C. Location: 206 1st Street N., Farley, Iowa 52046
   D. Owner: City of Farley

1.2 PRE-BID CONFERENCE: PRE BID CONFERENCE FOR ALL CONTRACTORS, SUBCONTRACTORS AND
   SUPPLIERS. ATTENDANCE FOR ALL GENERAL CONTRACTORS WISHING TO BID ON THE PROJECT IS
   STRONGLY ENCOURAGED.
   A. Place: Farley Memorial Hall, 202 1st Street N., Farley, Iowa 52046
   B. Date: May 22, 2019
   C. Time: 2:00 pm local time

1.3 RECEIPT OF BIDS:
   A. Place: Farley Memorial Hall, 202 1st Street N., Farley, Iowa 52046
   B. Date: May 29, 2019
   C. Time: 2:00 pm local time

1.4 BID OPENING:
   A. Place: Farley Memorial Hall, 202 1st Street N., Farley, Iowa 52046
   B. Date: May 29, 2019
   C. Time: 2:00 pm local time

1.5 DOCUMENTS ON FILE: Documents shall be available for inspection at the following locations and on our
   website at www.MartinGardnerArch.com: Printed documents are available by contacting the Marion office of
   the Architect.

   MARTIN GARDNER ARCHITECTURE, P.C.: Contact this office to obtain copies of bid documents.
   700 11th Street – Suite 200
   Marion, IA 52302

   MARTIN GARDNER ARCHITECTURE, P.C.
   11502 390th Street
   Strawberry Point, IA 52076
1.6 PLAN DEPOSIT: $250 Refundable. See Section 4.1.4 AND 4.1.5

1.7 SITE ACCESS:
   A. Site is available for viewing at any time.

1.8 BIDS: Bid forms for the General Contract is provided.

1.9 UNIT PRICE BIDS: Form to be completed and submitted with the general construction bid. See Section 9.1.

1.10 BID SECURITY: Required See Section 8.2.

1.11 BONDS: Required See Article 10.

1.12 PRICE GUARANTEE: Prices quoted shall be guaranteed for a period of forty-five (45) days after the date of the Bid.

1.13 IOWA SALES TAX: State of Iowa legislation, public systems have tax exempt status. Reference Iowa Code sections 421.17(19) and 422.68. Amendment to Chapter 19, “Sales and Use Tax on Construction Activities”, Iowa Administrative Code. No sales tax on all applicable materials shall be charged to this project and all bid forms submitted shall contain no said sales tax. Sales Tax Exemption Certificate will be issued by the Owner upon completion of the contract for construction.

1.14 PROPOSED COMPLETION DATE: Substantial Completion shall be achieved by the date indicated by the Bidder on the Proposal Form. Final Completion should be obtained Thirty (30) days after Substantial Completion.

1.15 LIQUIDATED DAMAGES: None.

ARTICLE 2 – DEFINITIONS

2.1 GENERAL: 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 other sample bidding and contract forms. The proposed Contract Documents consist of the form of Agreement between the Owner and Contractor, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications and all Addenda issued prior to execution of the Contract.

2.2 ADDITIONAL DEFINITIONS: Definitions set forth in the General Conditions of the Contract for Construction, AIA Document A201, or in other Contract Documents are applicable to the Bidding Documents.

2.3 ADDENDA: Addenda are written or graphic instruments issued by the Architect prior to the execution of the Contract which modify or interpret the Bidding Documents by additions, deletions, clarifications or corrections. All addenda issued during the bidding period shall be included in the bids and will become a part of the Contract Documents.

2.4 BID OR PROPOSAL: A Bid or Proposal is a complete and properly executed proposal to do the Work for the sums stipulated therein, submitted in accordance with the Bidding Documents.

2.5 BASE BID: The Base Bid is the sum stated in the Bid for which the Bidder offers to perform the Work described in the Bidding Documents as the base, to which Work may be added or from which Work may be deleted for sums stated in Alternate Bids.

2.6 ALTERNATE BID: An Alternate Bid or Alternate is an amount stated in the Bid to be added to or deducted from the amount of the Base Bid if the corresponding change in the Work, as described in the Bidding Documents, is accepted.
2.7 UNIT PRICE: 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.

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

2.9 SUB-BIDDER: 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. The Sub-Bidder in submitting a proposal represents that to the extent applicable to his portion of the Work that he is making the same representations outlined in Article 3 as the Bidder.

ARTICLE 3 – BIDDER’S REPRESENTATIONS

3.1 The Bidder and to extent applicable, the Sub-Bidder by making a Bid represents that:

3.1.1 The Bidder has read and understands the Bidding Documents or Contract Documents, to the extent that such documentation relates to the Work for which the Bid is submitted, and for other portions of the Project, if any, being bid concurrently or presently under construction.

3.1.2 The Bid is made in compliance with the Bidding Documents.

3.1.3 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 personal observations with the requirements of the proposed Contract Documents. Submission of a bid will be considered evidence that the Bidder is familiar with local facilities and difficulties, requirements of the bidding documents and of pertinent State and local Codes, the state of labor and material markets and has made due allowance in his bid for all contingencies. Submission of a bid will also be considered evidence that the Bidder will supply a complete and full usable installation at the completion of the work without additional cost to the Owner.

3.1.4 The Bid is based upon the materials, equipment and systems required by the Bidding Documents without exception. See Substitutions

ARTICLE 4 – AVAILABILITY OF BIDDING DOCUMENTS

4.1 EXAMINATION AND PROCUREMENT OF DOCUMENTS:

4.1.1 EXAMINATION AND DOWNLOAD OF ELECTRONIC DOCUMENTS: Plans and specifications may also be viewed on the Architect’s website, www.MartinGardnerArch.com. Plans and specifications to be viewed are in Adobe.pdf format and may be downloaded and printed. Be aware that no warranty as to the compatibility of your computer software or hardware with the files provided is made. Variations between the printed files provided above by the Architect and these electronic files may exist. In the event that a conflict does exist, the printed documents supplied by the Architect will take precedence over the downloaded files. Persons accessing our documents on our website are requested to provide contact information so that project Addenda may be directly transmitted to them and plan holders list can be accurately maintained. The Architect will not be responsible to provide Addenda or other information to parties who fail to properly register their contact information on the website.

4.2 EXAMINATION OF PRINTED DOCUMENTS:

4.2.1 PROCUREMENT OF PRINTED DOCUMENTS: Bidders and Sub-bidders may obtain complete sets of the Bidding Documents from the Marion office of the Architect. Two sets of plans and specifications will be issued to Prime Contractors and one set of plans and specifications will be issued to other Sub-bidders including Subcontractors and Suppliers.

4.2.2 DEPOSIT: Refundable $250 per set.

4.2.3 DEPOSIT REFUND: Deposits will be refunded upon return of the Plans and Specifications to the office of the Architect in good condition within 14 days of the bid opening. Deposits for Documents not returned by that date will
be used to replace the missing documents which are to be used during construction. Prime Bidders who are awarded the project may retain their Documents and the deposit will be returned to them. All Sub-bidders are to return their plans for deposit refund unless the Bidder issues a confirmation that the Sub-bidder will be awarded work on the project.

4.3 PROCUREMENT OF DOCUMENTS FROM OTHER SOURCES: Neither the Owner, Architect, nor Architect’s Consultants will be responsible for the content nor completeness of Bidding Documents obtained from sources other than the office of the Architect. Contractors using printed or electronic plan rooms including those listed above should verify with their sources that all documents, including addenda are included in the materials.

4.4 PARTIAL DOCUMENT SETS: Bidders shall use complete sets of Bidding Documents in preparing Bids; neither the Owner, Architect, or Architect’s Consultants assumes responsibility for omissions, errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents. No partial sets of documents will be issued.

ARTICLE 5 – USE OF THE DOCUMENTS

5.1 TERMS OF USE: The Owner and Architect make copies of the Bidding Documents available on the above terms for the purpose of obtaining Bids on the Work. No license or grant of use is conferred by issuance of copies of the Bidding Documents.

5.2 DOCUMENT QUESTIONS: The Bidder shall carefully study and compare the Bidding Documents with each other, and with other work being bid concurrently or presently under construction to the extent that it relates to the Work for which the Bid is submitted, shall examine the site and local conditions, and shall at once report to the Architect items which the Bidder or Sub-bidder believe to be errors, inconsistencies or ambiguities discovered.

5.2.1 BUILDING CODE ISSUES: Bidders and Sub-bidders are not required to perform building code reviews, but items which are believed to be in conflict with local codes or interpretations of the Authorities Having Jurisdiction over the project, shall be brought to the Architect’s attention for clarification.

5.3 DOCUMENT CLARIFICATIONS: Bidders and Sub-bidders requiring clarification or interpretation of the Bidding Documents shall make an inquiry to the Architect as soon as items are encountered. Inquiries will be accepted verbally, in person, via telephone or written request via email, fax, or mail. Written inquiries will typically be addressed with the highest priority. Inquiries must be made at least three (3) business days before the receipt of bids to allow time for addenda to be generated and transmitted via mail to all bidders. Bidders who provide email addresses will receive email notification of addenda in addition to mailed notification. Inquiries received after this time of a procedural nature will be answered but no changes in the Bidding Documents will be allowed.

5.4 DOCUMENT CHANGES: Interpretations, corrections and changes to the Bidding Documents will be made by Addendum. Interpretations, corrections and changes of the Bidding Documents made in any other manner will not be binding, and Bidders shall not rely upon them. Contractors are encouraged to speak with the Architect, but should be aware that answers to questions cannot be considered final until thoroughly researched and properly documented in an Addendum.

ARTICLE 6 – ADDENDA

6.1 DISTRIBUTION: Addenda will be transmitted to all who are known by the issuing office to have received a complete set of Bidding Documents or who have registered at the Architect’s web site when the electronic plans were accessed. Bidders who provide email addresses to the Architect will receive email notification in addition to mailed notification.

6.2 AVAILABILITY: Copies of Addenda will be made available for inspection wherever Bidding Documents are on file for that purpose, including the Architect’s website. Copies of Addenda may be obtained from the Architect’s office
without additional charge to plan holders and suppliers. Copies of Addenda will be emailed to Bidders who have provided the Architect with email addresses.

6.3 DATE OF ISSUE: So that all Bidders have access to mailed documents, Addenda will be issued no later than three business 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.

6.4 VERIFICATION OF ADDENDA: Each Bidder shall ascertain prior to submitting a Bid that the Bidder has received all Addenda issued, and the Bidder shall acknowledge their receipt in the Bid. Verification of such information may be made at the Architect’s website, www.MartinGardnerArch.com.

ARTICLE 7 – SUBSTITUTIONS

7.1 SPECIFIED MATERIALS: 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. Unless otherwise approved by Addendum, the Bidders and Sub-bidders shall submit a Base Bid and Alternates that include the materials and/or equipment items of manufacturers as listed in Construction Documents, plans and specifications.

7.2 REQUEST FOR SUBSTITUTION: No substitution will be considered prior to receipt of Bids unless written request for approval has been received by the Architect at least five (5) days prior to the date for receipt of Bids.

7.2.1 FORM OF SUBSTITUTION REQUEST: Preferred Form of Request CSI 1.5C. Such requests shall include the name of the material or equipment for which it is to be substituted and a complete description of the proposed substitution including drawings, performance and test data, and other information necessary for an evaluation. A statement setting forth changes in other materials, equipment or other portions of the Work, including changes in the work of other contracts that incorporation of the proposed substitution would require, shall be included. 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.

A. If the Architect approves a proposed substitution prior to receipt of Bids, such approval will be set forth in an Addendum. Bidders shall not rely upon approvals made in any other manner.

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

ARTICLE 8 – BIDDING PROCEDURES

8.1 PREPARATION OF BIDS
8.1.1 BID FORMS: Bids shall be submitted on the forms included with the Bidding Documents or as revised by Addendum.

8.1.2 COMPLETION OF BIDS: All blanks on the bid form shall be legibly executed in a non-erasable medium.

8.1.3 ASSEMBLY OF BIDS: All bids are to be sealed in two envelopes.

8.1.3.1 SEPARATION OF BID FROM BID SECURITY: The Bid Proposal must be enclosed in an envelope separate from the Bid Security. Label the envelopes with the name of the General Contractor, name of the project, “Farley Municipal Building” as appropriate to the contents of the envelope.

8.1.3.2 ATTACHMENT OF ENVELOPES: The envelope containing the Bid Proposal shall be sealed. Do not submit loose envelopes. If the Bid is mailed the envelope must be enclosed in a mailing envelope and should be stapled together or sealed in another envelope.

8.1.3.4 ADDITIONAL BID MATERIALS: If additional information is required in the Contract Documents, this information may be sealed in the envelope with the Bid or in a separate envelope. Such envelope shall be clearly marked as to its contents.

8.1.4 STATEMENT OF BID AMOUNT: Sums shall be expressed in both words and figures. In case of discrepancy, the amount written in words shall govern.

8.1.5 CHANGES ON BID FORM: Interlineations, alterations and erasures must be initialed by the signer of the Bid.
8.1.6 ALTERNATES: All requested Alternates shall be bid. Where a choice to select whether an Alternate is an addition or deduction the proper choice must be selected. If no change in the Base Bid is required, enter "No Change."

8.1.7 BID STIPULATIONS: The Bidder shall make no stipulations on the bid form nor qualify the Bid in any manner.

8.1.8 BIDDER INFORMATION: Each copy of the Bid shall state the legal name of the Bidder and the nature of legal form of the Bidder. Each copy shall be signed by the person or persons legally authorized to bind the Bidder to a contract.

8.1.9 BIDDER IDENTIFICATION: Upon request of the Owner or Architect, the Bidder shall provide evidence of legal authority to perform within the jurisdiction of the Work, provide information as to the state of incorporation of a business operating as a corporation, provide information as to other companies related to this company by ownership, authorization to operate in the state where the project is located, and where the bid is signed by an agent, that is any person not regularly employed on the staff of the Bidder, a current power of attorney attached certifying the agent’s authority to bind the Bidder.

8.2 BID SECURITY

8.2.1 BID SECURITY: Each separate proposal shall be accompanied by a bid bond, certified or cashier’s check or a credit union certified share draft in a separate envelope equal to five percent (5%) of the total amount of the proposal. Bid Security, if in the form of a bid bond, must be in the form of AIA A310-2010 Bid Bond. Submit Bid Security in a separate envelope as noted below.

8.3 SUBMISSION OF BIDS

8.3.1 All copies of the Bid, the bid security, if any, and any other documents required to be submitted with the Bid shall be enclosed in opaque envelopes and assembled as noted in 8.1.3 above.

8.3.2 VERIFICATION OF TIME OF SUBMITTAL: Iowa Public bidding laws require timely submission of bids. Bids shall be deposited at the designated location prior to the time and date for receipt of Bids. Bids received after the time and date for receipt of Bids will be returned unopened. Where a time stamp is available it shall be used to show proof of timely submission, the time shown by the stamp will be final. Where times are affixed manually, the time shall be determined by mobile phone and the time of submission noted on the bid.

8.3.3 RESPONSIBILITY FOR DELIVERY OF BIDS: The Bidder shall assume full responsibility for timely delivery at the location designated for receipt of Bids. Failure of the US Mail or other service to make delivery on time is not acceptable.

8.3.4 BID MEDIUM: All bids must be submitted in written form. Oral, telephonic, telegraphic, and facsimile or other electronically transmitted bids will not be considered.

8.4 MODIFICATION OR WITHDRAWAL OF BID

8.4.1 BID MODIFICATION:

.1 MODIFICATION PRIOR TO TIME DUE: A bidder may request the return of a bid that has been submitted and may revise and resubmit a bid prior to the time bids are due. Revised bids must be in full compliance with these Instructions to Bidders. If the bid is to be resubmitted, the original bid form may be modified and the changes initialed by the person signing the form or a new bid form prepared and submitted to replace the original. The amount of the Bid Security must match any revisions in the bid amount.

.2 MODIFICATION AFTER TIME DUE: A Bid may not be modified by the Bidder after the time that bids are due or after they are opened.

8.4.2 BID WITHDRAWAL: The Bidder may withdraw his bid from consideration after the deadline for submittal and after the opening of the bids provided that the Owner has not formally accepted the bids. Once the bid has been formally accepted by the Owner, withdrawal of the bid requires forfeiture of the Bid Security.
8.5 OPENING OF BIDS: Bids for this project will be opened at the date and time noted in Article 1 above. All properly prepared bids will be read aloud as they are opened. Bids not accompanied by a Bid Security and completed DBE form will be returned unopened. Bids to public agencies will be tabulated and the results of all bids will be made available to all Bidders.

8.6 REJECTION OF BIDS
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 irregular is subject to rejection.

8.7 ACCEPTANCE OF BID (AWARD)
8.7.1 INTENT TO AWARD: It is the intent of the Owner to award a Contract to the lowest qualified Bidder provided the Bid has been submitted in accordance with the requirements of the Bidding 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.
8.7.2 REFERRAL OF BIDS FOR ACCEPTANCE: Provided the Owner finds the bids to be in their best interests, the contracts will be awarded to the lowest responsible bidder considering base bid, any selected alternates, unit prices, and that personnel meet the minimum qualifications.
8.7.3 WAIVER OF IRREGULARITIES: The Owner reserves the right to reject any or all bids, to waive minor informalities and to enter into such contract as it shall deem for the best interest of the Owner.
   A. 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 low Bidder on the basis of the sum of the Base Bid and Alternates accepted.

ARTICLE 9 – POST-BID INFORMATION
9.1. UNIT PRICE BID FORM FOR BUILDING CONSTRUCTION CONTRACT
9.1.1 SUBMITTAL: This form must be completed and included with the general construction bid form.
9.1.2 USE OF INFORMATION DURING BIDDING: These unit prices may be used for comparison purposes to determine if the Bid of the apparent low Bidder is in the best interests of the Owner. Bidders who fail to submit this form with their bid may be disqualified from the project.
9.1.3 USE OF THE INFORMATION DURING CONSTRUCTION: The prices provided on this form are to be used for addition or deletion of Work for the items indicated on the form. Unless otherwise directed, these costs are to be used to compute the additional cost or savings when the project scope of work is modified. The Owner reserves the right to request recomputation of proposed costs where significant quantities of material are involved in the change.

9.2 CONTRACTOR’S QUALIFICATION STATEMENT Bidders to whom award of a Contract is under consideration may be requested to submit a properly executed AIA Document A305, Contractor’s Qualification Statement.
9.2.1 OWNER’S FINANCIAL CAPABILITY
The Owner shall, at the request of the Bidder to whom award of a Contract is under consideration and no later than seven days prior to the expiration of the time for withdrawal of Bids, furnish to the Bidder reasonable evidence that financial arrangements have been made to fulfill the Owner’s obligations under the Contract. Unless such reasonable evidence is furnished, the Bidder will not be required to execute the Agreement between the Owner and Contractor.

9.3 SUBMITTALS REQUIRED BEFORE EXECUTION OF CONSTRUCTION CONTRACT
9.3.1 PROJECT MANAGER AND PROJECT SUPERINTENDENT RESUMES FOR BUILDING CONSTRUCTION CONTRACT:
   .1 To be submitted within 24 hours of the opening of bids by the apparent low Prime Contractors. In the case of close bids the Architect may request additional contractors to submit this form for further evaluation.
   .2 Resumes shall demonstrate education and experience requirements shown in Section 00800.1.3.
9.3.2 Contractors who fail to submit this proposal by the time requested or whose personnel qualifications fail to meet the required standards may be disqualified.
9.3.4 SUBMITTAL OF ADDITIONAL ITEMS FOR ALL CONTRACTS: Prior to execution of the final contract for construction the following items will be required to be submitted.
   .1 PROOF OF INSURANCE
   .3 SCHEDULE OF PROJECT VALUES
   .4 LIST OF SUBCONTRACTORS AND SUPPLIERS.
   .5 OTHER INFORMATION NOTED HEREIN
9.3.5 LIST OF SUBCONTRACTORS AND SUPPLIERS FOR BUILDING CONSTRUCTION CONTRACT: The Bidder shall, as soon as practicable or as stipulated in the Bidding Documents, after notification of selection for the award of a Contract, furnish to the Owner through the Architect in writing:
   .1 a designation of the Work to be performed with the Bidder’s own forces;
   .2 names of the manufacturers, products, and the suppliers of principal items or systems of materials and equipment proposed for the Work; 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.
9.3.6 QUALIFICATIONS OF THE CONSTRUCTION TEAM: 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 in the list of subcontractors and suppliers to furnish and perform the Work described in the Bidding Documents.
9.3.7 REJECTION OF SUBCONTRACTORS OR SUPPLIERS: 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 with an adjustment in the Base Bid or Alternate Bid to cover the difference in cost occasioned by such substitution. 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.
9.3.8 USE OF SPECIFIED ENTITIES: Persons and entities proposed by the Bidder and to whom the Owner and Architect have made no reasonable objection must be used on the Work for which they were proposed and shall not be changed except with the written consent of the Owner and Architect.

ARTICLE 10 – PERFORMANCE BOND AND PAYMENT BOND
10.1 BOND REQUIREMENTS: The successful bidder will be required to furnish Performance and Labor and Material Payment Bond for each project on AIA -312-2010 equal to One Hundred Percent (100%) of the contract price. Contractor is to include cost of such bonds in the Base Bid.
10.2 COST OF BOND: If the furnishing of such bonds is stipulated in the Bidding Documents, the cost shall be included in the Bid.
10.3 DELIVERY OF BOND: The Bidder shall deliver the required bonds to the Owner not later than the date of delivery of the executed Contract. If the Work is to be commenced prior thereto in response to a Letter of Intent, the Bidder shall, upon request and 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.
10.4 The attorney-in-fact who executes the required bonds on behalf of the surety to affix thereto a certified and current copy of the power of attorney.

ARTICLE 11 – FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR
11.1 GENERAL CONTRACT: Unless otherwise required in the Bidding Documents, the Agreement for the Work will be written on AIA Document A101, Standard Form of Agreement between Owner and Contractor Where the Basis of Payment Is a Stipulated Sum. - END OF SECTION
PART 1 - GENERAL

1.1 GENERAL
A. The "General Conditions of the Contract for Construction, "AIA Document A201-2017, Articles 1 through 15 inclusive, is a part of ALL CONTRACTS FOR THIS PROJECT and is bound herein.
B. The following supplements modify, change, delete from or add to the "General Conditions of the Contract for Construction, "AIA Document A201-2017". Where any Article of the General Conditions is modified or any Paragraph, Subparagraph or Clause thereof is modified or deleted by these Supplementary Conditions, the unaltered provisions of that Article, Paragraph, Subparagraph or Clause shall remain in effect.

1.2 ARTICLE 1: CONTRACT DOCUMENTS
A. Add new subparagraph, "1.1.9 PRODUCTS: The term product as used in these Supplementary Conditions includes materials, systems and equipment."

1.3 ARTICLE 3: CONTRACTOR
A. Add the following to paragraph 3.3.1 "Management of the project by an Owner or Officer of the Company or another designated employee shall be fulfilled by meeting the requirements of section 3.9."
B. Rename and insert the following in lieu of the existing paragraph 3.9:

"3.9 PROJECT MANAGEMENT AND SUPERVISORY PERSONNEL
3.9.1 The Contractor shall employ competent personnel to fulfill the proper management and supervision of the project. As a minimum a project superintendent and project manager and required assistants shall be employed to manage the project. These persons shall represent the Contractor and communications given to either the Project Manager or the Superintendent shall be as binding as given to the Contractor. Superintendent and Project Manager may be one individual. Superintendent shall be on site construction personnel are working at the site.

3.9.2 Project Manager: The Contractor shall employ a competent Project Manager who shall attend all project meetings, shall be responsible for review and processing of all shop drawings, shall have authority to direct the Superintendent, Subcontractors, and Suppliers, and shall be the primary point of contact for all contract matters on the project. The Project Manager may have assistants as required for the project. The Project Manager shall be in fiscal and time schedule control of the Project. The Project Manager may manage more than one project at a time provided that service to this project is provided in a timely manner. Project managers must be experienced in construction with experience in contracts, scheduling, and related on site experience. Project managers shall have a minimum of five years as a project superintendent or five years as a project manager or be able to demonstrate broad construction experience and knowledge over a long period of time that has prepared the individual for management of the project.

3.9.3 Superintendent: The superintendent shall be considered to be a project foreman who is at the site and involved in the project as note below. Superintendents are considered a part of the project work force and shall in addition to supervisory functions provide skilled construction work. Inquiries and questions at the jobsite shall be first directed to the superintendent. Only upon his direction shall questions from the jobsite be directed to the Architect. The superintendent shall coordinate onsite construction activities with the Owner when needed to facilitate construction or resolve onsite construction conflicts including when the Owner is occupying the building, providing part of the building labor or materials, or has separate Contractors working on the project. Questions regarding construction documents, which are not clearly apparent to the superintendent shall be directed to the
Architect for interpretation. As a minimum Superintendents shall have five years of successful experience as a lead framing carpenter and three years or five projects as a project superintendent or be able to demonstrate broad construction experience and knowledge over a long period of time that has prepared the individual for management of the project.

3.9.4 Submittal of Qualifications (Applies only to Building Construction Contract): The Contractor, as soon as practical after the award of the Contract, but prior to formal acceptance of the Contractor’s proposal by the Owner, shall furnish in writing to the Owner through the Architect the name and qualifications of the proposed Project Manager and Superintendent. The Architect may reply within 14 days to the Contractor in writing stating (1) whether the Owner or Architect has reasonable objection to the proposed Project Manager or Superintendent or (2) that the Architect requires additional information or time to review. Upon notice that a candidate is not acceptable the Contractor shall submit the name and qualifications of alternate personnel or withdraw their proposal for the project. If no written objection is filed within 14 days the Contractor’s selection shall be considered acceptable. The Contractor shall not employ on this project any Project Manager or Superintendent to whom the Owner or Architect has made reasonable and timely objection.

3.9.5 Change in Personnel: The Superintendent and Project Manager shall be assigned to the project for the duration of the project, and shall be replaced on the project only if dismissed from employment with the construction company, has an illness that would require long absences from the work site, is requested to be removed by the Owner and Architect, or upon request by the General Contractor for approval of the Owner and Architect. Any change in the Superintendent or Project Manager on the project shall be requested by the Contractor in writing at least two weeks prior to the change and shall be approved by the Architect and Owner in writing prior to any change. Any of the following will be deemed to be a failure to pursue the project in a timely manner and will be pursued according to Article 1.07 below or other provisions of the General Conditions as may be appropriate.

1. Absence from the project by the Superintendent at critical times in the project or when the construction trades are working at the site.
2. Reassignment of the Superintendent to other projects where the Superintendent is required to be full-time.
3. Repeated failure of the Superintendent or Project Manager to respond in a timely manner to inquiries from the Owner, Subcontractors, Suppliers, or the Architect.
4. Repeated failure of the Superintendent or Project Manager to attend project meetings.

ARTICLE 4: ARCHITECT

A. Add the following sentence to subparagraph, “4.1.1: The term Architect as used in the Contract Documents shall refer to Martin Gardner Architecture, P.C., Kyle D. Martin, A.I.A., President, 700 11th St., Suite 200, Marion, IA 52302, or his authorized representative.”

ARTICLE 9: PAYMENTS AND COMPLETION

A. Add new subparagraph, “9.3.4 Owner will make payment on Contract on or about the 15th day of each month of 95% of value based on contract price of labor and materials incorporated in the work, and of materials suitably stored on the site as of the 1st day of the month, less the aggregate of previous payments. Request for Payment (3 copies) shall be filed with the Architect by the 5th day of the month.”

B. Add new subparagraph, “9.10.6 Final payment will be made after 45 days from date of final acceptance and receipt of the following in 3 copies each:
1. Contractor’s Affidavit of Payment of Debts and Claims, AIA Form G706.
2. All guarantees, letters of certification, instruction manuals, and other documents required by these Specifications.
3. Consent of Surety Company to Final Payment, AIA Form G707.
4. Itemized statement in duplicate showing the amount of Iowa Sales Tax, or use tax, if any, and to who paid, on all materials, which have become a part of this contract.”
1.6 ARTICLE 11: INSURANCE

A. In subparagraph 11.1.1, in the first line following the word "maintain", insert the words "in a company or companies licensed to do business in Iowa."

B. Add new clause 11.1.1.1 "Liability insurance shall include all major divisions of coverage and be on a comprehensive basis including:

1. The Contractor shall purchase and maintain such insurance as will protect the contractor from claims set forth below which may arise out of or result from the Contractor’s operations under the contract, whether such operations be by the Contractor or by any subcontractor or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable:
   a. Claims under Workers’ Compensation, disability benefit, and other similar employee benefit acts;
   b. Claims for damages because of bodily injury, occupational sickness or disease, or death of the Contractor’s employee;
   c. Claims for damages because of bodily injury, sickness, or disease, or death of any person other than the Contractor’s employee.

2. The insurance to be maintained by Contractor shall be written as follows:
   a. Workers’ Compensation and Employers Liability Insurance as prescribed by Iowa law minimum limits shown below covering Employers Liability:
      - Bodily Injury by accident $500,000 each accident
      - Bodily Injury by disease $500,000 each accident
      - Bodily Injury by disease $500,000 policy limit
   b. Commercial General Liability Insurance Combined Single Limits shown below covering Bodily Injury, Property Damage and Personal Injury:
      - General Aggregate Limit $2,000,000
      - Products-Completed Operations Aggregate Limit $2,000,000
      - Personal and Advertising Injury Limit $1,000,000
      - Each Occurrence Limit $1,000,000
      - Fire Damage Limit (for any one fire) $50,000
      - Medical Damage Limit (any one person) $5,000
   c. This insurance must include the following features:
      1. Coverage for all premises and operations. The policy shall be endorsed to provide the Aggregate Per Project Endorsement.
      2. Personal and Advertising Injury.
      3. Operations by independent contractors.
      4. Contractual Liability coverage.
      5. Coverage for property damage underground or damaged by explosion or collapse (XCU).
   d. Automobile Liability insurance, covering all owned, non-owned, hired and leased vehicles with a minimum combined single limit for Bodily Injury and Property Damage of $1,000,000 per accident. Insurance must include Contractual Liability.
   e. Umbrella/Excess Insurance: At Contractor’s option, the limits specified in may be satisfied with combination of primary and Umbrella/Excess Insurance.
   f. Additional Insured: The Contractor will include the owner as additional insured on all policies except Workers’ Compensation as respects all work performed for the jurisdiction.
SPECIFICATIONS:  Farley Municipal Building  
206 1st Street N., Farley, Iowa 52046  
ARCHITECT PROJECT #I1728.01  

g. Insurance Certificates- Each policy noted above shall be issued by an insurance company authorized to write such insurance in the State of Iowa and shall be reasonably acceptable to owner. These insurance policies shall not be canceled without at least 10 days prior written notice to owner. A properly executed Certificate of Insurance showing evidence of these insurance Requirements shall be delivered to owner prior to the Commencement of Operations.  

h. The company and the insured expressly agree and state that the purchase of this policy of insurance by the insured does not waive any of the defenses of governmental immunity available to the insured under Iowa Code Section 670.4 as it now exists and as it may be amended from time to time. The company and the insured further agree and state that this policy of Insurance shall cover only those claims not subject to the defense of governmental immunity under Iowa Code Section 670.4 as it now exists and as it may be amended from time to time.  

3. Subrogation: To the extent that such insurance is in force and collectible and to the extent permitted by law, owner and Contractor each hereby releases and waives all right of recovery against the other or anyone claiming through or under each of them by way of subrogation or otherwise. The foregoing release and waiver shall apply to damage to contractor’s equipment, tools, and other personal property as well as automobiles.  

C. Builders Risk insurance shall be purchased by the Contractor.  

1.7 ARTICLE 14: TERMINATION OF CONTRACT  
A. Add new subparagraph 14.1.1.5 to read as follows, “Persistently or repeatedly refuses or fails to supply enough properly skilled workers or proper materials or employs subcontractors or suppliers who persistently or repeatedly refuse or fail to supply enough properly skilled workers or proper materials in a timely manner so as to keep the construction project on schedule.” 

B. Add new subparagraph 14.1.5, “If work or construction is stopped directly or indirectly by or as the result of the order or action of any federal or state authority or of any Court because of the occurrence or existence of a national emergency, and the circumstances or conditions are such that it is and will be impracticable to proceed with such work or construction, the contract may be terminated. When this contract is so terminated the Contractor shall be paid for all work or construction executed and completed at that time, and also for any materials or equipment on hand specially procured for that project. If the parties cannot agree as to the termination of this contract, or as to the amount of payment to be made, either party may have said question or questions determined by bringing an appropriate action therefore in the District Court of the state of the county in which the project is located.”  

END OF SECTION
FORM OF PROPOSAL FOR
BUILDING CONSTRUCTION

Farley Municipal Building
206 1st Street N.
Farley, Iowa 52046

DATE: _____________________________
ARCHITECT’S PROJECT NO: I1728.01

PROPOSAL FOR GENERAL CONSTRUCTION

The proposed project consists of a new 8,000 square foot municipal city building. Construction will be slab on grade, wood framing with brick veneer. Project consists of interior wood framing, gypsum drywall, aluminum window systems, hollow metal and wood doors with frames, flooring and casework finishes. Full electrical, HVAC and plumbing systems are included. Project will have full exterior site development including parking lots and sidewalks.

Name of Bidder: __________________________________________ a corporation/a partnership/an individual (strike out Inapplicable terms) doing business as ____________________________.

To: City of Farley
114 1st Street N.
Farley, Iowa 52046

CERTIFICATIONS Base Bid, Single-Prime (All Trades) Contract: The undersigned Bidder, having carefully examined the Procurement and Contracting Requirements, Conditions of the Contract, Drawings, Specifications, and all subsequent Addenda, as prepared by Martin Gardner Architecture and the Architect’s consultants, having visited the site, and being familiar with all conditions and requirements of the Work, hereby agrees to furnish all material, labor, equipment and services, including all scheduled allowances, necessary to complete the construction of the above-named project, according to the requirements of the Procurement and Contracting Documents, for the stipulated sum of:

The undersigned, having examined the contract documents and having familiarized himself with the nature of the work to be done and the conditions under which the work will be performed, in accordance with the drawings and specifications proposes to provide the required labor, services, materials and equipment, and to perform the work required for completion of the project at the price set forth hereafter.

ACKNOWLEDGEMENT OF ADDENDA: The undersigned Bidder acknowledges receipt of and use of the following Addenda in the preparation of this Bid:

Addendum No. 1, dated ____________________.
Addendum No. 2, dated ____________________.
Addendum No. 3, dated ____________________.
Addendum No. 4, dated ____________________.

Base Bid: _______________________________($_____________________________)

05/07/2019
Commencement Date: Commencement of construction will be contingent upon the Owner giving a Written Notice to Proceed.

Completion Dates: Contractor shall achieve Substantial Completion for this project on

______________________________________ (Insert Date) with Final Completion no later than thirty (30) days after the date indicated above.

The undersigned bidder states that this proposal is made in conformity with contract documents and agrees that, in the event of any discrepancies or differences between any condition of his proposal and the contract documents prepared by Martin Gardner Architecture, P.C., Kyle D. Martin, A.I.A., the provisions of the latter shall prevail.

The contractor in submitting this proposal agrees that the above schedule is acceptable and that he has made all provisions in his proposal to deliver the project by the above date provided the Owner accepts the above proposal or combination of proposals and submits to the contractor a Notice to Proceed or a contract for construction within forty-five (45) working days of the receipt of bids. If Notice to Proceed or the contract is received after forty-five (45) days than that number of days shall be added to the above completion date.

All of the above to commence after receipt of either a written Notice to Proceed or the executed Agreement furnished by the Owner, subject to factors which may delay, extend, suspend or terminate the work as set forth in the contract documents.

The contractor hereby submits this proposal in an envelope marked with the project name and “Proposal”. In a separate envelope accompanying the proposal shall be a Bid Bond as noted in the Instructions to Bidders. Mark this envelope with the project name and “Bid Bond”

BIDDER: _____________________________________________________________________________ Corporate Seal (if any)

BY: ________________________________________________________________________________
    (Authorized Signature)

TITLE: ______________________________________________________________________________
FORM OF PROPOSAL FOR
GENERAL CONSTRUCTION UNIT PRICES

Farley Municipal Building
206 1st Street N.
Farley, Iowa 52046

DATE: _____________________________
PROJECT NO: I1728.01

The apparent low bidder shall submit this form with their general construction bid.

Name of Bidder: ___________________________ a corporation/a partnership/an individual (strike out Inapplicable terms) doing business as ________________________________.

To: City of Farley
114 1st Street N.
Farley, Iowa 52046

The undersigned, having examined the contract documents and having familiarized himself with the nature of the work to be done and the conditions under which the work will be performed, in accordance with the drawings and specifications proposes to provide the required labor, services, materials and equipment, and to perform the work required for completion of the project at the price set forth hereafter.

UNIT PRICE TABULATION SHEET:
This table must be submitted by the each General Contractor with their bid proposal. The Owner reserves the right to reject the bid of the Contractor should the costs shown appear unreasonable. Prices are to be used in computing additional costs and credits for work on the project.

<table>
<thead>
<tr>
<th>NO.</th>
<th>ITEM</th>
<th>UNIT</th>
<th>UNIT PRICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>PLACEMENT OF 6&quot; GRANULAR SUBBASE AT CONCRETE FLOORS, SIDEWALK, AND STOOP INCLUDING COMPACTION WHERE REQUIRED. OWNER TO PROVIDE MATERIAL.</td>
<td>S.Y.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>OVER-EXCAVATION OF UNSATISFACTORY MATERIAL, WITHIN BUILDING PERIMETER, STOOPS, OR FROST PROTECTED SLAB ON GRADE. REJECTED MATERIAL TO BE PLACED ON SITE AS DIRECTED BY OWNER.</td>
<td>C.Y.</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>ENGINEERED GRANULAR BACKFILL PLACEMENT WITHIN BUILDING PERIMETER, STOOPS, OR FROST PROTECTED CONCRETE SLAB ON GRADE BELOW DECKS INCLUDING COMPACTION. OWNER TO PROVIDE MATERIAL.</td>
<td>C.Y.</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>CONCRETE FILL BELOW FOOTINGS IN LIEU OF COMPACTED FILL</td>
<td>C.Y.</td>
<td></td>
</tr>
</tbody>
</table>
The undersigned bidder states that this proposal is made in conformity with contract documents and agrees that, in the event of any discrepancies or differences between any condition of his proposal and the contract documents prepared by Martin Gardner Architecture, P.C., Kyle D. Martin, A.I.A., the provisions of the latter shall prevail.

The contractor in submitting this proposal agrees that the above schedule is acceptable and that he has made all provisions in his proposal to deliver the items shown provided the Owner accepts the previously submitted lump sum proposal or combination of proposals and submits to the contractor a Notice to Proceed or a contract for construction within forty-five (45) working days of the receipt of bids. If Notice to Proceed or the contract is received after forth-five (45) days than that number of days shall be added to the above completion date.

The contractor hereby submits this unit price proposal.

BIDDER: ___________________________________________________________________________ Corporate Seal (if any)

BY: _________________________________________________________________________________
    (Authorized Signature)

TITLE: ______________________________________________________________________________
A. Bidder: ____________________________________________________.
B. Project Name: Farley Municipal Building
C. Project Location: 206 1st Street N., Farley, Iowa 52046
D. Owner: City of Farley
E. Architect: Martin Gardner Architecture, P.C.
F. Architect Project Number: I1728.01

1.2 BIDDER’S CHECKLIST
A. In an effort to assist the Bidder in properly completing all documentation required, the following checklist is provided for the Bidder’s convenience. The Bidder is solely responsible for verifying compliance with bid submittal requirements.
B. Attach this completed checklist to the outside of the Submittal envelope. Check box that items are completed.

<table>
<thead>
<tr>
<th>No.</th>
<th>Item</th>
<th>Completed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Used the Bid Form provided in the Project Manual.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Prepared the Bid Form as required by the Instructions to Bidders and include the Unit Price Bid form.</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Indicated on the Bid Form the Addenda received.</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Attached to the Bid Form: Bid Bond OR a certified check for the amount required.</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Bid envelope shows name and address of the Bidder.</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Bid envelope shows the Bidder’s Contractor’s License Number.</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Bid envelope shows name of Project being bid.</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Bid envelope includes any product, warranty, or other information requested.</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Envelopes are marked as to bid and bond and envelopes are sealed inside third envelope or stapled together.</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Verified that the Bidder can provide executed Performance Bond and Labor and Material Bond.</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Verified that the Bidder can provide Certificates of Insurance in the amounts indicated.</td>
<td></td>
</tr>
</tbody>
</table>

END OF SECTION
DIVISION 01 – GENERAL REQUIREMENTS

SECTION 011000 – SUMMARY

PART 1 - GENERAL

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

1.2 SUMMARY
A. Section Includes:
1. Project information. Section 1.3
2. Work covered by Contract Documents. Section 1.4
3. Work by Owner. Section 1.5
4. Access to Site. Section 1.6
5. Use of Site. Section 1.7
6. Coordination with Occupants. Section 1.8
7. Work Restrictions. Section 1.9
8. Specification and Drawing Conventions. Section 1.10
9. Miscellaneous Provisions. Section 1.11

B. Related Requirements:
1. Section 015000 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner’s facilities.

1.3 PROJECT INFORMATION
A. Project Identification: Farley Municipal Building
1. Project Location: 206 1st Street N., Farley, Iowa 52046

B. Owner: City of Farley
1. 114 1st Street N., Farley, Iowa 52046

C. Architect: Martin Gardner Architecture, P.C.
1. Project Manager: Brian J Stark, Senior Project Manager, Strawberry Point Office, brians@martingardnerarch.com.
3. Address:
   a. Marion Office: 700 11th Street, Suite 200, Marion, Iowa 52302, 319-377-7604.
   b. Strawberry Point Office: 11502, 390th Street, Strawberry Point, Iowa 52076, 563-933-4712.

D. Architect’s Consultants: The Architect has retained the following design professionals who have prepared designated portions of the Contract Documents:
1. Civil Engineer: MSA Professional Services, Inc., Jake Huck, 400 Ice Harbor Drive, Dubuque, Iowa 52001, 563.584.2883, ihuck@msa-ps.com.
2. Structural Engineer: Hooting Coyote LLC, Todd Birkel, 1553 West Morley Road, Elizabeth, Illinois 61028, 815.858.5514, tbirkel@hootingcoyote.com.

1.4 WORK COVERED BY CONTRACT DOCUMENTS
A. The Work of Project is defined by the Contract Documents and consists of the following:
1. The proposed project consists of a new 8,000 square foot municipal city building. Construction will be slab on grade, wood framing with brick veneer. Project consists of interior wood framing, gypsum drywall, aluminum window systems, hollow metal and wood doors with frames, flooring and
casework finishes. Full electrical, HVAC and plumbing systems are included. Project will have full exterior site development including parking lots and sidewalks.

B. Type of Contract:
1. Project will be constructed under single prime contract.

1.5 WORK BY OWNER:
A. General: Cooperate fully with Owner so work may be carried out smoothly, without interfering with or delaying work under this Contract or work by Owner. Coordinate the Work of this Contract with work performed by Owner.
B. Subsequent Work: Owner will perform the following additional work at site after Substantial Completion. Completion of that work will depend on successful completion of preparatory work under this Contract.
1. Installation of furniture and furnishings.
2. Landscaping beyond final grading and initial seeding for landscape erosion control and establishment of grass cover.
3. Telephone equipment.
5. Access control system.

1.6 ACCESS TO SITE
A. The project contractors shall have use of the entire site for the duration of construction.
B. Contractors shall coordinate any required street closings with the local Jurisdiction Having Authority. Should closings be required, coordinate with local Authorities Having Jurisdiction.
C. Contractors shall use existing driveways to the site for access and shall protect street and driveways from damage during construction and repair or replace any paving damaged during construction.

1.7 USE OF SITE:
1. Limits: Confine construction operations to areas of the project site where construction operations are outlined on the project drawings.
2. Trees and Plant Material: Contractor shall not remove or damage any trees or shrubs which are not noted for removal without specific permission in advance. Protect all plant materials not noted for removal.
3. Existing Buildings to Remain: The existing building access doors shall be kept clear at all times, the existing dock area may be closed for limited periods of time, and access to other areas used by the Owner shall be kept clear at all times. Storage in all areas shall be coordinated with the Owner’s on-site personnel.
4. Driveways, Walkways and Entrances: Keep driveways and entrances serving premises clear and available to emergency vehicles at all times. Do not use these areas for parking or storage of materials. Block the adjacent public right-of-ways only when needed and follow local guidelines for public notice of street closing.
5. Deliveries: Schedule deliveries to minimize use of driveways and entrances by construction operations. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
6. Onsite Storage: At times during this construction process available areas of the site will be limited for storage of materials. Prime Contractor(s) are to work together to coordinate the storage of materials on site.

1.8 WORK RESTRICTIONS
A. General: Comply with restrictions on construction operations, including limitations on use of public streets, local noise ordinances, and with other requirements of authorities having jurisdiction. Consider building occupants and neighbors of the project site when scheduling work operations.
B. On-Site Work Hours:
1. Limit work on the project to normal business working hours of 7:00 a.m. to 8:00 p.m., Monday through Friday, unless otherwise indicated or required by local ordinance.
2. Weekend Hours: Weekend operations are allowed. Limit operations to 7:00 a.m. to 8:00 p.m.
5. Hours for Noisy Activity: See D below.

C. Utility Interruptions:
   1. Existing Utilities: Do not interrupt utilities serving facilities occupied by neighbors unless all persons
      affected by the interruption are notified 72 hours in advance.
   2. Notify Owner and Architect of impending outages as soon as possible, but not less than 72 hours in
      advance.
   3. Where outages are long term or will adversely affect the adjacent occupant’s operations, provide
      temporary utility supply during the outage. Verify duration of outages with Owner and neighbors
      affected by the power outage.

D. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration,
   odors, or other disruption to Owner occupancy with Owner.
   1. Notify Owner, and Architect not less than 24 hours in advance of proposed disruptive operations.
   2. Obtain Owner’s written permission before proceeding with disruptive operations.

E. Controlled Substances: Use of tobacco products on this project site is subject to the laws of the State of Iowa
   regarding use of tobacco products in public buildings and public areas.

F. Employee Identification: Not required.

G. Employee Screening: Not required.

1.9 SPECIFICATION AND DRAWING CONVENTIONS

A. Specification Content: The Specifications use certain conventions for the style of language and the intended
   meaning of certain terms, words, and phrases when used in particular situations. These conventions are as
   follows:
   1. Imperative mood and streamlined language are generally used in the Specifications. The words
      "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is
      used within a sentence or phrase.
   2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.
   3. Portions of these specifications are of the brief or "streamlined" type and include incomplete
      sentences. Omissions of words or phrases such as "the Contractor shall," "as noted on the
      Drawings," "according to the plans," "an," "the," "and," and "all" are intentional. Omitted words
      or phrases shall be supplied by inference. Words "provide" and "work" shall mean that each
      Contractor shall furnish, install and connect up complete, in operative condition and use, all
      materials, equipment, apparatus and required appurtenances of the particular item to which it has
      reference.
   4. Unless otherwise referenced all portions of the Specifications apply to all Prime Contracts for this
      project.

B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections
   in the Specifications.

C. Drawing Coordination: Requirements for materials and products identified on Drawings are described in
   detail in the Specifications. One or more of the following are used on Drawings to identify materials and
   products:
   1. Terminology: Materials and products are identified by the typical generic terms used in the individual
      Specifications Sections. Certain brand names when used in the drawings to identify a material, are
      not intended to indicate the use of that product exclusively unless so identified in the specifications for
      that product.
   2. Keynoting: Materials and products may be identified by reference keynotes to a list of notes on the
      drawings and/or referencing Specification Section numbers found in this Project Manual.

1.11 MISCELLANEOUS PROVISIONS: Not Applicable.
DIVISION 01 – GENERAL REQUIREMENTS

SECTION 012200 - UNIT PRICES

PART 1 - GENERAL

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

1.2 SUMMARY
   A. Section includes administrative and procedural requirements for unit prices.
   B. Related Requirements:
      1. Section 012600 "Contract Modification Procedures" for procedures for submitting and handling
         Change Orders.
      2. Section 014000 "Quality Requirements" for general testing and inspecting requirements.

1.3 DEFINITIONS
   A. Unit price is an amount incorporated in the Agreement, applicable during the duration of the Work as a
      price per unit of measurement for materials, equipment, or services, or a portion of the Work, added to or
      deducted from the Contract Sum by appropriate modification, if the scope of Work or estimated quantities of
      Work required by the Contract Documents are increased or decreased.
   B. Unit Prices are provided to expedite the computation of materials used where quantities cannot be
      anticipated prior to the start of construction or to expeditiously resolve unforeseen conditions that might arise
      so that construction is not delayed while pricing issues are resolved.
   C. Unit Prices are to be provided based upon the units of measure designated and shall be computed such that
      as little as one unit of material might be provided under this pricing. In situations where large quantities of
      material are required, the Contractor may be requested to re-examine the costs of providing and placing the
      materials to reflect the actual conditions encountered.

1.4 PROCEDURES
   A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes,
      overhead, and profit unless specifically noted otherwise in the specification section for the material or on the
      Unit Price Proposal Form.
   B. Approval to Use Unit Prices:
      1. Unit Prices for Remedial Work: Contractors shall notify the Architect when remedial work is required
         and conditions are present where unit prices may be the basis for computing costs for the
         remediation. Upon notice, the Architect may review the specific project conditions or request
         additional testing. Upon verification of the conditions, the Architect shall either notify the Contractor
         of alternate methods of resolution of the condition or authorize the Contractor to proceed with the
         remedial operation. For situations involving large quantities of material, the Architect may request
         that the Contractor re-examine the unit prices to reflect the actual conditions of encountered.
      2. Unit Prices to Resolve Allowance Costs in the Project: Where an allowance has been noted in the
         contract documents which are subject to provisions of Section 012100, the Unit Prices noted on the
         Unit Price Proposal form shall be used to calculate the actual cost of the work under the Allowance.
         Work under this provision requires no additional authorization.
   C. Measurement and Payment: Contractors are to provide delivery receipts for most unit price measurements.
      See individual Specification Sections for work that requires establishment of unit prices. Methods of
      measurement and payment for unit prices are specified in those Sections or on the Unit Price Proposal Form.
   D. Owner reserves the right to reject Contractor’s measurement of work-in-place that involves use of established
      unit prices and to have this work measured, at Owner’s expense, by an independent surveyor acceptable to
      Contractor.
E. List of Unit Prices: A schedule of unit prices is included in the Unit Price Proposal Form. Specification Sections for the materials contain material requirements and may contain additional information for materials described under each unit price.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF UNIT PRICES: See Unit Price Proposal Form
DIVISION 01 - GENERAL REQUIREMENTS

SECTION 012500 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

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

1.2 SUMMARY
   A. Section includes administrative and procedural requirements for substitutions.
   B. Related Requirements:
      1. Section 012100 "Allowances" for products selected under an allowance.
      2. Section 012300 "Alternates" for products selected under an alternate.
      3. Section 016000 "Product Requirements" for requirements for submitting comparable product
         submittals for products by listed manufacturers.

1.3 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. Contractor Substitutions for Convenience: Changes proposed by the Contractor that are not required
         in order to meet other Project requirements but may offer time, ease the ordering process or offer
         other advantages to Contractor
      3. Contractor Substitutions for Cost: Changes proposed by the Contractor that are not required by the
         project but will result in a cost reduction for the project.
      4. Owner Substitutions for Convenience: Changes proposed by the Owner that are not required in
         order to meet Project requirements, but provide the Owner with a perceived better project condition
         or other advantage.
      5. Owner Substitutions for Cost: Changes proposed by the Owner strictly to reduce the project cost.

1.4 ACTION SUBMITTALS
   A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication
      or installation method to be replaced. Include Specification Section number and title and Drawing numbers
      and titles.
      1. Substitution Request Form:
         Use CSI Form 13.1A or similar form as shown in the Appendix of this Project Manual.
      2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
         a. Statement indicating why specified product or fabrication or installation cannot be provided,
            if applicable.
         b. Coordination information, including a list of changes or revisions needed to other parts of the
            Work and to construction performed by Owner and separate contractors, that will be
            necessary to accommodate proposed substitution.
         c. Detailed comparison of significant qualities of proposed 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.
SPECIFICATIONS: Farley Municipal Building  
206 1st Street N., Farley, Iowa 52046  
ARCHITECT PROJECT #11728.01

d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
e. Samples, where applicable or requested.
f. Certificates and qualification data, where applicable or requested.
g. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
i. Research reports evidencing compliance with building code in effect for Project, from ICC-ES.
j. 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.
k. Cost information, including a proposal of change, if any, in the Contract Sum.
l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

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

1.6 PROCEDURES
A. Coordination: Revise 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 on discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
b. Substitution request is fully documented and properly submitted.
c. Requested substitution will not adversely affect Contractor's construction schedule.
d. Requested substitution has received necessary approvals of authorities having jurisdiction.
e. Requested substitution is compatible with other portions of the Work.
f. Requested substitution has been coordinated with other portions of the Work.
g. Requested substitution provides specified warranty.
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.

C. Substitutions for Convenience: Architect will consider requests for substitution if received within 60 days after commencement of the Work. Requests received after that time may be considered or rejected at discretion of Architect.

1. Conditions: Architect will consider Contractor’s request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
   a. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner’s additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
   b. Requested substitution does not require extensive revisions to the Contract Documents.
   c. Requested substitution is consistent with the Contract Documents and will produce indicated results.
   d. Substitution request is fully documented and properly submitted.
   e. Requested substitution will not adversely affect Contractor’s construction schedule.
   f. Requested substitution has received necessary approvals of authorities having jurisdiction.
   g. Requested substitution is compatible with other portions of the Work.
   h. Requested substitution has been coordinated with other portions of the Work.
   i. Requested substitution provides specified warranty.
   j. 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.

PART 3 - EXECUTION (Not Used)
DIVISION 01 – GENERAL REQUIREMENTS

SECTION 012600 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

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

1.2 SUMMARY
A. Section includes administrative and procedural requirements for handling and processing Contract modifications.
B. Related Requirements:
   1. Section 012500 "Substitution Procedures" for administrative procedures for handling requests for substitutions made after the Contract award.

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 Architect’s Information to Clarify form or other document with supporting information as required. Contractor shall make changes in the work as detailed with no change in the Contract Amount.
B. Cost Changes for Minor Changes in the Work: If the Contractor determines that a Minor Change in the work requires an adjustment in the Contract Amount, the Contractor shall immediately notify the Architect of a proposed change. Prepare and submit the amount of such proposed change as quickly as possible in the form of a Change Order Request. Do not proceed with the Work until action upon the Change Order Request can be reviewed and approved.

1.4 PROPOSAL REQUESTS
A. Owner-Initiated Proposal Requests: Should the Owner decide that a change in the Contract Documents or the built construction is desired or should the Owner choose to change the scope of the project, the following procedures shall be followed:
   1. The Owner will issue a detailed description of proposed changes in the Work.
   2. The Owner will submit such changes to the Architect for review.
   3. The Architect will make an initial determination as to if the proposed change will require a change in the Contract Sum or Contract Time. The Architect may request additional information to further clarify the requested change. The Architect will include Consultants in this process whenever appropriate. Where appropriate, the Architect will provide to the Owner, the cost of additional fees for the Architect and Consultants.
   4. The Architect may add additional information to clarify the request and will determine the method by which the proposed changes will be communicated to the General Contractor, or other Contractors. Methods for communication include but are not necessarily limited to Architect’s Information to Clarify, Change Directive, or Field Directive.
   5. Upon receipt of the request the Contractors shall promptly inform the Architect of any additional information needed to properly address the proposed change.
   6. Work Change Proposal Requests issued by the Architect are not instructions either to stop work in progress or to execute the proposed change, but the Contractor should notify the Architect at once if the work activities will adversely affect the proposed change.
   7. After the receipt of the Proposal Request, submit to the Architect within the time specified, a quotation detailing cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
      a. Include a list of quantities of products and labor required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substan-
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 a statement outlining the effect the proposed change would have upon the construction schedule or submit a revised schedule.
e. Quotation Form: Use forms acceptable to Architect.

8. The Architect will review the quotation and either request clarification from the Contractor or forward the quotation to the Owner.

9. The Owner will make a determination as to whether the quotation will be accepted.

10. If accepted, the Architect will prepare the necessary notices or change order.

11. Submittal of a proposed change to the Contractor does not restrict the Owner’s right to conduct the change in the work with their own forces or a separate Contractor.

12. Unless specifically approved advance all changes resulting in an increase in the project cost are to be performed on a time and material basis using the estimate of costs as the maximum cost. All savings shall be maintained by the Owner. Work is to be performed on a time and material basis using the estimate of cost as a maximum expense. The final cost shall be documented with labor records, material breakdowns, and profit and overhead documented as separate costs.

B. Architect-Initiated Proposals: Should the Architect decide that a change in the Contract Documents or the built construction is required, the following procedures shall be followed:

1. The Architect will issue a detailed description of proposed changes.

2. The Architect will make an initial determination as to if the proposed change will require a change in the Contract Sum or Contract Time. The Architect may request initial information from the Owner or Contractor to determine the scope and potential costs of the proposed change. The Architect will include Consultants in this process whenever appropriate. Where appropriate, the Architect will provide to the Owner, the cost of additional fees for the Architect and Consultants.

3. Methods for communication include but are not necessarily limited to Architect’s Information to Clarify, Change Directive, or Field Directive.

4. Upon receipt of the request the Contractors shall promptly inform the Architect of any additional information needed to properly address the proposed change.

5. Work Change Proposal Requests issued by the Architect are not instructions either to stop work in progress or to execute the proposed change.

6. After the receipt of the Proposal Request, submit to the Architect within the time specified, a quotation detailing cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.

a. Include a list of quantities of products and labor 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.

b. 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.

7. The Architect will review the quotation and either request clarification from the Contractor or forward the quotation to the Owner.

8. The Owner will make a determination as to whether the quotation will be accepted.

9. If accepted, the Architect will prepare the necessary notices or change order.

10. Submittal of a proposed change to the Contractor does not restrict the Owner’s right to conduct the change in the work with their own forces or a separate Contractor.

11. Unless specifically approved advance all changes resulting in an increase in the project cost are to be performed on a time and material basis using the estimate of costs as the maximum cost. All savings shall be maintained by the Owner. Work are to be performed on a time and material basis using the estimate of cost as a maximum expense.
The final cost shall be documented with labor records, material breakdowns, and profit and overhead documented as separate costs.

C. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request to the Architect for a change to any part of the project.
1. Seek clarification of the construction documents to be certain that the proposed change is not already included in the construction documents.
2. 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.
3. Include a list of quantities of products and labor required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
4. Overhead and profit charges by anyone contractor shall not exceed ten percent (10%) of the estimated cost of labor and material estimates. Contractors may elect, with agreement of the Architect and Owner, to charge project manager time to the change in lieu of an overhead and profit fee.
5. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
6. Include costs of labor and supervision directly attributable to the change.
7. Include an updated Contractor’s construction schedule or written statement 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. The current schedule for completion of the project will be considered to remain in effect unless it is addressed with this submission.
8. Comply with requirements in Division 1 Section “Substitution Procedures” if the proposed change requires substitution of one product or system for product or system specified.
9. Submit the request to the Architect. The Architect will review and request additional information if needed to clarify the request.
10. The Architect may determine that the request is unwarranted or propose an alternate method of resolving the issue.
11. The Architect will present the request to the Owner for review.
12. If accepted by the Owner, a change order will be issued by the Architect.
13. Unless specifically approved advance all changes resulting in an increase in the project cost are to be performed on a time and material basis using the estimate of costs as the maximum cost. All savings shall be maintained by the Owner. Work is to be performed on a time and material basis using the estimate of cost as a maximum expense. The final cost shall be documented with labor records, material breakdowns, and profit and overhead documented as separate costs.

1.5 ADMINISTRATIVE CHANGE ORDERS
A. Allowance Adjustment: See Section 012100 "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 Section 012200 "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
A. On Owner’s approval of a Change Order Request, Architect will issue a Change Order for signatures of Owner and Contractor on AIA Document G701. Architect will submit Change Order to Contractor for review and signature. Upon return to the Architect, the Architect will sign the Change Order and forward it to the Owner for final review and signature. Supporting material should be attached to the completed Change Order to document method of deriving the Change Order amount. 3.3.

1.7 METHOD OF CHARGING FOR CHANGE ORDERS
A. Unless otherwise agreed to by the Owner and Architect all change orders are to be executed on a time and material basis using, the Contractor shall perform all work on a change.
1.8 CONSTRUCTION CHANGE DIRECTIVE

A. Construction Change Directive: Architect may issue a Construction Change Directive on
   AIA Document G714. Construction Change Directive instructs Contractor to proceed with a change in the
   Work, for subsequent inclusion in a Change Order.
   1. Construction Change Directive contains a complete description of change in the Work. It also
      designates method to be followed to determine change in the Contract Sum or the Contract Time.

B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction
   Change Directive.
   1. After completion of change, submit an itemized account and supporting data necessary to
      substantiate cost and time adjustments to the Contract.

END OF SECTION
DIVISION 01 - GENERAL REQUIREMENTS

SECTION 012900 - PAYMENT PROCEDURES

PART 1 - GENERAL

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

1.2 SUMMARY
A. Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment.
B. Related Requirements:
   1. Section 012600 “Contract Modification Procedures” for administrative procedures for handling changes to the Contract.
   2. Section 013200 “Construction Progress Documentation” for administrative requirements governing the preparation and submittal of the Contractor’s construction schedule.

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

1.4 SCHEDULE OF VALUES
A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor’s construction schedule.
   1. Coordinate 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 initial schedule of values prior to execution of Contract for Construction. Submit the final 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. Arrange schedule of values consistent with format of AIA Document G703.
   4. 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. Bid Package
      c. Description of the Work.
      d. Change Orders (numbers) that affect value.
      e. 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.
   6. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
7. 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.

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.

1.5 APPLICATIONS FOR PAYMENT

A. Each Application for Payment following the initial Application for Payment shall be consistent with previous applications and payments as certified by Architect and 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: Submit Application for Payment to Architect by the Day of the month agreed to by all parties in the Contract for Construction. The period covered by each Application for Payment is one month, ending on the last day of the month or other date mutually agreed to by all parties in the Contract for Construction.

   1. Contractor is to submit Application for Payment in hard copy on or before the due date specified in the Contract for Construction.

   2. To expedite review and payment Contractors are encouraged to submit a draft copy of the Application for Payment to the Architect electronically when the hard copy is mailed. The Architect may share this draft copy with the Owner for review purposes.

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. Value of materials previously stored and remaining stored as of date of previous Applications for Payment.

      b. Value of previously stored materials put in place after date of previous Application for Payment and on or before date of current Application for Payment.

      c. Value of materials stored since date of previous Application for Payment and remaining stored as of date of current Application for Payment.
F. Transmittal: Submit 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. Waivers of Mechanic’s Lien: at the end of the project, submit waivers of mechanic’s lien from entities lawfully entitled to file a mechanic’s lien arising out of the Contract and related to the Work.

H. 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.
   4. List of Contractor’s staff assignments.

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

J. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited to, the following:
   1. Evidence of completion of Project closeout requirements.
   2. Updated final statement, accounting for final changes to the Contract Sum.
   3. AIA Document G706, “Contractor’s Affidavit of Payment of Debts and Claims.”
   5. Evidence that claims have been settled.
   6. Final liquidated damages settlement statement.

K. Payments to the Contractor will be made in accordance with the schedule outlined in the Contract for Construction. Payments by cities, counties, school boards, and agencies governed by a board of directors will be paid within 15 days of the date of the next legal board meeting provided that the board of directors agrees to make payment on the Contract. Should the board of directors have issue with the amount
DIVISION 01 – GENERAL REQUIREMENTS

SECTION 012910 - INITIAL CONTRACT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY
   A. Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment.
   B. Related Requirements:
      1. Division 1 Section “Contract Modification Procedures” for administrative procedures for handling changes to the Contract.
      2. Division 1 Section “Unit Prices” for administrative requirements governing the use of unit prices.
      3. Division 1 Section “Construction Progress Documentation” for administrative requirements governing the preparation and submittal of Contractor’s construction schedule.

1.3 MATERIALS REQUIRED PRIOR TO EXECUTION OF THE CONTRACT FOR CONSTRUCTION
   A. The following materials will be required to be submitted prior to execution of the Contract for Construction. Contractor shall submit the following in printed or electronically in Word .doc or .docx, Excel .xls or Adobe .pdf form unless noted otherwise:
      1. Initial list of subcontractors and major suppliers with contact information.
      2. Initial schedule of values as noted below.
      3. Construction Schedule. See Article 3.10 of the AIA 201 General Conditions of the Contract for Construction.
      4. Contractor’s construction schedule showing projected dates for major project milestones.
      5. List of Contractor’s staff assignments with resumes and qualifications of Project Manager and Superintendent.
      6. Certificates of insurance.
      7. Performance and payment bonds where bonds are required. Provide two original paper copies.
      8. Data needed to acquire Owner’s insurance. To be outlined as required by the Owner.

1.4 PREPARATION OF THE INITIAL SCHEDULE OF VALUES
   A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor’s Applications for Payment. See Article 9.2 of the AIA 201 General Conditions of the Contract for Construction.
   B. Format and Content: Use Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section. Additional breakdown is allowed and separation of labor and material values is acceptable. Submit on AIA Document G703.
      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.
      3. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
4. 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.

5. Each item in the schedule of values and Application 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.

6. Schedule Updating: Update and resubmit the Schedule of Values before the next Application for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

B. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor’s construction schedule.
   1. Coordinate 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 initial schedule of values to Architect at earliest possible date, but no later than seven days after notification of the award of the contract.

3. Sub-schedules for Separate Elements of Work: Where the Contractor’s construction schedule defines separate elements of the work, provide sub-schedules showing values coordinated with each element.
DIVISION 01 – GENERAL REQUIREMENTS

SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

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

1.2 SUMMARY
A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
   1. General coordination procedures.
   2. Coordination drawings.
   3. Requests for Information (RFIs).
   4. Project meetings.
B. Each contractor shall participate in coordination requirements. Certain areas of responsibility are assigned to a specific contractor.
C. Related Requirements:
   1. Section 011200 "Multiple Contract Summary" for a description of the division of work among separate contracts and responsibility for coordination activities not in this Section.
   2. Section 013200 "Construction Progress Documentation" for preparing and submitting Contractor’s construction schedule.
   3. Section 017300 "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
   4. Section 017700 "Closeout Procedures" for coordinating closeout of the Contract.

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. Use CSI Form 1.5A. 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.

B. Coordination: Each contractor shall coordinate its construction operations with those of other contractors and entities to ensure efficient and orderly installation of each part of the Work. Each contractor shall coordinate its operations with operations, included in different Sections that depend on each other for proper installation, connection, and operation.

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

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

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

C. 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.

D. 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.

E. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.

1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. See other Sections for disposition of salvaged materials that are designated as Owner’s property.

1.6 COORDINATION DRAWINGS

A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely shown on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.

1. Content: Projects-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:

   a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.

   b. Coordinate the addition of trade-specific information to the coordination drawings by multiple contractors in a sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.
c. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
d. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
e. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
f. Indicate required installation sequences.
g. Indicate dimensions shown on the Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

B. Coordination Drawing Organization: Organize coordination drawings as follows:

1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire-protection, fire-alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work.

2. Plenum Space: Indicate subframing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work. Locate components within ceiling plenum to accommodate layout of light fixtures indicated on Drawings. Indicate areas of conflict between light fixtures and other components.

3. Mechanical Rooms: Provide coordination drawings for mechanical rooms showing plans and elevations of mechanical, plumbing, fire-protection, fire-alarm, and electrical equipment.

4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.

5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.

6. Mechanical and Plumbing Work: Show the following:
   a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.
   b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.
   c. Fire-rated enclosures around ductwork.

7. Electrical Work: Show the following:
   a. Runs of vertical and horizontal conduit 1-1/4 inches (32 mm) in diameter and larger.
   b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire-alarm locations.
   c. Panel board, switch board, switchgear, transformer, busway, generator, and motor control center locations.
   d. Location of pull boxes and junction boxes, dimensioned from column center lines.

8. Fire-Protection System: Show the following:
   a. Locations of standpipes, mains piping, branch lines, pipe drops, and sprinkler heads.

9. Review: Architect will review coordination drawings to confirm that the Work is being coordinated, but not for the details of the coordination, which are Contractor’s responsibility. If Architect determines that coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, Architect will so inform Contractor, who shall make changes as directed and resubmit.

10. Coordination Drawing Prints: Prepare coordination drawing prints according to requirements in Section 013300 "Submittal Procedures."

1.7 REQUESTS FOR INFORMATION (RFIs)
A. General: Immediately on discovery of the need for additional information or interpretation of the 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.

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. RFI Forms: AIA Document G716 or Software-generated form with substantially the same content as indicated above, acceptable to Architect.
1. Attachments shall be electronic files in Adobe Acrobat PDF format.

D. 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 Section 012600 "Contract Modification Procedures."
   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.

E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number.
F. On receipt of Architect’s action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within seven days if Contractor disagrees with response.
1. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
2. Identification of related Field Order, Work 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: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
   3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within three days of the meeting.

B. Preconstruction Conference: Architect will schedule and conduct 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.
   1. Conduct the conference to review responsibilities and personnel assignments.
   2. Attendees: Authorized representatives of Owner, 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.
   3. 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 RFI.
      h. Procedures for testing and inspecting.
      i. Procedures for processing Applications for Payment.
      j. Distribution of the Contract Documents.
      k. Submittal procedures.
      l. Preparation of record documents.
      m. Use of the premises and existing building.
      n. Work restrictions.
      o. Working hours.
      p. Owner’s occupancy requirements.
      q. Responsibility for temporary facilities and controls.
      r. Procedures for moisture and mold control.
      s. Procedures for disruptions and shutdowns.
      t. Construction waste management and recycling.
      u. Parking availability.
      v. Office, work, and storage areas.
      w. Equipment deliveries and priorities.
      x. First aid.
      y. Security.
      z. Progress cleaning.
   4. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.

C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.
   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 of scheduled meeting dates.
   2. Agenda: Review progress 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. Temporary facilities and controls.
r. Space and access limitations.
s. Regulations of authorities having jurisdiction.
t. Testing and inspecting requirements.
u. Installation procedures.
v. Coordination with other work.
w. Required performance results.
x. Protection of adjacent work.
y. 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, 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. Coordination of separate contracts.

k. Owner’s partial occupancy requirements.

l. Installation of Owner’s furniture, fixtures, and equipment.
m. Responsibility for removing temporary facilities and controls.

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

E. Progress Meetings: Conduct progress meetings at monthly intervals.

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

2. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting 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) Status of proposal requests.
     15) Pending changes.
     16) Status of Change Orders.
     17) Pending claims and disputes.
     18) Documentation of information for payment requests.

4. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.

   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.

F. Coordination Meetings: Conduct Project coordination meetings at regular intervals. Project coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and preinstallation conferences.

1. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meetings shall be familiar with Project and authorized to conclude matters relating to the Work.

2. Agenda: Review and correct or approve minutes of the previous coordination meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
a. Combined Contractor’s Construction Schedule: Review progress since the last coordination meeting. Determine whether each contract is on time, ahead of schedule, or behind schedule, in relation to combined 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.

b. Schedule Updating: Revise combined Contractor’s construction schedule after each coordination meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.

c. Review present and future needs of each contractor present, including the following:
   1) Interface requirements.
   2) Sequence of operations.
   3) Status of submittals.
   4) Deliveries.
   5) Off-site fabrication.
   6) Access.
   7) Site utilization.
   8) Temporary facilities and controls.
   9) Work hours.
  10) Hazards and risks.
  11) Progress cleaning.
  12) Quality and work standards.
  13) Change Orders.

3. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.
DIVISION 01 – GENERAL REQUIREMENTS

SECTION 013200 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

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

1.2 SUMMARY
A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
   1. Startup construction schedule.
   2. Contractor’s construction schedule.
   3. Construction schedule updating reports.
   4. Daily construction reports.
   5. Material location reports.
   6. Site condition reports.
   7. Special reports.
B. Related Requirements:
   1. Section 011200 “Multiple Contract Summary” for preparing a combined Contractor’s construction schedule.
   2. Section 013300 “Submittal Procedures” for submitting schedules and reports.
   3. Section 014000 “Quality Requirements” for submitting a schedule of tests and inspections.

1.3 DEFINITIONS
A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.
   1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
   2. Predecessor Activity: An activity that precedes another activity in the network.
   3. Successor Activity: An activity that follows another activity in the network.
B. Cost Loading: The allocation of the schedule of values for the completion of an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum unless otherwise approved by Architect.
C. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.
D. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.
E. Event: The starting or ending point of an activity.
F. Resource Loading: The allocation of manpower and equipment necessary for the completion of an activity as scheduled.

1.4 INFORMATIONAL SUBMITTALS
A. Format for Submittals: Submit required submittals in the following format:
   1. Working electronic copy of schedule file, where indicated.
   2. PDF electronic file.
   3. Two paper copies.
B. Startup construction schedule,
   1. Approval of cost-loaded, startup construction schedule will not constitute approval of schedule of values for cost-loaded activities.
C. Contractor’s Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.

D. Construction Schedule Updating Reports: Submit with Applications for Payment.

E. Daily Construction Reports: Submit at weekly intervals.

F. Site Condition Reports: Submit at time of discovery of differing conditions.

1.5 QUALITY ASSURANCE

A. Prescheduling Conference: Conduct conference at Project site to comply with requirements in Section 013100 “Project Management and Coordination.” Review methods and procedures related to the preliminary construction schedule and Contractor’s construction schedule, including, but not limited to, the following:

1. Verify availability of qualified personnel needed to develop and update schedule.

2. Discuss constraints, including phasing, work stages, area separations, interim milestones, and partial Owner occupancy.


4. Review schedule for work of Owner’s separate contracts.

5. Review submittal requirements and procedures.

6. Review time required for review of submittals and resubmittals.

7. Review requirements for tests and inspections by independent testing and inspecting agencies.

8. Review time required for Project closeout and Owner startup procedures, including commissioning activities.

9. Review and finalize list of construction activities to be included in schedule.

10. Review procedures for updating schedule.

1.6 COORDINATION

A. Coordinate Contractor’s construction schedule with the schedule of values, list of multiple contracts, submittal schedule, progress reports, payment requests, and other required schedules and reports.

1. Secure time commitments for performing critical elements of the Work from entities involved.

2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 2 - PRODUCTS

2.1 CONTRACTOR’S CONSTRUCTION SCHEDULE, GENERAL

A. Time Frame: Extend schedule from date established for commencement of the Work date of Substantial 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.

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

1. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.

2. Submittal Review Time: Include review and resubmittal times indicated in Section 013300 “Submittal Procedures” in schedule. Coordinate submittal review times in Contractor’s construction schedule with submittal schedule.

3. Startup and Testing Time: Include no fewer than 15 days for startup and testing.

4. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect’s administrative procedures necessary for certification of Substantial Completion.

5. Punch List and Final Completion: Include not more than 30 days for completion of punch list items and final completion.
C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
   1. Phasing: Arrange list of activities on schedule by phase.
   2. Work under More Than One Contract: Include a separate activity for each contract.
   3. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.
   4. Products Ordered in Advance: Include a separate activity for each product. Include delivery date indicated in Section 011000 "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
   5. Owner-Furnished Products: Include a separate activity for each product. Include delivery date indicated in Section 011000 "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
   6. Work Restrictions: Show the effect of the following items on the schedule:
      a. Coordination with existing construction.
      b. Limitations of continued occupancies.
      c. Uninterruptible services.
      d. Partial occupancy before Substantial Completion.
      e. Use of premises restrictions.
      g. Seasonal variations.
      h. Environmental control.
   7. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
      a. Subcontract awards.
      b. Submittals.
      c. Purchases.
      d. Mockups.
      e. Fabrication.
      f. Sample testing.
      g. Deliveries.
      h. Installation.
      i. Tests and inspections.
      j. Adjusting.
      k. Curing.
      l. Building flush-out.
      m. Startup and placement into final use and operation.
   8. Construction Areas: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:
      a. Structural completion.
      b. Temporary enclosure and space conditioning.
      c. Permanent space enclosure.
      d. Completion of mechanical installation.
      e. Completion of electrical installation.
      f. Substantial Completion.

D. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and final completion, and the following interim milestones:
   1. Temporary enclosure and space conditioning.

E. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:
   1. Unresolved issues.
   2. Unanswered Requests for Information.
   3. Rejected or unreturned submittals.
   4. Notations on returned submittals.

F. Recovery Schedule: When periodic update indicates the Work is 14 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, and equipment required to achieve compliance, and date by which recovery will be accomplished.

G. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.

2.2 STARTUP CONSTRUCTION SCHEDULE
A. Bar-Chart Schedule: Submit startup, horizontal, bar-chart-type construction schedule within seven days of date established for the Notice of Award.

B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line. Outline significant construction activities for first 90 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.

2.3 CONTRACTOR’S CONSTRUCTION SCHEDULE (GANTT CHART)
A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal, Gantt-chart-type, Contractor’s construction schedule within 30 days of date established for commencement of the Work. Base schedule on the startup construction schedule and additional information received since the start of Project.

B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.
1. For construction activities that require three months or longer to complete, indicate an estimated completion percentage in 10 percent increments within time bar.

2.4 REPORTS
A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:
1. List of subcontractors at Project site.
2. 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, including presence of rain or snow.
7. Accidents.
8. Meetings and significant decisions.
9. Unusual events (see special reports).
10. Stoppages, delays, shortages, and losses.
11. Meter readings and similar recordings.
13. Orders and requests of authorities having jurisdiction.
14. Change Orders received and implemented.
15. Construction Change Directives received and implemented.
16. Services connected and disconnected.
17. Equipment or system tests and startups.
18. Partial completions and occupancies.
19. Substantial Completions authorized.

B. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.
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 before each regularly scheduled progress meeting.

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

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

3. As the Work progresses, indicate final completion percentage for each activity.

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

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

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

END OF SECTION
DIVISION 01 – GENERAL REQUIREMENTS

SECTION 013233 - PHOTOGRAPHIC REQUIREMENTS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS
   A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY
   A. Section includes administrative and procedural requirements for the following:
      1. Preconstruction photographs.
      2. Periodic construction photographs.
      3. Final completion construction photographs.
      4. Photographs to document additional work.
      5. Photographs to document quantities for unit pricing.
      6. Photographs to document quantities for allowances
   B. Related Requirements:
      1. Division 1 Section "Unit Prices" for procedures for unit prices for extra photographs.
      2. Division 1 Section "Submittal Procedures" for submitting photographic documentation.
      3. Division 1 Section "Closeout Procedures" for submitting photographic documentation as project record documents at Project closeout.
      4. Division 1 Section "Demonstration and Training" for submitting video recordings of demonstration of equipment and training of Owner's personnel.
      5. Division 2 Section "Building Demolition" for photographic documentation before building demolition operations commences.
      6. Division 2 Section "Site Clearing" for photographic documentation before site clearing operations commence.

1.3 NUMBER REQUIRED
   A. Preconstruction Photographs Basis for Bids- Sufficient photographs to document existing conditions. Photographs shall include condition of lawns, plant materials, existing buildings to be maintained or added onto, driveways, sidewalks, exposed utilities, and other site features. These photographs shall be taken just as construction forces are mobilizing on the site. These photographs will be part of the criteria used to determine when repairs to existing features is required. As a minimum 10 photographs shall be taken.
   B. Basis for Bids: A minimum of 30 photographs shall be prepared of the project each week. Additional photographs shall be provided as required to properly document the project status and conditions. Take photographs as work progresses to show major milestones. Special attention shall be given to reinforcing, wiring, and other concealed conditions. Photographs shall be used to document project progress and to verify concealed conditions that may require destructive demolition to verify if not documented.

1.4 INFORMATIONAL SUBMITTALS
   A. Key Plan: For complex buildings and to document location of hard to locate photographs, submit key plan of Project site and building with notation of vantage points marked for location and direction of each photograph. Indicate elevation or story of construction. Include same information as corresponding photographic documentation. Electronic files shall either be named for their location, referenced by number to the key plan, or referenced through a separate list cross referenced to the location plan.

1.5 QUALITY ASSURANCE
   A. Qualification Data: For photographer. Project Superintendent, Project Manager or other employee of the General or Prime Contractor who has been instructed as to the important elements of construction to be documented.
USAGE RIGHTS
A. By transferring the photographs to the Owner or Architect, the Contractor shares unlimited copyright usage rights from photographer to the Owner and Architect for unlimited reproduction of photographic documentation.

PART 2 - PRODUCTS
2.1 PHOTOGRAPHIC MEDIA
A. Digital Images: Provide images in JPG format, produced by a digital camera with minimum sensor size of 8 megapixels, and at an image resolution of not less than 3200 by 2400 pixels. Digital files of this size are to be transmitted with the close out documents via CD, DVD, flash drive, or other transferable media. Weekly image transfers may be reduced in size to allow transfer over the internet. Digital photographs are to have date and time clearly placed in the photograph.

PART 3 - EXECUTION
3.1 CONSTRUCTION PHOTOGRAPHS
A. General: Take photographs using the maximum range of depth of field, and that are in focus, to clearly show the Work. Photographs with blurry or out-of-focus areas will not be accepted.
B. Digital Images: Submit digital images exactly as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software at end of project. Weekly submittals may be reduced in size to accommodate internet transfer. Full size files are to be submitted with final close out documents on CD, DVD, or thumb drive.
C. Field Office Images: Field Superintendent shall have access to images.
D. Photographs for Documenting Additional Work, Unit Prices, or Construction Allowances: Provide sufficient number and sufficient viewpoints so that existing conditions, quantities of material, and extent of work area is visible
E. Preconstruction Photographs: Before starting construction, take photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points to show condition of the surrounding features that may be affected by construction.
F. Directed Construction Photographs: From time to time, Architect may instruct photographer about number and frequency of photographs and general directions on vantage points. Select actual vantage points and take photographs to show the status of construction and progress since last photographs were taken. Up to 30 photographs per week over the number indicated above may be requested by the Architect to verify conditions under consideration for change, remedial work, or construction delays. Architect may request photographs in addition to periodic photographs specified. Where needed in order to respond to a Request for Information, the Contractor shall respond within 24 hours. Where requested for other purposes response within three days is required. In emergency situations, take additional photographs within the same working day. Photographs for these purposes need not be taken by the designated photographer and may be of reduced quality if information needed is clear in the photograph.
G. Time-Lapse Sequence Construction Photographs: Take 5 photographs each week on the same day of the week in addition to the above noted required photos, to show status of construction and progress since last photographs were taken.
1. Frequency: Take photographs weekly, with timing each month adjusted to coincide with the cutoff date associated with each Application for Payment. Submit these files each week.
2. Vantage Points: Following suggestions by Architect, the photographer is to select vantage points. Unless otherwise directed the five required vantage point photographs shall be taken from the four corners of the site directed into the site to include the whole site and the fifth shall be from one location inside the building as selected by the Architect.

END OF SECTION
DIVISION 01 – GENERAL REQUIREMENTS

SECTION 013300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

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

1.2 SUMMARY
A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.
B. Related Requirements:
   1. Section 012900 “Payment Procedures” for submitting Applications for Payment and the schedule of values.
   2. Section 013200 “Construction Progress Documentation” for submitting schedules and reports, including Contractor’s construction schedule.
   3. Section 017823 “Operation and Maintenance Data” for submitting operation and maintenance manuals.
   4. Section 017839 “Project Record Documents” for submitting record Drawings, record Specifications, and record Product Data.
   5. Section 017900 “Demonstration and Training” for submitting 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 ACTION SUBMITTALS
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 revisions to submittals noted by 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 startup 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.
4. Format: Arrange the following information in a tabular format:
   a. Scheduled date for first submittal.
   b. Specification Section number and title.
   c. Submittal category: Action; informational.
   d. Name of subcontractor.
   e. Description of the Work covered.
   f. Scheduled date for Architect’s final release or approval.
   g. Scheduled date of fabrication.
   h. Scheduled dates for purchasing.
   i. Scheduled dates for installation.
   j. Activity or event number.

1.5 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

A. Architect’s Digital Data Files: AutoCAD digital data files of the Contract Drawings will be provided by the Architect on a limited basis for Contractor’s use in preparing submittals. The provision of such drawing files does not alleviate the contractor or supplier’s obligation to field verify existing or built conditions. Plans will be provided in Autocad .dwg format in the current version used by the Architect. Be aware that no warranty as to the compatibility of your computer software or hardware with the files provided is made. Variations between the printed files provided above by the Architect and these electronic files may exist. In the event that a conflict does exist, the printed documents issued by the Architect will take precedence over the downloaded files. Further in accepting and using such files the Subcontractor or Supplier understands that the files are provided for informational purpose only.

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
   1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
   2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
   3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
   4. Coordinate transmittal of 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 the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect’s receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
   1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
   2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
   3. Resubmittal Review: Allow 15 days for review of each resubmittal.
   4. Sequential Review: Where sequential review of submittals by Architect’s consultants, Owner, or other parties is indicated, allow 21 days for initial review of each submittal. Sequential review shall typically be required for civil, structural, and mechanical and electrical material reviews.

D. Paper Submittals: Place a permanent label or title block on each submittal item for identification.
   1. Indicate name of firm or entity that prepared each submittal on label or title block.
   2. Provide a space approximately 6 by 8 inches (150 by 200 mm) on label or beside title block to record Contractor’s review and approval markings and action taken by Architect.
   3. Include the following information for processing and recording action taken:
      a. Project name.
SPECIFICATIONS: Farley Municipal Building  
206 1st Street N., Farley, Iowa 52046  
ARCHITECT PROJECT #1728.01

b. Date.  
c. Name of Architect.  
d. Name of Contractor.  
e. Name of subcontractor.  
f. Name of supplier.  
g. Name of manufacturer.  
h. Submittal number or other unique identifier, including revision identifier. Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 061000.01.A).  
i. Number and title of appropriate Specification Section.  
j. Drawing number and detail references, as appropriate.  
k. Location(s) where product is to be installed, as appropriate.  
l. Other necessary identification.  

4. Additional Paper Copies: Unless additional copies are required for final submittal, and unless Architect observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Architect.  

5. Transmittal for Paper Submittals: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a separate transmittal form. Architect will return without review submittals received from sources other than Contractor.  

a. Transmittal Form for Paper Submittals: Provide the following information where applicable:  
1) Project name.  
2) Date.  
3) Destination (To:).  
4) Source (From:).  
5) Name and address of Architect.  
6) Name of Contractor.  
7) Name of firm or entity that prepared submittal along with name, telephone and email contact information of the preparer.  
8) Names of subcontractor, manufacturer, and supplier.  
9) Category and type of submittal.  
10) Submittal purpose and description.  
11) Specification Section number and title.  
12) Specification paragraph number or drawing designation and generic name for each of multiple items.  
13) Drawing number and detail references, as appropriate.  
14) Indication of full or partial submittal.  
15) Remarks.  
16) Signature of transmitter.  

E. Electronic Submittals: Electronic submittals are the preferred means of delivery for most items for this project, unless noted otherwise in the individual submittal requirements sections. Contractors identify and incorporate information in each electronic submittal file as follows:  
1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.  
2. Name file with submittal number or other unique identifier, including revision identifier. File name shall use project identifier and Specification Section number followed by a decimal point and then a sequential number (e.g., LNHS-061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., LNHS-061000.01.A).  
3. Provide means for insertion to permanently record Contractor’s review and approval markings and action taken by Architect.
4. Transmittal for Electronic Submittals: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a separate transmittal form. Architect will return without review submittals received from sources other than Contractor.
   a. Transmittal Form for Paper Submittals: Provide the following information where applicable
      1) Project name.
      2) Date.
      3) Destination (To:).
      4) Source (From:).
      5) Name and address of Architect.
      6) Name of Contractor.
      7) Name of firm or entity that prepared submittal along with name, telephone and email contact information of the preparer.
      8) Names of subcontractor, manufacturer, and supplier.
      9) Category and type of submittal.
     10) Submittal purpose and description.
     11) Specification Section number and title.
     12) Specification paragraph number or drawing designation and generic name for each of multiple items.
     13) Drawing number and detail references, as appropriate.
     14) Indication of full or partial submittal.
     15) Remarks.
     16) Signature of transmitter.

   F. Options: Identify options requiring selection by Architect.

   G. Deviations and Additional Information: 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.

   H. 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.

   I. 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.

   J. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's action stamp.

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.
      1. Submittal to Web Site: Where a Project Web site has been created, post electronic submittals as PDF electronic files directly to Project Web site or other site as designated by the Architect.
      2. Submittal via Email: Submit electronic submittals via email as PDF electronic files.
      3. Paper Action Submittals: Submit 3 paper copies of each submittal unless otherwise indicated. Architect will return 2 copies.
      4. Paper Informational Submittals: Submit 2 paper copies of each submittal unless otherwise indicated. Architect will not return copies.
5. 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.

B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
1. If information must be specially prepared for submittal because standard 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. Standard color charts.
   d. Statement of compliance with specified referenced standards.
   e. Testing by recognized testing agency.
   f. Application of testing agency labels and seals.
   g. Notation of coordination requirements.
   h. 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 where requested.
   b. Printed performance curves where requested.
   c. Operational range diagrams where requested.
   d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.

5. Submit Product Data before or concurrent with Samples.
6. Submit Product Data in the following format:
   a. PDF electronic file.
   b. Paper Copy: 5 paper copies of Product Data unless otherwise indicated. Architect will return 4 copies unless Concurrent review by Consultants is required. For each Consultant to review the document, provide one additional copy.

C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data, unless submittal based on Architect’s digital data drawing files is otherwise permitted.
1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
   a. Identification of products.
   b. Schedules.
   c. Compliance with specified standards.
   d. Notation of coordination requirements.
   e. Notation of dimensions established by field measurement.
   f. Relationship and attachment to adjoining construction clearly indicated.
   g. Seal and signature of professional engineer if specified.

2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches (215 by 280 mm), but no larger than 36 by 48 inches (750 by 1067 mm).

3. Submit Shop Drawings in the following format:
   a. PDF electronic file.
   b. Paper Copy: 5 paper copies of Product Data unless otherwise indicated. Architect will return 4 copies unless Concurrent review by Consultants is required. For each Consultant to review the document, provide one additional copy.
D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.

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

2. Identification: Attach label on unexposed side of Samples that includes the following:
   a. Generic description of Sample.
   b. Product name and name of manufacturer.
   c. Sample source.
   d. Number and title of applicable Specification Section.
   e. Specification paragraph number and generic name of each item.

3. For projects where electronic submittals are required, a physical color and material samples must also be submitted. Provide corresponding electronic submittal of Sample submittal, digital image file illustrating Sample characteristics, and identification information for record.

4. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
   a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
   b. Samples not incorporated into the Work, or otherwise designated as Owner’s property, are the property of Contractor.

5. Samples for Initial Selection: Initial Selection includes materials specified under an allowance where a final specific material has not been chosen. In consultation with the Architect submit manufacturer’s color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available for products for consideration.
   a. Number of Samples: Submit 1 full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer’s product line. Architect will return submittal with options selected.

6. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
   a. Number of Samples: Submit 3 sets of Samples. Architect will retain. The Architect will return 2 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 3 sets of paired units that show approximate limits of variations.

E. Product Schedule: As required in individual Specification Sections or where multiple colors of the same product are used in the same area, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:

1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
2. Manufacturer and product name, and model number if applicable.
3. Number and name of room or space.
4. Location within room or space.
5. Submit product schedule in the following format:
   a. PDF electronic file.
b. Paper Submission: 3 paper copies of product schedule or list unless otherwise indicated. Architect] will return 2 copies.

F. Coordination Drawing Submittals: Comply with requirements specified in Section 013100 "Project Management and Coordination."

G. Contractor's Construction Schedule: Comply with requirements specified in Section 013200 "Construction Progress Documentation."

H. Application for Payment and Schedule of Values: Comply with requirements specified in Section 012900 "Payment Procedures."

I. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Section 014000 "Quality Requirements."

J. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Section 017700 "Closeout Procedures."

K. Maintenance Data: Comply with requirements specified in Section 017823 "Operation and Maintenance Data."

L. 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.

M. 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 AWS forms. Include names of firms and personnel certified.

N. 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.

O. 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.

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

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

R. 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.

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

T. 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.

U. 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.

V. 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.
SPECIFICATIONS: Farley Municipal Building
206 1st Street N., Farley, Iowa 52046
ARCHITECT PROJECT #1728.01

W. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.

X. 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.

2.2 DELEGATED-DESIGN SERVICES

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
   1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.

B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF electronic file or 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.
   1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 3 - EXECUTION

3.1 CONTRACTOR’S REVIEW

A. Action and Informational Submittals: Project Manager or Project Superintendent shall 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. Project Closeout and Maintenance Material Submittals: See requirements in Section 017700 “Closeout Procedures.”

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

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

C. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.

D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.

E. Submittals not required by the Contract Documents may be returned by the Architect without action.

END OF SECTION
DIVISION 00 – PROCUREMENT AND CONTRACT REQUIREMENTS

SECTION 014000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

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

1.2 SUMMARY
A. Section includes 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.
4. Specific test and inspection requirements are not specified in this Section.
C. Related Requirements:
1. Section 012100 "Allowances" for testing and inspecting allowances.

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.
D. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.
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, e.g., 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 individuals, or that requirements specified apply exclusively to specific trade(s).

J. Experienced: When used with an entity or individual, “experienced” means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction. See individual specification sections for modifications to this experience requirement.

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 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, perspective, or other 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. Qualification Data: For Contractor’s quality-control personnel.
C. 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.
D. 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.
   1. Project quality-control manager may also serve as Project superintendent.
2. See Section 011000 Summary for outline of qualifications required of the Project Manager and Project Superintendent.

C. Testing and Inspection: Include a comprehensive schedule of Work requiring testing or inspection, including the following:
   1. Contractor-performed tests and inspections including subcontractor-performed tests and inspections. Include required tests and inspections and Contractor-elected tests and inspections.
   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.

D. Continuous Inspection of Workmanship: All work is to be under continuous inspection during construction to identify and correct deficiencies in workmanship in addition to testing and inspection specified. Corrective actions are to be required to bring work into compliance with standards of workmanship established by Contract requirements and approved mockups.

E. 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 in material, design, and extent to those indicated for this Project.

F. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged 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. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.

f. When testing is complete, remove test specimens, assemblies, and 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, 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 (7) 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 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 (7) 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.

1.10 QUALITY CONTROL

A. 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 twenty-four (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.

B. Manufacturer’s Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 013300 "Submittal Procedures."

C. 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.

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

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

F. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
1. Access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
4. Facilities for storage and field curing of test samples.
5. Delivery of samples to testing agencies.
6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
7. Security and protection for samples and for testing and inspecting equipment at Project site.

G. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
1. Schedule times for tests, inspections, obtaining samples, and similar activities.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 ACCEPTABLE TESTING AGENCIES
   A. Employ qualified testing agencies acceptable to the Owner and Architect.

3.2 TEST AND INSPECTION LOG
   A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:
1. Date test or inspection was conducted.
2. Description of the Work tested or inspected.
3. Date test or inspection results were transmitted to Architect.
4. Identification of testing agency or special inspector conducting test or inspection.
   B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect's

3.3 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 Section 017300 "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
DIVISION 01 – GENERAL REQUIREMENTS

SECTION 014200 – REFERENCES

PART 1 - GENERAL

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

1.2 DEFINITIONS
   A. General: Basic Contract definitions are included in the Conditions of the Contract.
   B. "Approved": When used to convey Architect’s action on Contractor’s submittals, applications, and requests, "approved" is limited to Architect’s duties and responsibilities as stated in the Conditions of the Contract.
   C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."
   D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."
   E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.
   F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
   G. "Install": Unload, temporarily store, unpack, assemble, erect, place, anchor, apply, work to dimension, finish, cure, protect, clean, and similar operations at Project site.
   H. "Provide": Furnish and install, complete and ready for the intended use.
   I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

1.3 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 date of the Contract Documents unless otherwise indicated.
   C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
      1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

1.4 ABBREVIATIONS AND ACRONYMS
   A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Gale’s "Encyclopedia of Associations: National Organizations of the U.S." or in Columbia Books' "National Trade & Professional Associations of the United States."
   B. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.
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8. ACI - American Concrete Institute; (Formerly: ACI International); www.aci.org.
10. AEIC - Association of Edison Illuminating Companies, Inc. (The); www.aeic.org.
16. AIA - American Institute of Architects (The); www.aia.org.
26. ARI - Air-Conditioning & Refrigeration Institute; (See AHRI).
27. ARI - American Refrigeration Institute; (See AHRI).
29. ASCE - American Society of Civil Engineers; www.asce.org.
30. ASCE/SEI - American Society of Civil Engineers/Structural Engineering Institute; (See ASCE).
32. ASME - ASME International; (American Society of Mechanical Engineers); www.asme.org.
33. ASSE - American Society of Safety Engineers (The); www.asse.org.
36. ATIS - Alliance for Telecommunications Industry Solutions; wwwatis.org.
42. AWWA - American Water Works Association; www.awwa.org.
43. BHMA - Builders Hardware Manufacturers Association; www.buildershardware.com.
44. BIA - Brick Industry Association (The); www.gobrick.com.
46. BIFMA - BIFMA International; (Business and Institutional Furniture Manufacturer’s Association); www.bifma.org.
47. BISSC - Baking Industry Sanitation Standards Committee; www.bissc.org.
48. BWIF - Badminton World Federation; (Formerly: International Badminton Federation); www.bwif.org.
49. CDA - Copper Development Association; www.copper.org.
50. CEA - Canadian Electricity Association; www.electricity.ca.
51. CEA - Consumer Electronics Association; www.ce.org.
52. CFFA - Chemical Fabrics and Film Association, Inc.; www.chemicalfabricsandfilm.com.
53. CFSEI - Cold-Formed Steel Engineers Institute; www.cfsei.org.
55. CIMA - Cellulose Insulation Manufacturers Association; www.cellulose.org.
58. CLFMI - Chain Link Fence Manufacturers Institute; www.chainlinkinfo.org.
60. CRI - Carpet and Rug Institute (The); www.carpet-rug.org.
62. CRSI - Concrete Reinforcing Steel Institute; www.crsi.org.
63. CSA - Canadian Standards Association; www.csa.ca.
64. CSA - CSA International; (Formerly: IAS - International Approval Services); www.csa-international.org.
65. CSI - Construction Specifications Institute (The); www.csinet.org.
67. CTI - Cooling Technology Institute; (Formerly: Cooling Tower Institute); www.cti.org.
68. CWG - Composite Wood Council; (See CPA).
70. DHI - Door and Hardware Institute; www.dhi.org.
71. ECA - Electronic Components Association; (See ECIA).
72. ECAMA - Electronic Components Assemblies & Materials Association; (See ECIA).
74. EIA - Electronic Industries Alliance; (See TIA).
77. ESD - ESD Association; (Electrostatic Discharge Association); www.esda.org.
78. ESTA - Entertainment Services and Technology Association; (See PLASA).
80. FCI - Fluid Controls Institute; www.fluidcontrols institute.org.
81. FIBA - Federation Internationale de Basketball; (The International Basketball Federation); www.fiba.com.
82. FIVB - Federation Internationale de Volleyball; (The International Volleyball Federation); www.fivb.org.
84. FM Global - FM Global; (Formerly: FMG - FM Global); www.fmglobal.com.
90. GS - Green Seal; www.green seal.org.
92. HI/GAMA - Hydronics Institute/Gas Appliance Manufacturers Association; (See AHRI).
93. HMMA - Hollow Metal Manufacturers Association; (See NAAMM).
97. IAS - International Accreditation Service; www.iasonline.org.
98. IAS - International Approval Services; (See CSA).
99. ICBO - International Conference of Building Officials; (See ICC).
101. ICEA - Insulated Cable Engineers Association, Inc.; www.icea.net.
102. ICPA - International Cast Polymer Alliance; www.icpa-hq.org.
103. ICRI - International Concrete Repair Institute, Inc.; www.icri.org.
105. IEEE - Institute of Electrical and Electronics Engineers, Inc. (The); www.ieee.org.
106. IES - Illuminating Engineering Society; (Formerly: Illuminating Engineering Society of North America); www.ies.org.
107. IESNA - Illuminating Engineering Society of North America; (See IES).
108. IEST - Institute of Environmental Sciences and Technology; www.iest.org.
111. ILI - Indiana Limestone Institute of America, Inc.; www.iliai.com.
112. Intertek - Intertek Group; (Formerly: ETL SEMCO; Intertek Testing Service NA); www.intertek.com.
113. ISA - International Society of Automation (The); (Formerly: Instrumentation, Systems, and Automation Society); www.isa.org.
114. ISAS - Instrumentation, Systems, and Automation Society (The); (See ISA).
115. ISFA - International Surface Fabricators Association; (Formerly: International Solid Surface Fabricators Association); www.isfanow.org.
117. ISSFA - International Solid Surface Fabricators Association; (See ISFA).
118. ITU - International Telecommunication Union; www.itu.int/home.
120. LMA - Laminating Materials Association; (See CPA).
123. MCA - Metal Construction Association; www.metalconstruction.org.
132. NACE - NACE International; (National Association of Corrosion Engineers International); www.nace.org.
137. NCAA - National Collegiate Athletic Association (The); www.ncaa.org.
140. NECA - National Electrical Contractors Association; www.necanet.org.
143. NETA - InterNational Electrical Testing Association; www.netaworld.org.
144. NFHS - National Federation of State High School Associations; www.nfhs.org.
146. NFPA - NFPA International; (See NFPA).
149. NLGA - National Lumber Grades Authority; www.nlga.org.
150. NOFMA - National Oak Flooring Manufacturers Association; (See NWFA).
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152. NRCA - National Roofing Contractors Association; www.nrca.net.
156. NSSGA - National Stone, Sand & Gravel Association; www.nssga.org.
159. PCI - Precast/Prestressed Concrete Institute; www pci.org.
161. PLASA - PLASA; (Formerly: ESTA - Entertainment Services and Technology Association);  www.plasa.org.
166. SCCTE - Society of Cable Telecommunications Engineers; www.scte.org.
168. SDI - Steel Door Institute; www.steeldoor.org.
169. SEFA - Scientific Equipment and Furniture Association (The); www.sefalabs.com.
170. SEI/ASCE - Structural Engineering Institute/American Society of Civil Engineers; (See ASCE).
172. SII - Steel Joist Institute; www.steeljoist.org.
175. SMPTE - Society of Motion Picture and Television Engineers; www.smp te.org.
176. SPFA - Spray Polyurethane Foam Alliance; www.sprayfoam.org.
183. SWPA - Submersible Wastewater Pump Association; www.swpa.org.
184. TCA - Tilt-Up Concrete Association; www.tilt-up.org.
187. TIA - Telecommunications Industry Association (The); (Formerly: TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance); www.tiaonline.org.
188. TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance; (See TIA).
190. TPI - Truss Plate Institute; www.tpinst.org.
194. UNI - Uni-Bell PVC Pipe Association; www.uni-bell.org.
195. USAV - USA Volleyball; www.usavolleyball.org.
199. WCLIB - West Coast Lumber Inspection Bureau; www.wclib.org.
C. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is believed to be accurate as of the date of the Contract Documents.

1. DIN - Deutsches Institut fur Normung e.V.; www.din.de.
2. IAPMO - International Association of Plumbing and Mechanical Officials; www.iapmo.org.

D. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Information is subject to change and is up to date as of the date of the Contract Documents.

1. COE - Army Corps of Engineers; www.usace.army.mil.
3. DOC - Department of Commerce; National Institute of Standards and Technology; www.nist.gov.
5. DOE - Department of Energy; www.energy.gov.
6. EPA - Environmental Protection Agency; www.epa.gov.
7. FAA - Federal Aviation Administration; www.faa.gov.
11. LBL - Lawrence Berkeley National Laboratory; Environmental Energy Technologies Division; www.eetd.lbl.gov.
12. OSHA - Occupational Safety & Health Administration; www.osha.gov.
13. SD - Department of State; www.state.gov.
15. USDA - Department of Agriculture; Agriculture Research Service; U.S. Salinity Laboratory; www.ars.usda.gov.
16. USDA - Department of Agriculture; Rural Utilities Service; www.usda.gov.
17. USDJ - Department of Justice; Office of Justice Programs; National Institute of Justice; www.ojp.usdoj.gov.

E. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.

2. DOD - Department of Defense; Military Specifications and Standards; Available from DLA Document Services; www.quicksearch.dla.mil.
3. DSCC - Defense Supply Center Columbus; (See FS).
4. FED-STD - Federal Standard; (See FS).
6. MILSPEC - Military Specification and Standards; (See DOD).
7. USAB - United States Access Board; www.access-board.gov.
8. USATBCB - U.S. Architectural & Transportation Barriers Compliance Board; (See USAB).
F. State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.

1. CBHF; State of California; Department of Consumer Affairs; Bureau of Electronic and Appliance Repair, Home Furnishings and Thermal Insulation; www.bearhfti.ca.gov.
2. CCR; California Code of Regulations; Office of Administrative Law; California Title 24 Energy Code; www.calregs.com.
3. CDHS; California Department of Health Services; (See CDPH).
4. CDPH; California Department of Public Health; Indoor Air Quality Program; www.cal-iaq.org.
5. CPUC; California Public Utilities Commission; www.cpuc.ca.gov.
6. SCAQMD; South Coast Air Quality Management District; www.aqmd.gov.
7. TFS; Texas A&M Forest Service; Sustainable Forestry and Economic Development; www.txforestservice.tamu.edu.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)
DIVISION 01 – GENERAL REQUIREMENTS

SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

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

1.2 SUMMARY
A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.
B. Related Requirements:
   1. Section 011000 "Summary" for work restrictions and limitations on utility interruptions.
   2. Section 321313 "Concrete Paving" for construction and maintenance of cement concrete pavement for temporary roads and paved areas.

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. Monthly Water Service Costs: To be paid for by Owner.
C. Monthly Sewer Costs: To be paid for by the Owner.
D. Monthly Electric Power Service Costs: To be paid for by Owner.
E. Monthly Storm Sewer Charges: To be paid for by Owner.

1.4 INFORMATIONAL SUBMITTALS
A. Erosion- and Sedimentation-Control Plan: Show compliance with requirements of EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.
B. 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-resistant 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.

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. Water and Sewer: Comply with Local Authorities Having Jurisdiction and International Plumbing Code or Uniform Plumbing Code.
C. 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. Ascertain condition of the service and make necessary repairs before Owner accepts
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the system, regardless of previously assigned responsibilities.

B. PART 2 - PRODUCTS

2.1 MATERIALS

A. Portable Chain-Link Fencing: Minimum 2-inch (50-mm), 0.148-inch (3.8-mm) thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet (1.8 m) high with galvanized-steel pipe posts; minimum 2-3/8-inch (60-mm) OD line posts and 2-7/8-inch (73-mm) OD corner and pull posts, with 1-5/8-inch (42-mm) OD top and bottom rails. Fence may be continuous fence with posts embedded in the ground or a panelized system. Provide concrete or galvanized-steel bases for supporting posts for panelized systems and panels are to be secured to each other to provide a integral fence.

B. Polyethylene Sheet: Reinforced, fire-resistant sheet, 10-mil (0.25-mm) 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 on all finish flooring adjacent to construction areas to trap foot debris. Provide minimum 36 by 60 inches (914 by 1624 mm). Replace regularly throughout construction as effectiveness is reduced.

D. Finish Floor and Other Surfaces Protection: Provide product designed for the finish floor, plastic laminate, glass or material to be protected and for the project conditions to be encountered. Replace damaged material immediately. Remove and replace material as recommended by the product manufacturer to avoid damage to existing material.

E. 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.

F. Orange or Green Plastic Snow Fence

2.2 TEMPORARY FACILITIES

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

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. Heating and cooling equipment necessary to maintain a uniform indoor temperature of 68 to 72 deg F (20 to 22 deg C).

3. Lighting fixtures capable of maintaining average illumination of 20 fc (215 lx) at desk height.

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: Permanent HVAC systems are not to be used for building heat until the building is fully enclosed and all dust producing activities are concluded. 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. Permanent HVAC System: The permanent building systems may only after all dust producing activities are completed and only when authorized by the Owner and the Architect. Until final completion 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 Section 017700 “Closeout Procedures”. 
Temporary and main unit filters shall be changed weekly during construction.

4. In floor heating system for metal building area is not to be used for space heat until approved for use by system equipment supplier.

C. Air-Filtration Units: Provide as needed for construction operations. 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, the project 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. Remove existing septic tank system as quickly as possible after demolition of the existing office building in manner required by Buchanan County Sanitarian. Connect to Independence municipal sewer system as soon as possible but not until first phase of building is complete.

C. Water Service: Install water service connection and distribution piping, if required, in sizes and pressures adequate for construction. Clean and maintain water service facilities in a condition acceptable to Owner. Provide temporary connection for construction purposes and remove same at end of project.

D. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel and Owner’s workers based at this operations center (approximately 10). Most workers are off-site for most of the time. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.

1. Toilets: Use of Owner’s new toilet facilities will NOT be permitted.

E. Heating: Provide temporary heating 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.

F. 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.

G. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations. The Owner is the power supplier and will provide power to temporary and permanent electrical service.

1. Install electric power service underground unless otherwise indicated.

2. Where required connect temporary service to Owner’s existing power service to first phase of construction, as directed by Owner. Provide additional or phased locations for temporary services according to project demolition and construction phasing.

H. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
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1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
2. Install lighting for Project identification sign.

I. Telephone Service: Provide temporary telephone service for use by all construction personnel whenever working at the site. Telephone service must be available to all project personnel whenever anyone is working at the site. Telephone service may be provided via mobile telephone provided that the phone is always available at the project site.

   Phone is to remain in the office and accessible to construction personnel at all times.

   1. On the project site, near or on the construction office, 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.

   2. Provide superintendent with cellular telephone for use when away from field office.

J. Internet Service: Provide construction office with internet access available to project personnel. Internet access shall be either cellular or land line broadband. Construction office is to have facilities to receive and print 8 ½ x 11” copies.

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 (9 m) 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 Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate for construction operations. Locate temporary roads and paved areas as indicated on Drawings. See Site Plan for approximate location.

C. Temporary Use of Permanent Roads and Paved Areas: Locate temporary roads and paved areas in same location as permanent roads and paved areas. Construct and maintain temporary roads and paved areas adequate for construction operations. Extend temporary roads and paved areas, within construction limits indicated, as necessary for construction operations.
   1. Coordinate elevations of temporary roads and paved areas with permanent roads and paved areas.
   2. Prepare subgrade and install sub base and base for temporary roads and paved areas according to Section 312000 “Earth Moving.”
   3. Recondition base after temporary use, including removing contaminated material, regrading, and proof rolling, compacting, and testing.
   4. For temporary roads not in future road locations, remove temporary gravel and paving and restore site for proposed use.

D. Traffic Controls: Comply with requirements of authorities having jurisdiction.
   1. Protect existing site improvements to remain including curbs, pavement, and utilities.
   2. Maintain access for fire-fighting equipment and access to fire hydrants.
   3. Provide traffic control signage, barricades, flagmen, and other means as required to direct traffic.
   4. Barricade area around trees and protect all existing trees not noted for removal.

E. Parking: Provide temporary areas on project site.

F. Dewatering Facilities and Drains: No dewatering due to ground water levels is anticipated on this site. 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.

G. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.
1. Identification Signs: Provide Project identification sign. Sign is to be 4 foot by 8 foot sign with the name of the project, the name of the Architect, the Structural Engineer, the Mechanical and Electrical Engineer, Building Construction Contractor, Electrician, Plumber, HVAC Contractor, and color rendering provided by the Architect.
2. Temporary Signs: Provide other signs as indicated and as required to inform and direct public and individuals seeking entrance to Project. See Site Plan for additional information.
   a. Provide temporary, directional signs for construction personnel and visitors.
3. Maintain and touchup signs so they are legible at all times.

H. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with progress cleaning requirements in Section 017300 “Execution.”

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 Section 011000 "Summary."
C. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings and/or requirements of 2003 EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.
   1. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree- or plant- protection zones.
   2. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
   3. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from Project site during the course of Project.
   4. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.
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. Due to the proximity of the existing paving to mature trees, special care must be exercised in working in these areas. Paving is to be carefully lifted from the root zone of the area. Most operations around trees require filling operations. Such places do not remove any soil material from around trees.
F. Site Enclosure Fence: A perimeter fence is required around the pole yard, the radio tower, and pole building entrance at all times. Provide temporary snow fence between construction area and pole yard during construction. No perimeter fence is deemed necessary at this site for the entire construction period for the construction area. Provide perimeter fence if vandalism or unauthorized entry becomes an issue on the project. Areas of excavation where falling hazard is a concern is to be fenced at all times when workers are not actively engaged in work in that area.
G. Building 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.

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

I. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required for worker safety and by authorities having jurisdiction.

J. Temporary Partitions: Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by Owner from fumes and noise.

K. Use of site driveways. See Site Plan for additional information. East driveway may be closed for public use throughout construction. Access for Owner vehicles shall be maintained. West driveway shall be closed just east of the temporary location for the payment drop box. Maintain construction and Owner vehicle access to this driveway at all times.

L. Owner’s personnel respond 24/7 to member calls. Access to pole building and pole yard must be maintained during construction for all Owner vehicles.

M. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire-prevention program.
   1. Prohibit smoking in construction areas.
   2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
   3. Develop and supervise an overall fire-prevention and protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.

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.
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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 cannot 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.

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. 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.

2. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 017700 "Closeout Procedures."

END OF SECTION
DIVISION 01 – GENERAL REQUIREMENTS

SECTION 016000 · PRODUCT REQUIREMENTS

PART 1 · GENERAL

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

1.2 SUMMARY
   A. Section includes 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 comparable products.
   B. Related Requirements:
      1. Section 012100 "Allowances" for products selected under an allowance.
      2. Section 012300 "Alternates" for products selected under an alternate.
      3. Section 012500 "Substitution Procedures" for requests for substitutions.
      4. Section 014200 "References" for applicable industry standards for products specified.

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, which 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. Comparable 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 equal 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,” 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 comparable products of additional manufacturers named in the specification.

1.4 ACTION SUBMITTALS
   A. Comparable Product Requests: Submit request for consideration of each comparable 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 "Comparable Products" Article.
      2. Architect’s Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Architect will notify Contractor of approval or rejection of proposed comparable product request within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
         a. Form of Approval: As specified in Section 013300 "Submittal Procedures."
         b. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.

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 compatible with products previously selected, even if previously selected products were also options.
   1. Each contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.
   2. If a dispute arises between contractors over concurrently selectable but incompatible products, Architect will determine which products shall be used.

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. Protect 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. 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. See other Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Section 017700 "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. Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor’s convenience will not be considered.
   2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor’s convenience will not be considered.
   3. 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. Comparable products or substitutions for Contractor’s convenience will be considered unless otherwise indicated.
      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 “Comparable Products” Article for consideration of an unnamed product.
   4. 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. Comparable products or substitutions for Contractor’s convenience will be considered unless otherwise indicated.
      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 “Comparable Products” Article for consideration of an unnamed manufacturer’s product.
   5. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.

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 Section 012500 "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 COMPARABLE PRODUCTS

A. Conditions for Consideration: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:

1. Evidence that the proposed product does not require revisions to the Contract Documents, which 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.

END OF SECTION
DIVISION 01 – GENERAL REQUIREMENTS

SECTION 017300 – EXECUTION

PART 1 - GENERAL

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

1.2 SUMMARY
   A. Section includes general 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.
   B. Related Requirements:
      1. Section 011000 "Summary" for limits on use of Project site.
      2. Section 013300 "Submittal Procedures" for submitting surveys.
      3. Section 017700 "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.

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 and/or professional engineer.
   B. Certificates: Submit certificate signed by land surveyor and/or professional engineer certifying that location and elevation of improvements comply with requirements.
   C. Cutting and Patching Plan: Submit plan describing procedures at least 10 days prior to the time cutting and patching will be performed. Include the following information:
      1. Extent: Describe reason for and extent of each occurrence of cutting and patching.
      2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building appearance and other significant visual elements.
      3. Products: List products to be used for patching and firms or entities that will perform patching work.
      4. Dates: Indicate when cutting and patching will be performed.
      5. Utilities and Mechanical and Electrical Systems: List services and systems that cutting and patching procedures will disturb or affect. List services and systems that will be relocated and those that will be temporarily out of service. Indicate length of time permanent services and systems will be disrupted.
         a. Include description of provisions for temporary services and systems during interruption of permanent services and systems.
   D. Certified Surveys: Submit two copies signed by land surveyor and/or professional engineer.
   E. Final Property Survey: Submit 10 copies showing the Work performed and record survey data.
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 Architect before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection.
   2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Operational elements include 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. Fire-detection and -alarm systems.
      i. Conveying systems.
      j. Electrical wiring systems.
      k. 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. Sprayed fire-resistive material.
      e. Equipment supports.
      f. Piping, ductwork, vessels, and equipment.
      g. 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, 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. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.
D. Manufacturer’s Installation Instructions: Obtain and maintain on-site manufacturer’s written recommendations and instructions for installation of products and equipment.

PART 2 - PRODUCTS

2.1 MATERIALS
A. General: Comply with requirements specified in other Sections.
B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
   1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials.
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 site work, 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. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

C. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:

1. Description of the Work.
2. List of detrimental conditions, including substrates.
3. List of unacceptable installation tolerances.
4. Recommended corrections.

D. 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 Architect or Engineer 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 Contractor, submit a request for information to Architect according to requirements in Section 013100 "Project Management and Coordination."

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 and/or professional engineer 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 limits on use of Project site.
3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
4. Inform installers of lines and levels to which they must comply.
5. Check the location, level and plumb, of every major element as the Work progresses.
6. Notify Architect when deviations from required lines and levels exceed allowable tolerances.
7. 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.
4. Maintain minimum headroom clearance of 96 inches (2440 mm) in occupied spaces and 90 inches (2300 mm) in unoccupied spaces.

B. Comply with manufacturer’s written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions that will ensure 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. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.
F. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.

G. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.
   1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
   2. Allow for building movement, including thermal expansion and contraction.
   3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

I. 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.

J. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

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. 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.

C. Temporary Support: Provide temporary support of work to be cut.

D. 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.

E. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching according to requirements in Section 011000 “Summary.”

F. 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.

G. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer’s written recommendations.
   1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
   2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
   3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
   4. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.
   5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
   6. Proceed with patching after construction operations requiring cutting are complete.
H. 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. 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.
   4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
   5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.

I. 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 (27 deg C).
      3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
         a. Use containers intended for holding waste materials of type to be stored.
      4. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently. For this project joint use areas will be limited to exterior spaces.
   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 Section 015000 "Temporary Facilities and Controls."

H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

J. Limiting Exposures: Supervise construction operations to 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 Section 019113 "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 Section 014000 "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.

END OF SECTION
PART 1 - GENERAL

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

1.2 SUMMARY
A. Section includes administrative and procedural requirements 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. Section 013233 "Photographic Documentation" for submitting final completion construction photographic documentation.
   2. Section 017300 "Execution" for progress cleaning of Project site.
   3. Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.
   4. Section 017839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
   5. Section 017900 "Demonstration and Training" for requirements for instructing Owner's personnel.

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
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 SUBSTANTIAL COMPLETION PROCEDURES
A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.
B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
   1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, 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 Architect. 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 Architect’s signature for receipt of submittals.
5. Submit test/adjust/balance records.
6. Submit sustainable design submittals not previously submitted.
7. 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.
4. Perform preventive maintenance on equipment used prior to Substantial Completion.
5. Instruct Owner’s personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Section 017900 “Demonstration and Training.”
6. Advise Owner of changeover in heat and other utilities.
7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
9. Complete final cleaning requirements, including touchup painting.
10. 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.

1.7 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 according to Section 012900 “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.

1.8 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.

1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor.
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:

1.9 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 (215-by-280-mm) 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. Provide copy of electronic file within the three ring binder paper file on DVD or thumb drive.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.
PART 3 - EXECUTION

3.1 FINAL CLEANING
A. 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-obscuring 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 grills.
   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.

B. Construction Waste Disposal: Comply with waste disposal requirements in Section 015000 “Temporary Facilities and Controls.”

3.2 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
DIVISION 01 – GENERAL REQUIREMENTS

SECTION 017823 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements 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.

B. Related Requirements:
   1. Section 011200 "Multiple Contract Summary" for coordinating operation and maintenance manuals covering the Work of multiple contracts.
   2. Section 013300 "Submittal Procedures" for submitting copies of submittals for operation and 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. Two paper copies. Include a complete operation and maintenance directory. Enclose title pages and directories in clear plastic sleeves.

C. 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.
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 the 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 Construction Manager.
   7. Name and contact information for Architect.
   8. Name and contact information for Commissioning Authority.
   9. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
   10. Cross-reference to related systems in other operation and maintenance manuals.

C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
   1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.

D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

E. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required. Place electronic files on DVD or thumb drive within the binders of the paper files for owner access.
   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, post-type binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch (215-by-280-mm) 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 OPERATIONAL 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 Project Manual and drawing or schedule designation or identifier where applicable.
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 Section 017839 "Project Record Documents."

G. Comply with Section 017700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION
DIVISION 01 – GENERAL REQUIREMENTS

SECTION 017839 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

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

1.2 SUMMARY
A. Section includes administrative and procedural requirements for project record documents, including the following:
   1. Record Drawings.
   2. Record Specifications.
   3. Record Product Data.
   4. Miscellaneous record submittals.
B. Related Requirements:
   1. Section 011200 “Multiple Contract Summary” for coordinating project record documents covering the Work of multiple contracts.
   2. Section 017300 “Execution” for final property survey.
   3. Section 017700 “Closeout Procedures” for general closeout procedures.
   4. Section 017823 “Operation and Maintenance Data” for operation and maintenance manual requirements.

1.3 CLOSEOUT SUBMITTALS
A. Record Drawings: Comply with the following:
   1. Number of Copies: Submit copies of record Drawings as follows:
      a. Final Submittal:
         1) Submit two paper-copy set(s) of marked-up record prints.
         2) Print each drawing, whether or not changes and additional information were recorded.
      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.
   B. Record Specifications: Submit two paper copies of Project’s Specifications, including addenda and contract modifications.
   C. Record Product Data: Submit 2 paper copies of each submittal.
      1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS
A. Record Prints: Contractors shall continuously document changes to the project construction. Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.
   1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.
      a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
      b. Accurately record information in an acceptable drawing technique.
      c. Record data as soon as possible after obtaining it.
      d. Record and check the markup before enclosing concealed installations.
e. Cross-reference record prints to corresponding archive photographic documentation.

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.

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, 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:
   1. Format: Same digital data software program, version, and operating system as the original Contract Drawings.
   2. Format: Annotated PDF electronic file with comment function enabled.
   3. Incorporate changes and additional information previously marked on record prints. Delete, redraw, and add details and notations where applicable.
   4. Refer instances of uncertainty to Architect for resolution.
      a. See Section 013300 “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.
   2. Format: Annotated PDF electronic file with comment function enabled.
   3. 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.
   4. Identification: As follows:
      a. Project name.
      b. Date.
      c. Designation “PROJECT RECORD DRAWINGS.”
      d. Name of Architect and Construction Manager.
      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. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
4. For each principal product, indicate whether record Product Data has been submitted in operation and maintenance manuals instead of submitted as record Product Data.
5. Note related Change Orders and record Drawings where applicable.

B. Format: Submit record Specifications as paper copy or scanned PDF electronic file(s) of marked-up paper copy of Specifications.

2.3 RECORD PRODUCT DATA
A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.
1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Include significant changes in the product delivered to Project site and changes in manufacturer’s written instructions for installation.
3. Note related Change Orders and record Drawings where applicable.
B. Format: Submit record Product Data as scanned PDF electronic file(s) of marked-up paper copy of Product Data.
1. Include record Product Data directory organized by Specification Section number and title, electronically linked to each item of record Product Data.

2.4 MISCELLANEOUS RECORD SUBMITTALS
A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.
B. Format: Submit miscellaneous record submittals as paper copy or scanned PDF electronic file(s) 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
DIVISION 01 – GENERAL REQUIREMENTS

SECTION 017900 - DEMONSTRATION AND TRAINING

PART 1 - GENERAL

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

1.2 SUMMARY
   A. Section includes administrative and procedural requirements for instructing Owner’s personnel, including the following:
      1. Demonstration of operation of systems, subsystems, and equipment.
      2. Training in operation and maintenance of systems, subsystems, and equipment.
      3. Demonstration and training video recordings.
   B. Allowances: Furnish demonstration and training instruction time under the Demonstration and Training Allowance as specified in Section 012100 "Allowances."
   C. Unit Price for Instruction Time: Length of instruction time will be measured by actual time spent performing demonstration and training in required location. No payment will be made for time spent assembling educational materials, setting up, or cleaning up. See requirements in Section 012200 "Unit Prices."

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. Qualification Data: For instructor.
   C. Attendance Record: For each training module, submit list of participants and length of instruction time.
   D. Evaluations: For each participant and for each training module, submit results and documentation of performance-based test.

1.4 CLOSEOUT SUBMITTALS

1.5 QUALITY ASSURANCE
   A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.
   B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Section 014000 "Quality Requirements," experienced in operation and maintenance procedures and training.
   C. Videographer Qualifications: A professional videographer who is experienced photographing demonstration and training events similar to those required.
   D. Preinstruction Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination." Review methods and procedures related to demonstration and training including, but not limited to, the following:
      1. Inspect and discuss locations and other facilities required for instruction.
      2. Review and finalize instruction schedule and verify availability of educational materials, instructors’ personnel, audiovisual equipment, and facilities needed to avoid delays.
      3. Review required content of instruction.
4. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.

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. Basis of System Design, Operational Requirements, and Criteria: Include the following:
      a. System, subsystem, and equipment descriptions.
      b. Performance and design criteria if Contractor is delegated design responsibility.
      c. Operating standards.
      d. Regulatory requirements.
      e. Equipment function.
      f. Operating characteristics.
      g. Limiting conditions.
      h. Performance curves.
   2. Documentation: Review the following items in detail:
      a. Emergency manuals.
      b. Operations manuals.
      c. Maintenance manuals.
      d. Project record documents.
      e. Identification systems.
      f. Warranties and bonds.
      g. Maintenance service agreements and similar continuing commitments.
   3. Emergencies: Include the following, as applicable:
      a. Instructions on meaning of warnings, trouble indications, and error messages.
      b. Instructions on stopping.
      c. Shutdown instructions for each type of emergency.
      d. Operating instructions for conditions outside of normal operating limits.
      e. Sequences for electric or electronic systems.
      f. Special operating instructions and procedures.
   4. Operations: Include the following, as applicable:
      a. Startup procedures.
      b. Equipment or system break-in procedures.
      c. Routine and normal operating instructions.
      d. Regulation and control procedures.
      e. Control sequences.
      f. Safety procedures.
      g. Instructions on stopping.
      h. Normal shutdown instructions.
i. Operating procedures for emergencies.

j. Operating procedures for system, subsystem, or equipment failure.

k. Seasonal and weekend operating instructions.

l. Required sequences for electric or electronic systems.

m. Special operating instructions and procedures.

5. Adjustments: Include the following:
   a. Alignments.
   b. Checking adjustments.
   c. Noise and vibration adjustments.
   d. Economy and efficiency adjustments.

6. Troubleshooting: Include the following:
   a. Diagnostic instructions.
   b. Test and inspection procedures.

7. Maintenance: Include the following:
   a. Inspection procedures.
   b. Types of cleaning agents to be used and methods of cleaning.
   c. List of cleaning agents and methods of cleaning detrimental to product.
   d. Procedures for routine cleaning.
   e. Procedures for preventive maintenance.
   f. Procedures for routine maintenance.
   g. Instruction on use of special tools.

8. Repairs: Include the following:
   a. Diagnosis instructions.
   b. Repair instructions.
   c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
   d. Instructions for identifying parts and components.
   e. Review of spare parts needed for operation and maintenance.

PART 3 - EXECUTION

3.1 PREPARATION
   A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Section 017823 "Operation and Maintenance Data."
   B. Set up instructional equipment at instruction location.

3.2 INSTRUCTION
   A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.
   B. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
      1. Architect will furnish an instructor to describe basis of system design, operational requirements, criteria, and regulatory requirements.
      2. Owner will furnish an instructor to describe Owner's operational philosophy.
      3. Owner will furnish Contractor with names and positions of participants.
   C. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.
      1. Schedule training with Owner at least seven days' advance notice.
   D. Training Location and Reference Material: Conduct training on-site in the completed and fully operational facility using the actual equipment in-place. Conduct training using final operation and maintenance data submittals.
E. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of a demonstration performance-based test.

F. 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.
DIVISION 03 - CONCRETE

SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
B. See Structural Notes on the Structural Drawings for additional specific information about the requirements for this project. Information on the structural drawings shall take precedence over provisions herein.

1.2 SUMMARY
A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.

1.3 DEFINITIONS
A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash, slag cement, other pozzolans, and silica fume; materials subject to compliance with requirements.
B. W/C Ratio: The ratio by weight of water to cementitious materials.

1.4 ACTION SUBMITTALS
A. Product Data: For each type of product.
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, welded connections, tie spacing, hoop spacing, and supports for concrete reinforcement.
D. Construction Joint Layout:
   1. Construction joints are not indicated in the drawings provide locations and types of joints to be used in each condition. Joint spacing not to exceed 10 feet in the short dimension and the maximum area between joints shall not exceed 400 square feet. Locate joints on structural lines, at corners of slabs, or concealed under walls whenever possible.
   2. Construction joints are to be located as required to meet referenced standards.
E. Provide the following samples for review prior to ordering:
   1. Vapor retarder

1.5 INFORMATIONAL SUBMITTALS
A. 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. Curing compounds.
   6. Floor and slab treatments. (Where specified elsewhere.)
   8. Adhesives.
   9. Vapor retarders.
   10. Semirigid joint filler.
1.6 QUALITY ASSURANCE
   A. Installer Qualifications: Company to install poured concrete shall have at least 5 years of successful projects or company owner to have at least 10 years of successful project experience and lead concrete installer to have a minimum of 5 years of successful concrete placement.
   B. Testing Agency: Owner is providing testing agency for concrete testing for this project. Contractor shall be responsible for notifying the testing agency 24 hours in advance of time of concrete pour so that testing personnel may be present. Concrete personnel shall cooperate with the Testing Agency to obtain samples and perform testing as required.

1.7 DELIVERY, STORAGE, AND HANDLING
   A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage. Where reinforcement has special coatings, provide special handling and storage to protect.

1.8 FIELD CONDITIONS
   A. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
      1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
      2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
      3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
   B. Hot-Weather Placement: Comply with ACI 301 and as follows:
      1. Maintain concrete temperature below 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.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL
   A. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
      1. ACI 301.
      2. ACI 117.

2.2 FORM-FACING MATERIALS
   A. Under no conditions should forms which are dented or delaminated or which have a build-up of concrete on the surface be used for forming concrete. Surfaces which are exposed to view or which are to be waterproofed with these problems may be subject to partial or complete patching or complete removal and replacement due to form issues.
   B. Smooth-Formed Finished Concrete: Unless otherwise specifically noted and specified, no decorative, textured, or patterned concrete forms are to be used on this project. Form-facing panels that provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints. Plywood, metal, or other approved panel materials.
      1. 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.
2. Overlaid Finnish birch plywood.
C. 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. Forms for Cylindrical Columns, Pedestals, and Supports: Metal, glass-fiber-reinforced plastic, paper, or fiber tubes that produce surfaces with gradual or abrupt irregularities not exceeding specified formwork surface class. Provide units with sufficient wall thickness to resist plastic concrete loads without detrimental deformation.
E. Pan-Type Forms: Glass-fiber-reinforced plastic or formed steel, stiffened to resist plastic concrete loads without detrimental deformation.
F. Void Forms: Biodegradable paper surface, treated for moisture resistance, structurally sufficient to support weight of plastic concrete and other superimposed loads.
H. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.
I. Form-Release Agent: Commercially formulated form-release agent that does not bond with, stain, or adversely affect concrete surfaces and does not impair subsequent treatments of concrete surfaces.
J. Form Ties: Factory-fabricated, removable or snap-off glass-fiber-reinforced plastic or metal form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
1. Furnish units that leave no corroducible metal closer than 1 inch to the plane of exposed concrete surface.
2. Furnish ties that, when removed, leave holes no larger than 1 inch in diameter in concrete surface.
3. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

2.3 STEEL REINFORCEMENT
A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.
B. Low-Alloy-Steel Reinforcing Bars: ASTM A 706/A 706M, deformed.
C. Steel Bar Mats: ASTM A 184/A 184M, fabricated from ASTM A 615/A 615M, Grade 60 ASTM A 706/A 706M, deformed bars, assembled with clips.
D. Plain-Steel Wire: ASTM A 1064/A 1064M, as drawn.
E. Deformed-Steel Wire: ASTM A 1064/A 1064M.
F. Plain-Steel Welded-Wire Reinforcement: ASTM A 1064/A 1064M, plain, fabricated from as-drawn steel wire into flat sheets.

2.4 REINFORCEMENT ACCESSORIES
A. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), 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, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:
1. For concrete surfaces exposed to view, where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.

2.5 CONCRETE MATERIALS
A. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.
B. Cementitious Materials:
2. Fly Ash: ASTM C 618, Class F or C.
C. Normal-Weight Aggregates: ASTM C 33/C 33M, Class 3S coarse aggregate or better, graded. Provide aggregates from a single source.
   2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

D. Air-Entraining Admixture: ASTM C 260/C 260M.

E. Chemical Admixtures: To be allowed only when specifically noted in the Structural Drawings or by specific approval of the products by the Architect or Structural Engineer prior to use. Where use is anticipated include in concrete design mix and provide product information for review. Certified by manufacturer to be compatible with other admixtures and that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
   1. 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.

F. Set-Accelerating Corrosion-Inhibiting Admixture: To be allowed only when specifically noted in the Structural Drawings or by specific approval of the products by the Architect or Structural Engineer prior to use. Commercially formulated, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete and complying with ASTM C 494/C 494M, Type C.

G. Non-Set-Accelerating Corrosion-Inhibiting Admixture: To be allowed only when specifically noted in the Structural Drawings or by specific approval of the products prior to use. Commercially formulated, non-set-accelerating, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete.


2.6 FIBER REINFORCEMENT
A. Carbon-Steel Fiber: ASTM A 820/A 820M, Type 1, cold-drawn wire, deformed, size as shown on drawings.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Bekaert
      b. Euclid Chemical Company (The); an RPM company.
      c. Nycon, Inc.
      d. Propex
      e. Sika Corporation.

B. Other fiber types will be considered upon application for approval prior to bidding.

2.7 VAPOR RETARDERS
A. Sheet Vapor Retarder: ASTM E 1745, Class A, except with maximum water-vapor permeance of .01 Perms. Include manufacturer’s recommended adhesive or pressure-sensitive tape. 15 mils minimum thickness.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Raven Industries, Inc.
      b. Stego Industries, LLC.

2.8 LIQUID FLOOR TREATMENTS
A. Concrete Sealer and Densifier: Concrete hardener and dust proofer that bonds chemically with the concrete to strengthen and harden floors that are porous, readily absorptive, and only moderately hard.
   1. Manufacturers:
      a. Master Builders MasterKure HD 300 WB (formerly Lapidolith)
   B. Moisture Curing Option To be used for all concrete surfaces where chemical curing will interfere with later installations.
1. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.

2.9 RELATED MATERIALS
A. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Type A shore durometer hardness of 80 according to ASTM D 2240.
B. Bonding Agent: ASTM C 1059/C 1059M, Type II, nonredispersible, acrylic emulsion or styrene butadiene.
C. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements, and as follows:
1. Types I and II, nonload bearing or Types IV and V, load bearing as required for application, for bonding hardened or freshly mixed concrete to hardened concrete.
D. Reglets: Fabricate reglets of not less than 0.022-inch (0.55-mm) thick, galvanized-steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.
E. Dovetail Anchor Slots: Hot-dip galvanized-steel sheet, not less than 0.034 inch (0.85 mm) thick, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.

2.10 REPAIR MATERIALS
A. Repair Underlayment: (Repair materials are to be used only in very small and limited quantities in concealed areas unless noted otherwise or approved in advance.) Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch (3.2 mm) and that can be feathered at edges to match adjacent floor elevations.
2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch (3.2 to 6 mm) or coarse sand as recommended by underlayment manufacturer.
4. Compressive Strength: Not less than 4100 psi (29 MPa) or at least equal by test to surrounding materials at 28 days when tested according to ASTM C 109/C 109M.
B. Repair Overlay: (Overlay materials are only to be used in areas of existing construction and only where specifically noted in the drawings or approved in advance.) Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch (6.4 mm) and that can be filled in over a scarified surface to match adjacent floor elevations.
2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch (3.2 to 6 mm) or coarse sand as recommended by topping manufacturer.
4. Compressive Strength: Not less than 5000 psi (34.5 MPa) at 28 days when tested according to ASTM C 109/C 109M.

2.11 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 (ACI 301M).
B. Cementitious Materials: Use of fly ash, pozzolan, slag cement, and silica fume is allowed to reduce the total amount of portland cement, which would otherwise be used.
1. Fly Ash: 25 percent.
4. Combined Fly Ash or Pozzolan and Slag Cement: 50 percent portland cement minimum, with fly ash or pozzolan not exceeding 25 percent.

5. Silica Fume: 10 percent.

6. Combined Fly Ash, Pozzolans, and Silica Fume: 35 percent with fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.

7. Combined Fly Ash or Pozzolans, Slag Cement, and Silica Fume: 50 percent with fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.

C. Admixtures: Allowed provided all admixtures to be used on a project are submitted with the mix design and approved by the structural engineer and soil testing agency. Use admixtures according to manufacturer’s written instructions.

1. Use water-reducing, high-range water-reducing, or plasticizing admixture in concrete, as required, for placement and workability.

2. Use water-reducing and -retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.

3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a w/c ratio below 0.50.

4. Use corrosion-inhibiting admixture in concrete mixtures where indicated.

D. Color Pigment: Where noted in the drawings, add color pigment to concrete mixture according to manufacturer’s written instructions and to result in hardened concrete color consistent with approved mockup.

2.12 CONCRETE MIXTURES FOR BUILDING ELEMENTS: See structural drawings for additional information.

A. Footings: Normal-weight concrete.

1. Minimum Compressive Strength: As indicated in the structural drawings but not less than 3000 psi at 28 days.

2. Maximum W/C Ratio: 0.50 unless specifically approved by Structural Engineer or Testing Agency.

3. Slump Limit: 4 inches for concrete without admixtures or 8 inches for concrete with verified slump of 2 to 4 inches before adding high-range water-reducing admixture or plasticizing admixture plus or minus 1 inch.

4. Air Content: 5.5 percent, plus or minus 1.5 percent at point of delivery for 1-1/2-inch nominal maximum aggregate size.


1. Minimum Compressive Strength: As indicated in the structural drawings but not less than 4000 psi at 28 days.

2. Maximum W/C Ratio: 0.45 unless specifically approved by Structural Engineer or Testing Agency.

3. Slump Limit: 4 inches for concrete without admixtures or 8 inches for concrete with verified slump of 2 to 4 inches before adding high-range water-reducing admixture or plasticizing admixture plus or minus 1 inch.

4. Air Content: 5.5 percent, plus or minus 1.5 percent at point of delivery for 1-1/2-inch nominal maximum aggregate size.

C. Slabs-on-Grade: Normal-weight concrete.

1. Minimum Compressive Strength: As indicated in the structural drawings but not less than 4000 psi at 28 days.

2. Maximum W/C Ratio: 0.45.

3. Slump Limit: 4 inches for concrete without admixtures, or 8 inches for concrete with verified slump of 2 to 4 inches before adding high-range water-reducing admixture or plasticizing admixture plus or minus 1 inch.

4. Air Content: 5.5 percent, plus or minus 1.5 percent at point of delivery for 1-1/2-inch (38-mm) nominal maximum aggregate size.

5. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.

1. Minimum Compressive Strength: Verify with structural drawings but not less than 4000 psi at 28 days.
2. Maximum W/C Ratio: 0.45.
3. Slump Limit: 4 inches without admixtures or 8 inches for concrete with verified slump of 2 to 4 inches before adding high-range water-reducing admixture or plasticizing admixture plus or minus 1 inch.
4. Air Content: 5.5 percent, plus or minus 1.5 percent at point of delivery for 1-1/2-inch nominal maximum aggregate size.

2.13 FABRICATING REINFORCEMENT
A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.14 CONCRETE MIXING
A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 FORMWORK INSTALLATION
A. Design, erect, shore, brace, and maintain formwork, according to ACI 301 (ACI 301M), 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 (ACI 117M).
C. Limit concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:
   1. For all surfaces exposed to view, where painted, or where waterproofing requires: Class A, 1/8 inch for smooth-formed finished surfaces.
   2. For surfaces concealed by furring or other finishes which are directly attached to concrete: Class B, 1/4 inch.
   3. For permanently concealed walls where furring or concealment is not directly attached to the wall, buried walls not requiring waterproofing Class C, 1/2 inch and Class D, 1 inch for rough-formed finished surfaces.
D. Construct forms tight enough to prevent loss of concrete mortar.
E. Construct forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast-concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
   1. Install keyways, reglets, recesses, and the like, for easy removal.
   2. Do not use rust-stained steel form-facing material.
F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.
G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
H. Unless otherwise noted or shown, chamfer exterior corners top and edges of the tops and sides of permanently exposed concrete where there is no other wall or ceiling surface flush with face of concrete wall.
I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.
J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
L. Coat contact surfaces of forms with form-release agent, according to manufacturer’s written instructions, before placing reinforcement.

3.2 EMBEDDED ITEM INSTALLATION
A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
   1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC 303.
   2. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
   3. Install dovetail anchor slots in concrete structures as indicated.

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 for 24 hours after placing concrete unless curing conditions allow forms to be removed sooner, but no less than 12 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 support 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 are not 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. Do not use forms where concrete laitance will affect structural integrity of the concrete, detract from appearance of the concrete or with adhesion of waterproofing, EIFS, or other cladding systems. The Architect reserves the right to reject exposed concrete walls damaged by the use of laitance covered or damaged forms.

3.4 SHORING AND RESHORING INSTALLATION
A. Comply with ACI 318 (ACI 318M) and ACI 301 (ACI 301M) for design, installation, and removal of shoring and reshoring.
   1. Do not remove shoring or reshoring until measurement of slab tolerances is complete.
B. Plan sequence of removal of shores and reshore to avoid damage to concrete. Locate and provide adequate reshoring to support construction without excessive stress or deflection.

3.5 VAPOR-RETARDER INSTALLATION
A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder according to ASTM E1643 and manufacturer’s written instructions.
   1. Lap joints 6 inches and seal with manufacturer’s recommended tape.
B. Bituminous Vapor Retarders: Place, protect, and repair bituminous vapor retarder according to manufacturer’s written instructions.

3.6 STEEL REINFORCEMENT INSTALLATION
A. General: Comply with CRSI’s "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
   1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.
B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that reduce bond to concrete.
C. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
D. 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.

3.7 JOINTS
A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
   1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
   2. Locate joints for beams, slabs, joists, and girders in the middle third of spans or as directed by the drawings. 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. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:
   1. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch (3.2-mm)-wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks. Sawcut newly placed concrete slabs as soon as practical and in no case more than 24 hours after placement.
D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated
   1. Terminate full-width joint-filler strips not less than 1/2 inch (13 mm) or more than 1 inch (25 mm) below finished concrete surface where joint sealants, specified in Section 079200 "Joint Sealants," are indicated.
   2. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

3.8 CONCRETE PLACEMENT
A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections are completed.
B. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301 (ACI 301M).
   1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
C. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
   1. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.
   2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301 (ACI 301M).
   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 (150 mm) 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.

D. 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.

3.9 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. Applies to concrete surfaces not exposed to public view.
   2. Where waterproofing or EIFS is to be applied, surface must not reduce adhesion of glues and mastics.
   3. Below grade
B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
   1. Apply to concrete surfaces exposed to public view, to receive a rubbed finish, or to be painted or covered with a coating or covering material applied directly to concrete including spray texture materials.
C. 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.

3.10 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. 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. Use float finish in areas indicated in the drawings or where concrete is to be covered with fluid applied or sheet waterproofing, built up membrane roofing, or sand be terrazzo. In all of these cases concrete contractor must coordinate surface requirements with covering product manufacturer’s recommendations.
C. 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 to be covered with resilient flooring (VCT, LVT, and others), carpet, thin-set terrazzo, ceramic or quarry tile, paint, or another thin-film-finish coating systems.
   2. Finish and measure surface, so gap at any point between concrete surface and an unleveled, freestanding, 10-ft.-long straightedge resting on two high spots and placed anywhere on the surface does not exceed 1/4 inch.
3. Finish surfaces to the following tolerances, according to ASTM E 1155 (ASTM E 1155M), for a randomly trafficked floor surface:
   D. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, stoops, and other exterior, wet condition walking surfaces, and other areas 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.

3.11 MISCELLANEOUS CONCRETE ITEM INSTALLATION
   A. Filling In: Fill in holes and openings left in concrete structures after work of other trades is in place unless otherwise indicated. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.
   B. 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. Construct concrete bases 4 inches (change thickness if required) high unless otherwise indicated, and extend base not less than 6 inches in each direction beyond the maximum dimensions of supported equipment unless otherwise indicated or unless required.
      3. Minimum Compressive Strength: 4000 psi at 28 days.
      4. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of concrete base.
      5. For supported equipment, install anchor bolts that extend through concrete base and anchor into structural concrete substrate. Verify size, type, and coating required, if any, of anchor bolts.
      6. Prior to pouring concrete, place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
      7. Cast anchor-bolt insert into bases. Install anchor bolts to elevations required for proper attachment to supported equipment.
      8. See structural drawings for engineered foundations and equipment slabs.
      9. Provide for all equipment noted in the architectural, mechanical, electrical, or structural drawings or for equipment which are not designed with an integral base.

3.12 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 (ACI 301M) for hot-weather protection during curing.
   B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer’s written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
   C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for remainder of curing period.
   D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.
   E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
      1. Moisture Curing: To be used wherever curing compounds are incompatible with finish floor or membrane adhesives, floor coatings, waterproofing membranes, or other covering materials. Keep surfaces continuously moist for not less than seven days with the following materials:
         a. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
2. 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
   a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer.

3.13 LIQUID FLOOR TREATMENT APPLICATION
A. Concrete Sealer and Densifier Penetrating Liquid Floor Treatment (Master Builders HD300WB formerly Lapidolith): Magnesium-fluorosilicate concrete hardener and dust proofer that bonds chemically with the concrete to strengthen and harden floors that are porous, readily absorptive, and only moderately hard.
1. CONCRETE
   a. After the first application, allow the floor to dry until no longer visibly wet.
   b. If crystals develop during the second application, flush the surface liberally with clean water, preferably hot. At the same time, rapidly brush the floor with a stiff-bristled broom. Then mop up excess water and allow the surface to dry.

2. CONCRETE, POLISHED SHEEN
   a. To achieve the appearance of a polished sheen from traffic, use 3 applications of Lapidolith®. The first is diluted 4 to 1 (water to Lapidolith®), the second is diluted 3 to 1, and the third is diluted 2 to 1 (see Yield section).
   b. As the last application is drying, wait for the uniform appearance of white crystals. Flood the floor with water and buff with a commercial floor buffer using a 3M® or similar type of abrasive pad. Continue buffing until the floor acquires a patina or polish and the whiteness is gone.
   c. The above recommendation is for dense, steel troweled floors. Older or more porous concrete may require less dilution or a lower coverage rate or more than 3 applications.
   CAUTION: unusually wet or oily environments will be more slippery with this surface treatment.

3.14 JOINT FILLING
A. Prepare, clean, and install joint filler according to manufacturer’s written instructions.
B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joints clean and dry.
C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches (50 mm) deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.15 CONCRETE SURFACE REPAIRS
A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect’s approval.
B. Patching Mortar: Mix dry-pack patching mortar, consisting of 1 part portland cement to 2 1/2 parts fine aggregate passing a No. 16 (1.18-mm) 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 (13 mm) in any dimension to solid concrete. Limit cut depth to 3/4 inch (19 mm). Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
   2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar matches surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
3. Repair defects on concealed formed surfaces that affect concrete’s durability and structural performance as determined by Architect.

D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch (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 remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch (6 mm) 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.

5. Repair defective areas, except random cracks and single holes 1 inch (25 mm) 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 (19-mm) 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.

6. Repair random cracks and single holes 1 inch (25 mm) 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.

3.16 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Inspections:

1. 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/C 172M 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. (4 cu. m), but less than 25 cu. yd. (19 cu. m), plus one set for each additional 50 cu. yd. (38 cu. m) or fraction thereof.

   a. When frequency of testing provides fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.

2. Slump: ASTM 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/C 231M, 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 (4.4 deg C) and below or 80 deg F (27 deg C) and above, and one test for each composite sample.

5. Compression Test Specimens: ASTM C 31/C 31M.
a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.
b. Cast and field cure two sets of two standard cylinder specimens for each composite sample.

6. Compressive-Strength Tests: ASTM C 39/C 39M; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.
   a. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.

7. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.

8. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi (3.4 MPa).

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 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 (ASTM E 1155M) within 24 hours of finishing.

3.17 PROTECTION OF LIQUID FLOOR TREATMENTS

A. Protect liquid floor treatment from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by liquid floor treatments installer.

END OF SECTION
DIVISION 04 – MASONRY

SECTION 042200 - CONCRETE UNIT MASONRY

PART 1 - GENERAL

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

1.2 SUMMARY
A. Section Includes:
   1. Concrete masonry units.
   2. Decorative concrete masonry units.
   3. Mortar and grout.
   4. Steel reinforcing bars.
   5. Masonry-joint reinforcement.
   6. Embedded flashing.
   7. Miscellaneous masonry accessories.
B. Related Requirements:
   1. Section 051200 "Structural Steel Framing" for installing anchor sections of adjustable masonry anchors for connecting to structural steel frame.
   2. Section 076200 "Sheet Metal Flashing and Trim" for exposed sheet metal flashing and for furnishing manufactured reglets installed in masonry joints.

1.3 DEFINITIONS
A. CMU(s): Concrete masonry unit(s).
B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.4 ACTION SUBMITTALS
A. Product Data: For each type of product.
B. Shop Drawings: For the following:
   1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
   2. Reinforcing Steel: Detail bending, lap lengths, and placement of unit masonry reinforcing bars. Comply with ACI 315. Show elevations of reinforced walls.
   3. Fabricated Flashing: Detail corner units, end-dam units, and other special applications.
C. Samples for Initial Selection:
   1. Decorative CMUs, in the form of small-scale units.
   2. Pre-faced CMUs.
   3. Colored mortar.
   4. Weep holes/vents.

1.5 INFORMATIONAL SUBMITTALS
A. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.
B. Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units, mortar type, and resulting net-area compressive strength of masonry determined according to TMS 602/ACI 530.1/ASCE 6.
C. Cold-Weather and Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.
DELIVERY, STORAGE, AND HANDLING
A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.
B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
D. Deliver preblended, dry mortar mix in moisture-resistant containers. Store preblended, dry mortar mix in delivery containers on elevated platforms in a dry location or in covered weatherproof dispensing silos.
E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

FIELD CONDITIONS
A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day’s work. Cover partially completed masonry when construction is not in progress.
1. Extend cover a minimum of 24 inches (600 mm) down both sides of walls, and hold cover securely in place.
B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least three days after building masonry walls or columns.
C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
2. Protect sills, ledges, and projections from mortar droppings.
3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.
D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.
1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F (4 deg C) and higher and will remain so until masonry has dried, but not less than seven days after completing cleaning.

PART 2 - PRODUCTS

MANUFACTURERS
A. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.
B. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.

PERFORMANCE REQUIREMENTS
A. Provide structural unit masonry that develops indicated net-area compressive strengths at 28 days.
1. Determine net-area compressive strength of masonry from average net-area compressive strengths of masonry units and mortar types (unit-strength method) according to TMS 602/ACI 530.1/ASCE 6.
2. Determine net-area compressive strength of masonry by testing masonry prisms according to ASTM C 1314.

2.3 UNIT MASONRY, GENERAL
A. Masonry Standard: Comply with TMS 602/ACI 530.1/ASCE 6 except as modified by requirements in the Contract Documents.
B. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated. Do not use units where such defects are exposed in the completed work and will be within 20 feet (6 m) vertically and horizontally of a walking surface.
C. Fire-Resistance Ratings: Comply with requirements for fire-resistance-rated assembly designs indicated.
   1. Where fire-resistance-rated construction is indicated, units shall be listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction.

2.4 CONCRETE MASONRY UNITS
A. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.
   1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
   2. Provide bullnose units for outside corners where CMU is exposed unless otherwise indicated. Provide square-edged units for outside corners where CMU is covered by gypsum board or other finish material.
B. CMUs: ASTM C 90.
   1. Density Classification: Normal weight unless otherwise indicated.
   2. Size (Width): Manufactured to dimensions 3/8 inch (10 mm) less-than-nominal dimensions.
C. Decorative CMUs: ASTM C 90.
   1. Density Classification: Normal weight unless otherwise indicated.
   2. Size (Width): Manufactured to dimensions specified in "CMUs" Paragraph.
   3. Pattern and Texture:
      a. Standard pattern, split-face finish.
      b. Smooth pattern for exterior veneers.
   4. Colors: Color selection based on King’s Materials, Inc., Midland Concrete Products. Color to be Parchment for all exterior exposed CMU and split face veneer. Architect reserves the right to change color during the final selection process.

2.5 MASONRY LINTELS
A. General: Provide one of the following:
B. Masonry Lintels: Prefabricated or built-in-place masonry lintels made from bond beam CMUs matching adjacent CMUs in color, texture, and density classification, with reinforcing bars placed as indicated and filled with coarse grout. Cure precast lintels before handling and installing. Temporarily support built-in-place lintels until cured.

2.6 MORTAR AND GROUT MATERIALS
A. Portland Cement: ASTM C 150/C 150M, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.
   1. Alkali content shall not be more than 0.1 percent when tested according to ASTM C 114.
B. Hydrated Lime: ASTM C 207, Type S.
C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.
D. Masonry Cement: ASTM C 91/C 91M.
   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. Cemex S.A.B. de C.V.
b. Essroc.
c. Holcim (US) Inc.
d. Lafarge North America Inc.
e. Lehigh Hanson; Heidelberg Cement Group.

E. Mortar Cement: ASTM C 1329/C 1329M.
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. Lafarge North America Inc.

F. Aggregate for Mortar: ASTM C 144.
1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
2. For joints less than 1/4 inch (6 mm) thick, use aggregate graded with 100 percent passing the No. 16 (1.18-mm) sieve.
3. White-Mortar Aggregates: Natural white sand or crushed white stone.


H. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C 494/C 494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.
1. 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. BASF Corporation; Construction Systems.
   b. Euclid Chemical Company (The); an RPM company.
   c. Grace Construction Products; W.R. Grace & Co. – Conn.

I. Water: Potable.

2.7 REINFORCEMENT
A. Uncoated Steel Reinforcing Bars: ASTM A 615/A 615M or ASTM A 996/A 996M, Grade 60 (Grade 420).
B. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells and to hold reinforcing bars in center of cells. Units are formed from 0.148-inch (3.77-mm) steel wire, hot-dip galvanized after fabrication. Provide units designed for number of bars 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:
   b. Heckmann Building Products, Inc.
   c. Hohmann & Barnard, Inc.
   d. Wire-Bond.

C. Masonry-Joint Reinforcement, General: Ladder type complying with ASTM A 951/A 951M.

2.8 TIES AND ANCHORS
A. General: Ties and anchors shall extend at least 1-1/2 inches (38 mm) into masonry but with at least a 5/8-inch (16-mm) cover on outside face.
B. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated:
   2. Galvanized-Steel Sheet: ASTM A 653/A 653M, Commercial Steel, G60 (Z180) zinc coating.
   3. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
C. 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.
D. Adjustable Anchors for Connecting to Concrete: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.
E. Partition Top Anchors: 0.105-inch (2.66-mm) thick metal plate with a 3/8-inch (9.5-mm) diameter metal rod 6 inches (152 mm) long welded to plate and with closed-end plastic tube fitted over rod that allows rod to move in and out of tube. Fabricate from steel, hot-dip galvanized after fabrication.

2.9 EMBEDDED FLASHING MATERIALS
A. Metal Flashing: Provide metal flashing complying with Section 076200 "Sheet Metal Flashing and Trim" and as follows:
   1. Fabricate through-wall flashing with snaplock receiver on exterior face where indicated to receive counterflashing.
B. 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.
   4. Where flashing is fully concealed, use flexible flashing.
C. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

2.10 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.
B. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D 2000, Designation M22A-805 or PVC, complying with ASTM D 2287, Type PVC-65406 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.
C. Bond-Breaker Strips: Asphalt-saturated felt complying with ASTM D 226/D 226M, Type I (No. 15 asphalt felt).

2.11 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 portland cement-lime or mortar cement mortar unless otherwise indicated.
   3. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.
B. Grout for Unit Masonry: Comply with ASTM C 476.
   1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with TMS 602/ACI 530.1/ASCE 6 for dimensions of grout spaces and pour height.

PART 3 · EXECUTION

3.1 EXAMINATION
A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
   1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
   2. Verify that foundations are within tolerances specified.
   3. Verify that reinforcing dowels are properly placed.
   4. Verify that substrates are free of substances that would impair mortar bond.
B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping.
C. Proceed with installation only after unsatisfactory conditions have been corrected.
3.2 INSTALLATION, GENERAL
A. Build chases and recesses to accommodate items specified in this and other Sections.
B. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match construction immediately adjacent to opening.
C. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

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 (12 mm) or minus 1/4 inch (6 mm).
2. For location of elements in plan, do not vary from that indicated by more than plus or minus 1/2 inch (12 mm).
3. For location of elements in elevation, do not vary from that indicated by more than plus or minus 1/4 inch (6 mm) in a story height or 1/2 inch (12 mm) 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 (6 mm in 3 m), or 1/2-inch (12-mm) 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 (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2-inch (12-mm) maximum.
3. For vertical lines and surfaces do not vary from plumb by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2-inch (12-mm) 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 (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2-inch (12-mm) maximum.
5. For lines and surfaces, do not vary from straight by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2-inch (12-mm) maximum.
6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet (6 mm in 3 m), or 1/2-inch (12-mm) maximum.
7. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch (1.5 mm).
C. Joints:
1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm), with a maximum thickness limited to 1/2 inch (12 mm).
2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch (3 mm).
3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch (9 mm) or minus 1/4 inch (6 mm).
4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm).

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 (100-mm) 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 4 inches (100 mm). Bond and interlock each course of each wythe at corners. Do not use units with less-than-nominal 4-inch (100-mm) horizontal face dimensions at corners or jambs.
D. Stopping and Resuming Work: Stop work by stepping back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.

E. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

F. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.

G. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below, and rod mortar or grout into core.

H. Fill cores in hollow CMUs with grout 24 inches (600 mm) under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.

I. Build nonload-bearing interior partitions full height of story to underside of solid floor or roof structure above unless otherwise indicated.
   1. Install compressible filler in joint between top of partition and underside of structure above.
   2. Fasten partition top anchors to structure above and build into top of partition. Grout cells of CMUs solidly around plastic tubes of anchors and push tubes down into grout to provide 1/2-inch (13-mm) clearance between end of anchor rod and end of tube. Space anchors 48 inches (1200 mm) o.c. unless otherwise indicated.
   3. Wedge nonload-bearing partitions against structure above with small pieces of tile, slate, or metal. Fill joint with mortar after dead-load deflection of structure above approaches final position.
   4. At fire-rated partitions, treat joint between top of partition and underside of structure above to comply with Section 078443 "Joint Firestopping."

3.5 MORTAR BEDDING AND JOINTING

A. Lay hollow CMUs as follows:
   1. Bed face shells in mortar and make head joints of depth equal to bed joints.
   2. Bed webs in mortar in all courses of piers, columns, and pilasters.
   3. Bed webs in mortar in grouted masonry, including starting course on footings.
   4. Fully bed entire units, including areas under cells, at starting course on footings where cells are not grouted.

B. Lay solid CMUs with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.

C. Set cast-stone trim units in full bed of mortar with full vertical joints. Fill dowel, anchor, and similar holes.
   1. Clean soiled surfaces with fiber brush and soap powder and rinse thoroughly with clear water.
   2. Wet joint surfaces thoroughly before applying mortar.
   3. Rake out mortar joints for pointing with sealant.

D. Rake out mortar joints at pre-faced CMUs to a uniform depth of 1/4 inch (6 mm) and point with epoxy mortar to comply with epoxy-mortar manufacturer's written instructions.

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.

G. Cut joints flush where indicated to receive waterproofing unless otherwise indicated.

3.6 MASONRY-JOINT REINFORCEMENT

A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch (16 mm) on exterior side of walls, 1/2 inch (13 mm) elsewhere. Lap reinforcement a minimum of 6 inches (150 mm).
   1. Space reinforcement not more than 16 inches (406 mm) o.c.
   2. Space reinforcement not more than 8 inches (203 mm) o.c. in foundation walls and parapet walls.
   3. Provide reinforcement not more than 8 inches (203 mm) above and below wall openings and extending 12 inches (305 mm) beyond openings in addition to continuous reinforcement.

B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.

C. Cut and bend reinforcing units as directed by manufacturer for continuity at corners, returns, offsets, column fireproofing, pipe enclosures, and other special conditions.
3.7 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 an open space not less than 1/2 inch (13 mm) wide between masonry and structural steel or concrete unless otherwise indicated. Keep open space free of mortar and other rigid materials.
      2. Anchor masonry with anchors embedded in masonry joints and attached to structure.
      3. Space anchors as indicated, but not more than 24 inches (610 mm) o.c. vertically and 36 inches (915 mm) o.c. horizontally.

3.8 CONTROL AND EXPANSION JOINTS
   A. General: Install control- and expansion-joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.
   B. Form control joints in concrete masonry as follows using one of the following methods:
      1. Fit bond-breaker strips into hollow contour in ends of CMUs on one side of control joint. Fill resultant core with grout, and rake out joints in exposed faces for application of sealant.
      2. Install preformed control-joint gaskets designed to fit standard sash block.
      3. Install interlocking units designed for control joints. Install bond-breaker strips at joint. Keep head joints free and clear of mortar, or rake out joint for application of sealant.
      4. Install temporary foam-plastic filler in head joints, and remove filler when unit masonry is complete for application of sealant.

3.9 LINTELS
   A. Provide masonry lintels where shown and where openings of more than 12 inches (305 mm) for brick-size units and 24 inches (610 mm) for block-size units are shown without structural steel or other supporting lintels.
   B. Provide minimum bearing of 8 inches (200 mm) at each jamb unless otherwise indicated.

3.10 FLASHING
   A. General: Install embedded flashing at ledges and other obstructions to downward flow of water in wall where indicated.
   B. Install flashing as follows unless otherwise indicated:
      1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.
      2. At lintels, extend flashing a minimum of 6 inches (150 mm) into masonry at each end. At heads and sills, extend flashing 6 inches (150 mm) at ends and turn up not less than 2 inches (50 mm) to form end dams.
      3. Interlock end joints of ribbed sheet metal flashing by overlapping ribs not less than 1-1/2 inches (38 mm) or as recommended by flashing manufacturer, and seal lap with elastomeric sealant complying with requirements in Section 079200 "Joint Sealants" for application indicated.
      4. Install metal drip edges with ribbed sheet metal flashing by interlocking hemmed edges to form hooked seam. Seal seam with elastomeric sealant complying with requirements in Section 079200 "Joint Sealants" for application indicated.
   C. Install reglets and nailers for flashing and other related construction where they are shown to be built into masonry.

3.11 REINFORCED UNIT MASONRY INSTALLATION
   A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.
1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.

2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other loads that may be placed on them during construction.

B. Placing Reinforcement: Comply with requirements in TMS 602/ACI 530.1/ASCE 6.

C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.
   1. Comply with requirements in TMS 602/ACI 530.1/ASCE 6 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).

3.12 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.

3.13 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. Masonry Waste Recycling: Return broken CMUs not used as fill to manufacturer for recycling.

C. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above or recycled, and other masonry waste, and legally dispose of off Owner’s property.

END OF SECTION
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. Clay face brick.
   2. Mortar.
   3. Ties and anchors.
   4. Embedded flashing.
   5. Miscellaneous masonry accessories.
B. Products Installed but not Furnished under This Section:
   1. Steel lintels in masonry veneer.
C. Related Requirements:
   1. Section 076200 "Sheet Metal Flashing and Trim" for sheet metal flashing and for furnishing manufactured reglets installed in masonry joints.

1.3 ACTION SUBMITTALS
A. Product Data: For each type of product.
B. Shop Drawings: For the following:
   1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
   2. Stone Trim Units: Show sizes, profiles, and locations of each stone trim unit required.
   3. Fabricated Flashing: Detail corner units, end-dam units, and other special applications.
C. Samples for Initial Selection:
   1. Clay face brick, in the form of straps of five or more bricks.
   2. Stone trim.
   3. Colored mortar.
   4. Weep holes/vents.

1.4 QUALITY ASSURANCE
A. 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 for each type of exposed unit masonry construction 48 inches (1200 mm) long by 36 inches (900 mm) high by full thickness, including face and backup wythes and accessories.
      a. Include a sealant-filled joint at least 16 inches (400 mm) long in each mockup.
      b. Include through-wall flashing installed for a 24-inch (600-mm) length in corner of exterior wall mockup approximately 16 inches (400 mm) down from top of mockup, with a 12-inch (300-mm) length of flashing left exposed to view (omit masonry above half of flashing).
   2. Where masonry is to match existing, erect mockups adjacent and parallel to existing surface.
   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 Architect specifically approves such deviations in writing.
6. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.5 DELIVERY, STORAGE, AND HANDLING
A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.
B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
D. Deliver preblended, dry mortar mix in moisture-resistant containers. Store preblended, dry mortar mix in delivery containers on elevated platforms in a dry location or in covered weatherproof dispensing silos.
E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.6 FIELD CONDITIONS
A. Protection of Masonry: During construction, cover tops of veneer, projections, and sills with waterproof sheeting at end of each day’s work. Cover partially completed masonry when construction is not in progress.
   1. Extend cover a minimum of 24 inches (600 mm) down face of veneer, and hold cover securely in place.
B. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry. Immediately remove grout, mortar, and soil that come in contact with 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.
C. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.
   1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F (4 deg C) and higher and will remain so until masonry has dried, but not less than seven days after completing cleaning.

PART 2 - PRODUCTS
A. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.
B. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.

2.2 UNIT MASONRY, GENERAL
A. Masonry Standard: Comply with TMS 602/ACI 530.1/ASCE 6, except as modified by requirements in the Contract Documents.
B. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated. Do not use units where such defects will be exposed in the completed Work.

C. Fire-Resistance Ratings: Comply with requirements for fire-resistance-rated assembly designs indicated.

2.3 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. Clay Face Brick: Facing brick complying with ASTM C 216, Grade SW, Type FBA.
   1. Products: For bidding purposes only subject to final product selection. Subject to compliance with requirements, available products that may be incorporated into the work include, but are not limited to the following:
      a. Sioux City Brick
      b. Name: Savannah Wellington
      c. Color: Red
      d. Plant: Adel, Iowa
      e. Size: Modular

2.4 MORTAR MATERIALS

A. Portland Cement: ASTM C 150/C 150M, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.
   1. Alkali content shall not be more than 0.1 percent when tested according to ASTM C 114.

B. Colored Cement Products: Packaged blend made from portland cement and hydrated lime and mortar pigments, all complying with specified requirements, and containing no other ingredients.
   1. Formulate blend as required to produce color selected from manufacturer’s standard colors.

C. Water: Potable.

2.5 TIES AND ANCHORS

A. General: Ties and anchors shall extend at least 1-1/2 inches (38 mm) into veneer but with at least a 5/8-inch (16-mm) cover on outside face.

B. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated:
   6. Stainless-Steel Sheet: ASTM A 240/A 240M or ASTM A 666, Type 304.

C. Adjustable Masonry-Veneer Anchors:
   1. Screw-Attached, Masonry-Veneer Anchors: Units consisting of a wire tie and a metal anchor section.
      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) Dayton Superior Corporation, Dur-O-Wal Division; or D/A 210 with D/A 700-708.
2) Refer to structural drawings for alternative or special reinforcing requirements for anchorage.

2.6 EMBEDDED FLASHING MATERIALS

A. Elastomeric Thermoplastic Flashing: Composite flashing product consisting of a polyester-reinforced ethylene interpolymer alloy.
   1. Products: Subject to compliance with requirements, available products that may be incorporated into work to include, but not limited to the following:
      a. DuPont; Thru-Wall Flashing.
      b. Hohmann & Barnard, Inc.; Flex-Flash.
      c. Hyload, Inc.; Hyload Cloaked Flashing System.
      d. Mortar Net USA, Ltd.; Total Flash.
   2. Self-Adhesive Sheet: Elastomeric thermoplastic flashing, 0.025 inch (0.64 mm) thick, with a 0.015-inch (0.38-mm-) thick coating of adhesive.
      a. Accessories: Provide preformed corners, end dams, other special shapes, and seaming materials produced by flashing manufacturer.

B. 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 elastomeric thermoplastic flashing with a drip edge.
   4. Where flashing is fully concealed, use flexible flashing.

C. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer’s standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

D. Termination Bars for Flexible Flashing: Stainless steel sheet 0.019 inch by 1-1/2 inches (0.48 mm by 38 mm) with a 3/8 inch (9.5 mm) sealant flange at top.

2.7 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, urethane, or PVC.

B. Weep/Vent Products: Use the following unless otherwise indicated:
   1) Cellular Plastic Weep/Vent: One-piece, flexible extrusion made from UV-resistant polypropylene copolymer, full height and width of head joint and depth 1/8 inch less than depth of outer wythe, in color selected from manufacturer’s standard. Provide one vent at each joint in the precast concrete panels just above through wall flashing. Provide one vent at 4’-0” O.C. at the base and top of the wall and at each through wall horizontal flashing locations such as top(s) of windows and doors.

   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) Wilko Weep Vents
      2) Dayton Superior Corporation, Dur-O-Wal Division; Cell Vents.
      3) Hohman and Bernard, Blok-Lok Cell VentsMortar Net Weep Vents

2.8 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.
2.9 MORTAR MIXES

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.
   1. Do not use calcium chloride in mortar or grout.
   2. Use portland cement-lime mortar unless otherwise indicated.

B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.

C. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification. Use Type N unless another type is indicated.

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 10 percent of portland cement by weight.
   2. Pigments shall not exceed 5 percent of masonry cement or mortar cement by weight.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
   1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

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

3.2 INSTALLATION, GENERAL

A. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to opening.

B. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

C. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures. Mix units from several pallets or cubes as they are placed.

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 (12 mm) or minus 1/4 inch (6 mm).
   2. For location of elements in plan, do not vary from that indicated by more than plus or minus 1/2 inch (12 mm).
   3. For location of elements in elevation, do not vary from that indicated by more than plus or minus 1/4 inch (6 mm) in a story height or 1/2 inch (12 mm) 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 (6 mm in 3 m), or 1/2 inch (12 mm) 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 (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2 inch (12 mm) maximum.
   3. For vertical lines and surfaces, do not vary from plumb by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2 inch (12 mm) 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 (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2 inch (12 mm) maximum.
5. For lines and surfaces, do not vary from straight by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2 inch (12 mm) maximum.
6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet (6 mm in 3 m), or 1/2 inch (12 mm) maximum.

C. Joints:
1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm), with a maximum thickness limited to 1/2 inch (12 mm).
2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch (3 mm).
3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch (9 mm) or minus 1/4 inch (6 mm).
4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm). 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 (1.5 mm) 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 (100-mm) horizontal face dimensions at corners or jambs.
C. Stopping and Resuming Work: Stop work by stepping back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.
D. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.
E. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.

3.5 MORTAR BEDDING AND JOINTING
A. Lay hollow brick and CMUs with face shells fully bedded in mortar and with head joints of depth equal to bed joints. At starting course, fully bed entire units, including area under cells.
1. At anchors and ties, fully bed units and fill cells with mortar as needed to fully embed anchors and ties in mortar.
B. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

3.6 ANCHORED MASONRY VENEERS
A. Anchor masonry veneers to wall framing with masonry-veneer anchors to comply with the following requirements:
1. Fasten screw-attached anchors through sheathing to wall framing with metal fasteners of type indicated. Use two fasteners unless anchor design only uses one fastener.
2. Locate anchor sections to allow maximum vertical differential movement of ties up and down.
3. Space anchors as indicated, but not more than 18 inches (458 mm) o.c. vertically and horizontally. Install additional anchors within 12 inches (305 mm) of openings and at intervals, not exceeding 24 inches (610 mm), around perimeter.
B. Provide not less than 2 inches (50 mm) of airspace between back of masonry veneer and face of insulation.
1. Keep airspace clean of mortar droppings and other materials during construction. Bevel beds away from airspace, to minimize mortar protrusions into airspace. Do not attempt to trowel or remove mortar fins protruding into airspace.
3.7 EXPANSION JOINTS
A. General: Install expansion-joint materials in unit masonry as masonry progresses. Do not allow materials to span expansion joints without provision to allow for in-plane wall or partition movement.
B. Form expansion joints 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 3/8 inch (10 mm) for installation of sealant and backer rod specified in Section 079200 "Joint Sealants."

3.8 LINTELS
A. Install steel lintels where indicated.
B. Provide minimum bearing of 8 inches (200 mm) at each jamb unless otherwise indicated.

3.9 FLASHING, WEEP HOLES, AND VENTS
A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated. Install vents at shelf angles, lintels, and other obstructions to upward flow of air in cavities, and where indicated.
B. Install flashing as follows unless otherwise indicated:
   1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.
   2. Extend flashing through veneer, across airspace behind veneer, and up face of sheathing at least 8 inches (200 mm); with upper edge tucked under water-resistant barrier, lapping at least 4 inches (100 mm).
   3. At lintels and shelf angles, extend flashing a minimum of 6 inches (150 mm) into masonry at each end. At heads and sills, extend flashing 6 inches (150 mm) at ends and turn up not less than 2 inches (50 mm) to form end dams.
   4. Interlock end joints of ribbed sheet metal flashing by overlapping ribs not less than 1-1/2 inches (38 mm) or as recommended by flashing manufacturer, and seal lap with elastomeric sealant complying with requirements in Section 079200 "Joint Sealants" for application indicated.
   5. Install metal flashing termination beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch (13 mm) back from outside face of wall, and adhere flexible flashing to top of metal flashing termination.
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 veneers in head joints of first course of masonry immediately above embedded flashing and in walls over four feet high two courses down from the top of the wall.
   1. Use specified weep/vent products to form weep holes.
   2. Use wicking material to form weep holes above flashing under brick sills. Turn wicking down at lip of sill to be as inconspicuous as possible.
   3. Space weep holes 24 inches (600 mm) o.c. unless otherwise indicated.
E. Install vents in head joints in exterior wythes at spacing indicated. Use specified weep/vent products to form vents.
   1. Close cavities off vertically and horizontally with blocking in manner indicated. Install through-wall flashing and weep holes above horizontal blocking.

3.10 REPAIRING, POINTING, AND CLEANING
A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.
B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.
C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

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 nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
   4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
   5. Clean masonry with a proprietary acidic cleaner applied according to manufacturer’s written instructions.
   6. Clean stone trim to comply with stone supplier’s written instructions.

3.11 MASONRY WASTE DISPOSAL

A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor’s property. At completion of unit masonry work, remove from Project site.

B. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above or recycled, and other masonry waste, and legally dispose of off Owner’s property.
DIVISION 05 – METALS

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.
   B. See Structural Drawings for project specific requirements.

1.2 SUMMARY
   A. Section Includes:
      1. Structural steel.
      2. Prefabricated building columns.
      3. Field-installed shear connectors.
   B. Related Requirements:
      1. Section 055000 "Metal Fabrications" for steel lintels and shelf angles not attached to structural-steel frame, miscellaneous steel fabrications and other steel items not defined as structural steel.
      2. Section 099113 "Exterior Painting" and Section 099123 "Interior Painting for surface-preparation and priming requirements.

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. Heavy Sections: Rolled and built-up sections as follows:
      1. Shapes included in ASTM A 6/A 6M with flanges thicker than 1-1/2 inches (38 mm).
      2. Welded built-up members with plates thicker than 2 inches (50 mm).
      3. Column base plates thicker than 2 inches (50 mm).
   C. Protected Zone: Structural members or portions of structural members indicated as "Protected Zone" on Drawings. Connections of structural and nonstructural elements to protected zones are limited.
   D. 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 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.

1.6 INFORMATIONAL SUBMITTALS
A. Qualification Data: For Installer and fabricator.
B. Welding certificates.
C. Mill test reports for structural steel, including chemical and physical properties.
D. 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. Shear stud connectors.
   5. Shop primers.

1.7 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. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel.”
C. Comply with applicable provisions of the following specifications and documents:
   1. AISC 303.
   2. AISC 360.
   3. RCSC’s “Specification for Structural Joints Using ASTM A 325 or A 490 Bolts.”

1.8 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 STRUCTURAL-STEEL MATERIALS
A. W-Shapes: ASTM A 572/A 572M, Grade 50 (345).
B. Channels, Angles, S-Shapes: ASTM A 572/A 572M, Grade 50 (345).
C. Plate and Bar: ASTM A 572/A 572M, Grade 50 (345).
D. Corrosion-Resisting Structural-Steel Shapes, Plates, and Bars: ASTM A 588/A 588M, Grade 50 (345).
E. Corrosion-Resisting, Cold-Formed Hollow Structural Sections: ASTM A 847/A 847M, structural tubing.
F. Steel Pipe: ASTM A 53/A 53M, Type E or Type S, Grade B.
   1. Finish: [Black] [Galvanized] Black except where indicated to be galvanized.
G. Steel Castings: ASTM A 216/A 216M, Grade WCB with supplementary requirement S11.
H. Steel Forgings: ASTM A 668/A 668M.
I. Welding Electrodes: Comply with AWS requirements.
2.2 BOLTS, CONNECTORS, AND ANCHORS

A. High-Strength Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M), Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade C, (ASTM A 563M, Class 8S) heavy-hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M), Type 1, hardened carbon-steel washers; all with plain finish.
   1. Direct-Tension Indicators: ASTM F 959, Type 325 (ASTM F 959M, Type 8.8), compressible-washer type with plain finish.

B. High-Strength Bolts, Nuts, and Washers: ASTM A 490 (ASTM A 490M), Type 1, heavy-hex steel structural bolts or tension-control, bolt-nut-washer assemblies with splined ends; ASTM A 563, Grade DH, (ASTM A 563M, Class 10S) heavy-hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M), Type 1, hardened carbon-steel washers with plain finish.
   1. Direct-Tension Indicators: ASTM F 959, Type 490 (ASTM F 959M, Type 10.9), compressible-washer type with plain finish.

C. Zinc-Coated High-Strength Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M), Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade DH (ASTM A 563M, Class 10S) heavy-hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M), Type 1, hardened carbon-steel washers.
   1. Finish: Hot-dip or mechanically deposited zinc coating.
   2. Direct-Tension Indicators: ASTM F 959, Type 325 (ASTM F 959M, Type 8.8), compressible-washer type with mechanically deposited zinc coating or mechanically deposited zinc coating, baked epoxy-coated finish.

D. Shear Connectors: ASTM A 108, Grades 1015 through 1020, headed-stud type, cold-finished carbon steel; AWS D1.1/D1.1M, Type B.

E. Unheaded Anchor Rods: ASTM F 1554, Grade 36.
   1. Configuration: Straight or Hooked as detailed on structural drawings.

F. Headed Anchor Rods: ASTM F 1554, Grade , straight.
   3. Washers: ASTM F 436 (ASTM F 436M), Type 1, hardened carbon steel.

G. Threaded Rods: ASTM A 572/A 572M, Grade 50 (345).


I. Eye Bolts and Nuts: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1030.


2.3 PRIMER

A. Primer: Comply with Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

B. Galvanizing Repair Paint: MPI#18, MPI#19, or SSPC-Paint 20.

2.4 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.
2.5 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. Do not thermally cut bolt holes or enlarge holes by burning.
D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.
E. 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.
F. Steel Wall-Opening Framing: Select true and straight members for fabricating steel wall-opening framing to be attached to structural-steel frame. Straighten as required to provide uniform, square, and true members in completed wall framing. Build up welded framing, weld exposed joints continuously, and grind smooth.
G. Welded Door Frames: Build up welded door frames attached to structural-steel frame. Weld exposed joints continuously and grind smooth. Plug-weld fixed steel bar stops to frames. Secure removable stops to frames with countersunk machine screws, uniformly spaced not more than 10 inches (250 mm) o.c. unless otherwise indicated.
H. 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.

2.6 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: Snug tightened.
2. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in AISC 303 for mill material.

2.7 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 (50 mm).
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. SSPC-SP 2, "Hand Tool Cleaning."
2. SSPC-SP 3, "Power Tool 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 (0.038 mm). 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.
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).

2.8 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, shelf angles and welded door frames attached to structural-steel frame and located in exterior walls.

2.9 SOURCE QUALITY CONTROL
A. Welded Connections: Visually inspect shop-welded connections according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:

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.
   1. Prepare a certified survey of existing conditions. Include bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.
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.
   3. Pretension 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.

H. 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.

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.
B. Weld Connections: Comply with AWS D1.1/D1.1M and AWS D1.8/D1.8M 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 where indicated, back gouge, and grind steel smooth.
   3. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in AISC 303, “Code of Standard Practice for Steel Buildings and Bridges,” for mill material.

3.5 PREFABRICATED BUILDING COLUMNS
A. Install prefabricated building columns to comply with AISC 360, manufacturer’s written recommendations, and requirements of testing and inspecting agency that apply to the fire-resistance rating indicated.

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
DIVISION 05 – METALS

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.
B. See Structural Drawings for project specific requirements.

1.2 SUMMARY
A. Section Includes:
   1. Nomposite floor deck and accessories at exterior canopies.
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 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.

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."

2.2 NON-COMPOSITE DECK
A. Non-Composite Floor Deck: Fabricate ribbed-steel sheet noncomposite form-deck panels to comply with "SDI Specifications and Commentary for Noncomposite Steel Floor Deck," in SDI Publication No. 30, with the minimum section properties indicated, and with the following:
   1. Galvanized Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 33 zinc coating.
   2. Profile Depth: As indicated on the structural drawings.
   3. Design Uncoated-Steel Thickness: As indicated on the structural drawings.
   4. Span Condition: Triple span or more.
   5. Refer to structural drawings for more information.

2.3 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 (4.8-mm) minimum diameter.

D. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi (230 MPa), design uncoated thickness as indicated on the drawings, of same material and finish as deck; of profile indicated or required for application.

E. Pour Stops and Girder Fillers: Steel sheet, minimum yield strength of 33,000 psi (230 MPa), of same material and finish as deck, and of thickness as indicated on the drawings, but not less than recommended by SDI Publication No. 30 for overhang and slab depth.

F. Column Closures, End Closures, Z-Closures, and Cover Plates: Steel sheet, of same material, finish, and thickness as deck unless otherwise indicated on the drawings.

G. Weld Washers: Uncoated steel sheet, shaped to fit deck rib with factory-punched hole of 3/8-inch (9.5-mm) minimum diameter.

H. Galvanizing Repair Paint: ASTM A 780/A 780M.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine supporting frame and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

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

3.2 INSTALLATION, GENERAL

A. Install deck panels and accessories 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.

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.

3.3 DECK INSTALLATION

A. Fasten floor-deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated and as follows:

1. Weld Diameter: 5/8 inch (16 mm), nominal.

2. Weld Spacing: Weld edge ribs of panels at each support. Space additional welds an average of 12 inches (305 mm) apart, but not more than 18 inches (457 mm) apart.

B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding the lesser of one-half of the span or 36 inches (914 mm), and as follows:

C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches (38 mm), with end joints as follows:

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. 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 deck.
3.4 PROTECTION
A. 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.
DIVISION 05 – METALS

SECTION 055000 - METAL FABRICATIONS

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. Steel framing and supports for countertops.
2. Steel tube reinforcement for low partitions.
3. Steel framing and supports for mechanical and electrical equipment.
4. Steel framing and supports for applications where framing and supports are not specified in other Sections.
5. Steel girders for supporting wood frame construction.
6. Loose bearing and leveling plates for applications where they are not specified in other Sections.
B. Products furnished, but not installed, under this Section include the following:
1. Loose steel lintels.
2. Anchor bolts, steel pipe sleeves, slotted-channel inserts, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.
3. Steel weld plates and angles for casting into concrete for applications where they are not specified in other Sections.
C. Related Requirements:
1. Section 033000 "Cast-in-Place Concrete" for installing anchor bolts, steel pipe sleeves, slotted-channel inserts, wedge-type inserts, and other items cast into concrete.
2. Section 042000 "Unit Masonry" for installing loose lintels, anchor bolts, and other items built into unit masonry.
3. Section 051200 "Structural Steel Framing."

1.3 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.

1.4 ACTION SUBMITTALS
A. Product Data: For the following:
1. Nonslip aggregates and nonslip-aggregate surface finishes.
2. Prefabricated building columns.
3. Metal nosings and treads.
4. Paint products.
5. Grout.
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 countertops.
2. Steel framing and supports for applications where framing and supports are not specified in other Sections.
3. Elevator machine beams, hoist beams, and divider beams.
4. Steel pipe columns for supporting wood frame construction.
5. Metal ladders.
6. Metal bollards.
7. Loose steel lintels.

1.5 INFORMATIONAL SUBMITTALS
A. Welding certificates.
B. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.
C. Research/Evaluation Reports: For post-installed anchors, from ICC-ES.

1.6 QUALITY ASSURANCE
A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
B. Welding Qualifications: Qualify procedures and personnel according to the following:
   1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
   2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
   3. AWS D1.6/D1.6M, "Structural Welding Code - Stainless Steel."

1.7 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 and alternating tread devices.
B. Structural Performance of Aluminum Ladders: Aluminum ladders, including landings, shall withstand the effects of loads and stresses within limits and under conditions specified in ANSI A14.3.
C. Structural Performance of Alternating Tread Devices: Alternating tread devices shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated.
   1. Uniform Load: 100 lb/sq. ft. (4.79 kN/sq. m).
   2. Concentrated Load: 300 lb (1.33 kN) applied on an area of 4 sq. in. (2580 sq. mm).
   3. Uniform and concentrated loads need not be assumed to act concurrently.
   4. Alternating Tread Device Framing: Capable of withstanding stresses resulting from railing loads in addition to loads specified above.
D. 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.

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/A 36M.
C. Stainless-Steel Sheet, Strip, and Plate: ASTM A 240/A 240M or ASTM A 666, Type 304.
D. Stainless-Steel Bars and Shapes: ASTM A 276, Type 304.
E. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or D.
F. Rolled-Stainless-Steel Floor Plate: ASTM A 793.
G. Steel Tubing: ASTM A 500/A 500M, cold-formed steel tubing.
H. Steel Pipe: ASTM A 53/A 53M, Standard Weight (Schedule 40) unless otherwise indicated.
I. Zinc-Coated Steel Wire Rope: ASTM A 741.
1. Wire-Rope Fittings: Hot-dip galvanized-steel connectors with capability to sustain, without failure, a load equal to minimum breaking strength of wire rope with which they are used.
J. Slotted Channel Framing: Cold-formed metal box channels (struts) complying with MFMA-4.
1. Size of Channels: 1-5/8 by 1-5/8 inches (41 by 41 mm) or as indicated on the drawings.
K. Cast Iron: Either gray iron, ASTM A 48/A 48M, or malleable iron, ASTM A 47/A 47M, 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 (ASTM F 1941M), 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 stainless-steel fasteners for fastening stainless steel.
4. Provide bronze fasteners for fastening bronze.
B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with hex nuts, ASTM A 563 (ASTM A 563M); and, where indicated, flat washers.
C. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 325, Type 3 (ASTM A 325M, Type 3); with hex nuts, ASTM A 563, Grade C3 (ASTM A 563M, Class 853); and, where indicated, flat washers.
D. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts, ASTM F 593 (ASTM F 738M); with hex nuts, ASTM F 594 (ASTM F 836M); and, where indicated, flat washers; Alloy Group 1 (A1).
E. Anchor Bolts: ASTM F 1554, Grade 36, of dimensions indicated; with nuts, ASTM A 563 (ASTM A 563M); 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 E 488/E 488M, 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/A 47M malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F 2329.
1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5, unless otherwise indicated.
H. Slotted-Channel Inserts: Cold-formed, hot-dip galvanized-steel box channels (struts) complying with MFMA-4, 1-5/8 by 7/8 inches (41 by 22 mm) by length indicated with anchor straps or studs not less than 3 inches (75 mm) long at not more than 8 inches (200 mm) o.c. Provide with temporary filler and tee-head bolts.
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. Shop Primer for Galvanized Steel: Primer formulated for exterior use over zinc-coated metal and compatible
      with finish paint systems indicated.
   C. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with
      paints specified to be used over it.
   D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.
   E. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying
      with ASTM C 1107/C 1107M. Provide grout specifically recommended by manufacturer for interior and
      exterior applications.
   F. Concrete: Comply with requirements in Section 033000 “Cast-in-Place Concrete” for normal-weight, air-
      entrained, concrete with a minimum 28-day compressive strength of 3000 psi (20 MPa).

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 (1 mm) 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 (3.2 by 38 mm), with a minimum 6-inch (150-mm) embedment and 2-
      inch (50-mm) hook, not less than 8 inches (200 mm) from ends and corners of units and 24 inches (600 mm)
      o.c., unless otherwise indicated.

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 steel pipe columns for supporting wood frame construction from steel pipe with steel baseplates and top plates as indicated. Drill or punch baseplates and top plates for anchor and connection bolts and weld to pipe with fillet welds all around. Make welds the same size as pipe wall thickness unless otherwise indicated.
   1. Unless otherwise indicated, fabricate from Schedule 40 steel pipe.
   2. Unless otherwise indicated, provide 1/2-inch (12.7-mm) baseplates with four 5/8-inch (16-mm) anchor bolts and 1/4-inch (6.4-mm) top plates.
D. Galvanize miscellaneous framing and supports where indicated.
E. Prime miscellaneous framing and supports with zinc-rich primer where indicated.

2.7 MISCELLANEOUS STEEL TRIM
A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.
B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.
   1. Provide with integrally welded steel strap anchors for embedding in concrete or masonry construction.
C. Galvanize miscellaneous steel trim.

2.8 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. Prime plates with zinc-rich primer.

2.9 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 (200 mm) unless otherwise indicated.
C. Galvanize and prime loose steel lintels located in exterior walls.

2.10 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.

2.11 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.

2.12 STEEL AND IRON FINISHES
A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153/A 153M for steel and iron hardware and with ASTM A 123/A 123M 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 not indicated to be galvanized unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.
   1. Shop prime with universal shop primer indicated.
D. Preparation for Shop Priming: Prepare surfaces to comply with 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. 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.

E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

F. Corrosion Protection: Coat concealed surfaces of aluminum that 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. Support steel girders on solid grouted masonry, concrete, or steel pipe columns. Secure girders with anchor bolts embedded in grouted masonry or concrete or with bolts through top plates of pipe columns.
   1. Where grout space under bearing plates is indicated for girders supported on concrete or masonry, install as specified in "Installing Bearing and Leveling Plates" Article.

C. Install pipe columns on concrete footings with grouted baseplates. Position and grout column baseplates as specified in "Installing Bearing and Leveling Plates" Article.
   1. Grout baseplates of columns supporting steel girders after girders are installed and leveled.

3.3 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.
3.4 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
   1. Apply by brush or spray to provide a minimum 2.0-mil (0.05-mm) dry film thickness.

B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780/A 780M.
PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
B. See Structural Drawings for further information regarding specific project requirements.

1.2 SUMMARY
A. Section Includes:
1. Framing with dimension lumber.
2. Framing with engineered wood products.
3. Wood blocking and nailers.
5. Wood sleepers.
6. Plywood backing panels.
B. Related Requirements:
1. Section 061063 "Exterior Rough Carpentry."
2. Section 061533 "Wood Patio Decking" for elevated decks, including support framing.
3. Section 061600 "Sheathing" for sheathing, subflooring, and underlayment.
4. Section 061753 "Shop-Fabricated Wood Trusses" for wood trusses made from dimension lumber.

1.3 DEFINITIONS
A. Boards or Strips: Lumber of less than 2 inches nominal (38 mm actual) size in least dimension.
B. Dimension Lumber: Lumber of 2 inches nominal (38 mm actual) size or greater but less than 5 inches nominal (114 mm actual) size in least dimension.
C. Exposed Framing: Framing not concealed by other construction.
D. OSB: Oriented strand board.
E. Timber: Lumber of 5 inches nominal (114 mm actual) size or greater in least dimension.

1.4 DELIVERY, STORAGE, AND HANDLING
A. Stack wood products flat with spacers beneath and between each bundle to provide air circulation. Protect wood products 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, comply with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Grade lumber by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
   1. Factory mark each piece of lumber with grade stamp of grading agency.
   2. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece.
   3. Dress lumber, S4S, unless otherwise indicated.
B. Maximum Moisture Content of Lumber: 15 percent for 2-inch nominal (38-mm actual) thickness or less; 19 percent for more than 2-inch nominal (38-mm actual) thickness unless otherwise indicated.
C. Engineered Wood Products: Acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.
1. Allowable design stresses, as published by manufacturer, shall 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.

2.2 WOOD-PRESERVATIVE-TREATED LUMBER

A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2.
   1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
   2. For exposed items indicated to receive a stained or natural finish, chemical formulations shall 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.
   2. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
   3. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
   4. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
   5. Wood framing members that are less than 18 inches (460 mm) above the ground in crawlspaces or unexcavated areas.
   6. Wood floor plates that are installed over concrete slabs-on-grade.

2.3 DIMENSION LUMBER FRAMING

A. Non-Load-Bearing Interior Partitions: No. 2 grade.
   1. Application: All interior partitions.
   2. Species:
      a. Spruce-pine-fir; NLGA.

B. Load-Bearing Partitions: No. 2 grade.
   2. Species:
      a. Spruce-pine-fir; NLGA.

C. Ceiling Joists: No. 2 grade.
   1. Species:
      a. Spruce-pine-fir; NLGA.

D. Joists, Rafters, and Other Framing Not Listed Above: No. 2 grade.
   1. Species:
      a. Spruce-pine-fir; NLGA.

E. Exposed Framing Indicated to Receive a Stained or Natural Finish: Hand-select material for uniformity of appearance and freedom from characteristics, on exposed surfaces and edges, that would impair finish appearance, including decay, honeycomb, knot-holes, shake, splits, torn grain, and wane.

2.4 ENGINEERED WOOD PRODUCTS

A. Source Limitations: Obtain each type of engineered wood product from single source from a single manufacturer.

B. Laminated-Veneer Lumber: Structural composite lumber made from wood veneers with grain primarily parallel to member lengths, evaluated and monitored according to ASTM D 5456 and manufactured with an exterior-type adhesive complying with ASTM D 2559.
   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. Georgia-Pacific Building Products.
c. Louisiana-Pacific Corporation.
d. Weyerhaeuser Company.

2.5 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. Dimension Lumber Items: Construction or No. 2 grade lumber of any species.
C. Concealed Boards: 15 percent maximum moisture content and any of the following species and grades:
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.

2.6 PLYWOOD BACKING PANELS
A. Equipment Backing Panels: plywood, DOC PS 1, Exterior, A-C in thickness indicated or, if not indicated, not less than 3/4-inch (19-mm) nominal thickness.

2.7 FASTENERS
A. General: Fasteners shall be of size and type indicated and shall 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.
C. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

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. KC Metals Products, Inc.
2. Simpson Strong-Tie Co., Inc.
3. USP Structural Connectors.
B. Allowable design loads, as published by manufacturer, shall meet or exceed those of basis-of-design products. 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. Framing anchors shall be punched for fasteners adequate to withstand same loads as framing anchors.
1. Use for interior locations unless otherwise indicated.
D. Hot-Dip, Heavy-Galvanized Steel Sheet: ASTM A 653/A 653M; structural steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G185 (Z550) coating designation; and not less than 0.036 inch (0.9 mm) thick.
   1. Use for wood-preservative-treated lumber and where indicated.

2.9 MISCELLANEOUS MATERIALS
A. Sill-Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch (6.4 mm) thick, selected from manufacturer’s standard widths to suit width of sill members indicated.
B. Adhesives for Gluing Furring and Sleepers to Concrete or Masonry: Formulation complying with ASTM D 3498 that is approved for use indicated by adhesive manufacturer.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL
A. Framing Standard: Comply with AF&PA’s WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
B. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer’s written instructions.
C. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry accurately to other construction. Locate furring, nailers, blocking, and similar supports to comply with requirements for attaching other construction.
D. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels.
E. Install shear wall panels to comply with manufacturer’s written instructions.
F. Install metal framing anchors to comply with manufacturer’s written instructions. Install fasteners through each fastener hole.
G. Install sill sealer gasket to form continuous seal between sill plates and foundation walls.
H. Do not splice structural members between supports unless otherwise indicated.
I. 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 (406 mm) o.c.
J. 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 (2438 mm) o.c. with solid wood blocking or noncombustible materials accurately fitted to close furred spaces.
   2. Fire block concealed spaces of wood-framed walls and partitions at each floor level, at ceiling line of top story, and at not more than 96 inches (2438 mm) o.c. Where fire blocking is not inherent in framing system used, provide closely fitted solid wood blocks of same width as framing members and 2-inch nominal (38-mm actual) thickness.
   3. Fire block concealed spaces between floor sleepers with same material as sleepers to limit concealed spaces to not more than 100 sq. ft. (9.3 sq. m) and to solidly fill space below partitions.
   4. Fire block concealed spaces behind combustible cornices and exterior trim at not more than 20 feet (6 m) o.c.
K. Sort and select lumber so that natural characteristics do not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
L. 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.
M. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.

N. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

O. 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.

P. For exposed work, arrange fasteners in straight rows parallel with edges of members, with fasteners evenly spaced, and with adjacent rows staggered.
   1. Use common nails unless otherwise indicated. Drive nails snug but do not countersink nail heads.

3.2 WOOD BLOCKING, AND NAILER INSTALLATION

A. Install where indicated and where required for 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.

C. Provide permanent grounds of dressed, pressure-preservative-treated, key-beveled lumber not less than 1-1/2 inches (38 mm) wide and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.

3.3 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 (19-by-63-mm actual) size furring horizontally and vertically at 24 inches (610 mm) o.c.

3.4 WALL AND PARTITION FRAMING INSTALLATION

A. General: Provide single bottom plate and double top plates using members of 2-inch nominal (38-mm actual) thickness whose widths equal that of studs, except single top plate may be used for non-load-bearing partitions and for load-bearing partitions where framing members bearing on partition are located directly over studs. Fasten plates to supporting construction unless otherwise indicated.

B. Construct corners and intersections with three or more studs, except that two studs may be used for interior non-load-bearing partitions.

C. Frame openings with multiple studs and headers. Provide nailed header members of thickness equal to width of studs. Support headers on jamb studs.
   1. For non-load-bearing partitions, provide double-jamb studs and headers not less than 4-inch nominal (89-mm actual) depth for openings 48 inches (1200 mm) and less in width, 6-inch nominal (140-mm actual) depth for openings 48 to 72 inches (1200 to 1800 mm) in width, 8-inch nominal (184-mm actual) depth for openings 72 to 120 inches (1800 to 3000 mm) in width, and not less than 10-inch nominal (235-mm actual) depth for openings 10 to 12 feet (3 to 3.6 m) in width.
   2. For load-bearing walls, provide double-jamb studs for openings 60 inches (1500 mm) and less in width, and triple-jamb studs for wider openings. Provide headers of depth indicated.

3.5 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.

B. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes wet enough that moisture content exceeds that specified, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION
PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
   B. See Structural Drawings for project specific requirements.

1.2 SUMMARY
   A. Section Includes:
      1. Wall sheathing.
      2. Roof sheathing.
   B. Related Requirements:
      1. Section 061000 "Rough Carpentry"
      2. Section 072500 "Weather Barriers" for water-resistive barrier applied over wall sheathing.

1.3 ACTION SUBMITTALS
   A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
      1. 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 waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

1.4 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-Resistance Ratings: As tested according to ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
      1. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.2 WOOD PANEL PRODUCTS
   A. Thickness: As needed to comply with requirements specified, but not less than thickness indicated.
   B. Factory mark panels to indicate compliance with applicable standard.
2.3 PRESERVATIVE-TREATED PLYWOOD
A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with ground, Use Category UC3b for exterior construction not in contact with ground, and Use Category UC4a for items in contact with ground.
1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
B. Mark plywood with appropriate classification marking of an inspection agency acceptable to authorities having jurisdiction.
C. Application: Treat items indicated on Drawings and plywood in contact with masonry or concrete or used with roofing, flashing, vapor barriers, and waterproofing.

2.4 WALL SHEATHING
A. Plywood Sheathing: Exposure 1, Structural I sheathing.
1. Span Rating: Not less than 32/16.
2. Nominal Thickness: Not less than as indicated on the drawings.
B. Oriented-Strand-Board Sheathing: DOC PS 2, Exposure 1, Structural I sheathing.
1. Span Rating: Not less than 32/16.
2. Nominal Thickness: Not less than as indicated on the drawings.

2.5 ROOF SHEATHING
A. Plywood Sheathing: Exterior, Structural I sheathing.
2. Nominal Thickness: Not less than as indicated on the drawings.
B. Oriented-Strand-Board Sheathing: DOC PS 2, Exposure 1, Structural I sheathing.
2. Nominal Thickness: Not less than as indicated on the drawings.

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.
B. Nails, Brads, and Staples: ASTM F 1667.
C. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.
D. Screws for Fastening Sheathing to Wood Framing: ASTM C 1002.
E. Screws for Fastening Wood Structural Panels to Cold-Formed Metal Framing: ASTM C 954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened.

2.7 MISCELLANEOUS MATERIALS
A. Adhesives for Field Gluing Panels to Wood Framing: Formulation complying with APA AFG-01 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:
SPECIFICATIONS: Farley Municipal Building
206 1st Street N., Farley, Iowa 52046
ARCHITECT PROJECT #1728.01

1. Table 2304.9.1, "Fastening Schedule," in the ICC’s International Building Code and as indicated under special fastening provisions of the structural drawings.

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. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

F. 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


B. Fastening Methods: Fasten panels as indicated below:

1. Wall and Roof Sheathing:
   a. Nail to wood framing.
   b. Screw to cold-formed metal framing.
   c. Space panels 1/8 inch (3 mm) apart at edges and ends.
DIVISION 06 – WOOD, PLASTICS AND COMPOSITES

SECTION 061753 - SHOP-FABRICATED WOOD TRUSSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
B. See Structural Drawings for project specific requirements.

1.2 SUMMARY
A. Section Includes:
   1. Wood roof trusses.
   2. Wood girder trusses.

1.3 DEFINITIONS
A. Metal-Plate-Connected Wood Trusses: Planar structural units consisting of metal-plate-connected members fabricated from dimension lumber and cut and assembled before delivery to Project site.

1.4 ACTION SUBMITTALS
A. Shop Drawings: Show fabrication and installation details for trusses.
   1. Show location, pitch, span, camber, configuration, and spacing for each type of truss required.
   2. Indicate sizes, stress grades, and species of lumber.
   3. Indicate locations of permanent bracing required to prevent buckling of individual truss members due to design loads.
   4. Indicate locations, sizes, and materials for permanent bracing required to prevent buckling of individual truss members due to design loads.
   5. Indicate type, size, material, finish, design values, orientation, and location of metal connector plates.
   6. Show splice details and bearing details.

1.5 QUALITY ASSURANCE
A. Metal Connector-Plate Manufacturer Qualifications: A manufacturer that is a member of TPI and that complies with quality-control procedures in TPI 1 for manufacture of connector plates.
   1. Manufacturer’s responsibilities include providing professional engineering services needed to assume engineering responsibility.
   2. Engineering Responsibility: Preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.
B. Fabricator Qualifications: Shop that participates in a recognized quality-assurance program, complies with quality-control procedures in TPI 1, and involves third-party inspection by an independent testing and inspecting agency acceptable to Architect and authorities having jurisdiction.

1.6 DELIVERY, STORAGE, AND HANDLING
A. Handle and store trusses to comply with recommendations in SBCA BCSI, “Building Component Safety Information: Guide to Good Practice for Handling, Installing, Restraining, & Bracing Metal Plate Connected Wood Trusses."
   1. Store trusses flat, off of ground, and adequately supported to prevent lateral bending.
   2. Protect trusses from weather by covering with waterproof sheeting, securely anchored.
   3. Provide for air circulation around stacks and under coverings.
B. Inspect trusses showing discoloration, corrosion, or other evidence of deterioration. Discard and replace trusses that are damaged or defective.
PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS
   A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design metal-plate-connected wood trusses.
   B. Structural Performance: Metal-plate-connected wood trusses shall be capable of withstanding design loads within limits and under conditions indicated. Comply with requirements in TPI 1 unless more stringent requirements are specified below.
      1. Design Loads: As indicated.
      2. Maximum Deflection under Design Loads:
         b. Floor Trusses: Vertical deflection of 1/480 of span.
   C. Comply with applicable requirements and recommendations of TPI 1, TPI DSB, and SBCA BCSI.

2.2 DIMENSION LUMBER
   A. Lumber: DOC PS 20 and applicable rules of any rules-writing agency certified by the American Lumber Standard Committee (ALSC) Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
      1. Factory mark each piece of lumber with grade stamp of grading agency.
      2. For exposed lumber indicated to receive a stained or natural finish, omit grade stamp and provide certificates of grade compliance issued by grading agency.
      3. Provide dressed lumber, S4S.
      4. Provide dry lumber with 19 percent maximum moisture content at time of dressing.
   B. Permanent Bracing: Provide wood bracing that complies with requirements for miscellaneous lumber in Section 061000 "Rough Carpentry."

2.3 METAL CONNECTOR PLATES
   A. 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. Alpine Engineered Products, Inc.; a division of ITW Building Components Group, Inc.
      2. MiTek Industries, Inc.
   B. General: Fabricate connector plates to comply with TPI 1.
   C. Hot-Dip Galvanized-Steel Sheet: ASTM A 653/A 653M; Structural Steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G60 (Z180) coating designation; and not less than 0.036 inch (0.9 mm) thick.
      1. Use for interior locations unless otherwise indicated.

2.4 FASTENERS
   A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
      1. Provide fasteners for use with metal framing anchors that comply with written recommendations of metal framing manufacturer.
      2. Where trusses are exposed to weather, in ground contact, made from pressure-preservative treated wood, 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.

2.5 METAL FRAMING ANCHORS AND ACCESSORIES
   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. Simpson Strong-Tie Co., Inc.
      2. USP Structural Connectors.
B. Allowable design loads, as published by manufacturer, shall comply with or exceed those of basis-of-design products. 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. Framing anchors shall be punched for fasteners adequate to withstand same loads as framing anchors.

   1. For interior locations unless otherwise indicated.

D. Truss Tie-Downs: Bent strap tie for fastening roof trusses to wall studs below, 1-1/2 inches (38 mm) wide by 0.050 inch (1.3 mm) thick. Tie fastens to one side of truss, top plates, and side of stud below.

E. Roof Truss Clips: Angle clips for bracing bottom chord of roof trusses at non-load-bearing walls, 1-1/4 inches (32 mm) wide by 0.050 inch (1.3 mm) thick. Clip is fastened to truss through slotted holes to allow for truss deflection.

F. Roof Truss Bracing/Spacers: U-shaped channels, 1-1/2 inches (38 mm) wide by 1 inch (25 mm) deep by 0.040 inch (1.0 mm) thick, made to fit between two adjacent trusses and accurately space them apart, and with tabs having metal teeth for fastening to trusses.

2.6 MISCELLANEOUS MATERIALS
A. Galvanizing Repair Paint: SSPC-Paint 20, with dry film containing a minimum of 92 percent zinc dust by weight.

2.7 FABRICATION
A. Cut truss members to accurate lengths, angles, and sizes to produce close-fitting joints.
B. Fabricate metal connector plates to sizes, configurations, thicknesses, and anchorage details required to withstand design loads for types of joint designs indicated.
C. Assemble truss members in design configuration indicated; use jigs or other means to ensure uniformity and accuracy of assembly, with joints closely fitted to comply with tolerances in TPI 1. Position members to produce design camber indicated.
   1. Fabricate wood trusses within manufacturing tolerances in TPI 1.

D. Connect truss members by metal connector plates located and securely embedded simultaneously in both sides of wood members by air or hydraulic press.

2.8 SOURCE QUALITY CONTROL
A. Special Inspections: Owner will engage a qualified special inspector to perform special inspections.
   1. Provide special inspector with access to fabricator’s documentation of detailed fabrication and quality-control procedures that provide a basis for inspection control of the workmanship and the fabricator’s ability to conform to approved construction documents and referenced standards.
   2. Provide special inspector with access to places where wood trusses are being fabricated to perform inspections.

B. Correct deficiencies in Work that special inspections indicate do not comply with the Contract Documents.

PART 3 - EXECUTION

3.1 INSTALLATION
A. Install wood trusses only after supporting construction is in place and is braced and secured.
B. If trusses are delivered to Project site in more than one piece, assemble trusses before installing.
C. Hoist trusses in place by lifting equipment suited to sizes and types of trusses required, exercising care not to damage truss members or joints by out-of-plane bending or other causes.
D. Install and brace trusses according to TPI recommendations and as indicated.
E. Install trusses plumb, square, and true to line and securely fasten to supporting construction.
F. Space trusses as indicated; adjust and align trusses in location before permanently fastening.
G. Anchor trusses securely at bearing points; use metal truss tie-downs or floor truss hangers as applicable. Install fasteners through each fastener hole in metal framing anchors according to manufacturer's fastening schedules and written instructions.

H. Securely connect each truss ply required for forming built-up girder trusses.
   1. Anchor trusses to girder trusses as indicated.

I. Install and fasten permanent bracing during truss erection and before construction loads are applied. Anchor ends of permanent bracing where terminating at walls or beams.
   1. Install bracing to comply with Section 061000 "Rough Carpentry."
   2. Install and fasten strongback bracing vertically against vertical web of parallel-chord floor trusses at centers indicated.

J. Install wood trusses within installation tolerances in TPI 1.

K. Do not alter trusses in field. Do not cut, drill, notch, or remove truss members.

L. Replace wood trusses that are damaged or do not comply with requirements.
   1. Damaged trusses may be repaired according to truss repair details signed and sealed by the qualified professional engineer responsible for truss design, when approved by Architect.

3.2 REPAIRS AND 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.
B. Protect wood trusses from weather. If, despite protection, wood trusses become wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.
C. Repair damaged galvanized coatings on exposed surfaces according to ASTM A 780/A 780M and manufacturer's written instructions.

3.3 FIELD QUALITY CONTROL
A. Special Inspections: Owner will engage a qualified special inspector to perform special inspections to verify that temporary installation restraint/bracing and the permanent individual truss member restraint/bracing are installed in accordance with the approved truss submittal package.
SECTION 072100 - THERMAL INSULATION

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. Extruded polystyrene boards.
      2. Glass-fiber blanket.
      3. Loose-fill insulation.

1.3 ACTION SUBMITTALS
   A. Product Data: For each type of product.

1.4 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 boards." 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.
      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.

2.2 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. Owens Corning.
2.3 LOOSE-FILL INSULATION
   A. Cellulosic-Fiber Loose-Fill Insulation: ASTM C 739, chemically treated for flame-resistance, processing, and handling characteristics.

2.4 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.
   B. Eave Ventilation Troughs: Preformed, rigid fiberboard or plastic sheets designed and sized to fit between roof framing members and to provide ventilation between insulated attic spaces and vented eaves. Vents shall be installed to cover entire width of space between framing members.

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 SLAB INSULATION
   A. On vertical slab edge and foundation surfaces, set insulation units using manufacturer’s recommended adhesive according to manufacturer’s written instructions.
      1. If not otherwise indicated, extend insulation a minimum of 48 inches below exterior grade line.
   B. On horizontal surfaces, loosely lay insulation units according to manufacturer’s written instructions. Stagger end joints and tightly abut insulation units.
      1. If not otherwise indicated, extend insulation a minimum of 48 inches in from exterior walls.

3.4 INSTALLATION OF FOUNDATION WALL INSULATION
   A. Butt panels together for tight fit.
   B. Anchor Installation: Install board insulation on concrete substrates by adhesively attached, spindle-type insulation anchors as follows:
      1. Fasten insulation anchors to concrete 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.
      2. 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.
      3. Where insulation will not be covered by other building materials, apply capped washers to tips of spindles.
   C. Adhesive Installation: Install with adhesive or press into tacky waterproofing or dampproofing according to manufacturer’s written instructions.

3.5 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 (76-mm) clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.


5. For wood-framed construction, install blankets according to ASTM C 1320 and as follows:
   a. With faced blankets having stapling flanges, lap blanket flange over flange of adjacent blanket to maintain continuity of vapor retarder once finish material is installed over it.

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. (40 kg/cu. m).

   2. Spray Polyurethane Insulation: Apply according to manufacturer's written instructions.

C. Loose-Fill Insulation: Apply according to ASTM C 1015 and manufacturer’s written instructions. Level horizontal applications to uniform thickness as indicated, lightly settle to uniform density, but do not compact excessively.

   1. For cellulose-fiber loose-fill insulation, comply with CIMA's Bulletin #2, "Standard Practice for Installing Cellulose Insulation."

3.6 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.
DIVISION 07 – THERMAL AND MOISTURE PROTECTION

SECTION 072500 - WEATHER BARRIERS

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 SECTION INCLUDES
   A. Weather barrier membrane
   B. Seam Tape
   C. Flashing
   D. Fasteners

1.3 REFERENCES
   A. ASTM International
      1. ASTM C920; Standard Specification for Elastomeric Joint Sealants
      2. ASTM C1193; Standard Guide for Use of Joint Sealants
      3. ASTM D882; Test Method for Tensile Properties of Thin Plastic Sheeting
      4. ASTM D1117; Standard Guide for Evaluating Non-woven Fabrics
      5. ASTM E84; Test Method for Surface Burning Characteristics of Building Materials
      6. ASTM E96; Test Method for Water Vapor Transmission of Materials
      7. ASTM E1677; Specification for Air Retarder Material or System for Framed Building Walls
      8. ASTM E2178; Test Method for Air Permeance of Building Materials
   B. AATCC – American Association of Textile Chemists and Colorists
      1. Test Method 127 Water Resistance: Hydrostatic Pressure Test
   C. TAPPI
      1. Test Method T-410; Grams of Paper and Paperboard (Weight per Unit Area)
      2. Test Method T-460; Air Resistance (Gurley Hill Method)

1.4 SUBMITTALS
   A. Refer to Section 01 33 00 Submittal Procedures.
   B. Product Data: Submit manufacturer current technical literature for each component.
   C. Samples: Weather Barrier Membrane, minimum 8-1/2 inches by 11 inch.
   D. Quality Assurance Submittals
      1. Design Data, Test Reports: Provide manufacturer test reports indicating product compliance with indicated requirements.
      2. Manufacturer Instructions: Provide manufacturer’s written installation instructions.
      3. Manufacturer’s Field Service Reports: Provide site reports from authorized field service representative, indicating observation of weather barrier assembly installation.
   E. Closeout Submittals
      1. Refer to Section [01 78 00 Closeout Submittals] [insert section number and title].
      2. Weather Barrier Warranty: Manufacturer’s executed warranty form with authorized signatures and endorsements indicating date of Substantial Completion.

1.5 QUALITY ASSURANCE
   A. Qualifications
      1. Installer shall have experience with installation of commercial weather barrier assemblies under similar conditions.
      2. Installation shall be in accordance with weather barrier manufacturer’s installation guidelines and recommendations.

B. Pre-installation Meeting
1. Refer to Section 01 31 19 Project Meetings.
2. Hold a pre-installation conference, two weeks prior to start of weather barrier installation. Attendees shall include Contractor and Weather Barrier Manufacturer’s Designated Representative.
3. Review all related project requirements and submittals, status of substrate work and preparation, areas of potential conflict and interface, availability of weather barrier assembly materials and components, installer’s training requirements, equipment, facilities and scaffolding, and coordinate methods, procedures and sequencing requirements for full and proper installation, integration and protection.

1.6 DELIVERY, STORAGE AND HANDLING
A. Refer to Section 01 60 00 Product Requirements.
B. Deliver weather barrier materials and components in manufacturer’s original, unopened, undamaged containers with identification labels intact.
C. Store weather barrier materials as recommended by weather barrier manufacturer.

1.7 SCHEDULING
A. Review requirements for sequencing of installation of weather barrier assembly with installation of windows, doors, louvers and flashings to provide a weather-tight barrier assembly.
B. Schedule installation of weather barrier materials and exterior cladding within nine months of weather barrier assembly installation.

1.8 WARRANTY
A. Special Warranty
1. Special weather-barrier manufacturer’s warranty for weather barrier assembly for a period of ten (10) years from date of final weather barrier installation.
2. Approval by weather barrier manufacturer for warranty is required prior to assembly installation.

PART 2 – PRODUCTS

2.1 MANUFACTURER
A. DuPont Building Innovations; 4417 Lancaster Pike, Chestnut Run Plaza 721, Wilmington, DE 19805; 1.800.44TYVEK (8-9835); http://construction.tyvek.com

2.2 MATERIALS
A. Basis of Design: High-performance, spunbonded polyolefin, non-woven, non-perforated, weather barrier is based upon DuPont™ Tyvek® CommercialWrap® and related assembly components.
B. Performance Characteristics:
1. Air Penetration: 0.001 cfm/ft² at 75 Pa, when tested in accordance with ASTM E2178. Type I per ASTM E1677.
2. Water Vapor Transmission: 28 perms, when tested in accordance with ASTM E96, Method B.
3. Water Penetration Resistance: 280 cm when tested in accordance with AATCC Test Method 127.
4. Basis Weight: 2.7 oz/yd², when tested in accordance with TAPPI Test Method T-410.
5. Air Resistance: Air infiltration at >1500 seconds, when tested in accordance with TAPPI Test Method T-460.
6. Tensile Strength: 38/35 lbs/in., when tested in accordance with ASTM D882, Method A.
7. Tear Resistance: 12/10 lbs., when tested in accordance with ASTM D1117.

2.3 ACCESSORIES
A. Seam Tape: 3 inch wide, DuPont™ Tyvek® Tape for commercial applications.
B. Fasteners:
1. Tyvek® Wrap Caps, as manufactured by DuPont Building Innovations: #4 nails with large 1-inch plastic cap fasteners.

C. Sealants
1. Provide sealants that comply with ASTM C920, elastomeric polymer sealant to maintain watertight conditions.

2. Products:
   a. Tremco 830
   b. Tremco Butyl
   c. Sealants recommended by the weather barrier manufacturer.

D. Adhesives:
1. Provide adhesive recommended by weather barrier manufacturer.

2. Products:
   a. Liquid Nails® LN-109
   b. Polyglaze® SM 5700
   c. Denso Butyl Liquid
   d. 3M High Strength 90
   e. SIA 655
   f. Adhesives recommended by the weather barrier manufacturer.

E. Primers:
1. Provide flashing manufacturer recommended primer to assist in adhesion between substrate and flashing.

2. Products:
   a. 3M High Strength 90
   b. Denso Butyl Spray
   c. SIA 655
   d. Permagrip 105
   e. ITW TACC Sta' Put SPH
   f. Primers recommended by the flashing manufacturer

F. Flashing
1. DuPont™ FlexWrap™, as manufactured by DuPont Building Innovations: flexible membrane flashing materials for window openings and penetrations.

2. DuPont™ StraightFlash™, as manufactured by DuPont Building Innovations: straight flashing membrane materials for flashing windows and doors and sealing penetrations such as masonry ties, etc.

3. DuPont™ StraightFlash™ VF, as manufactured by DuPont Building Innovations: dual-sided straight flashing membrane materials for brick mold and non-flanged windows and doors.

PART 3 – EXECUTION

3.1 EXAMINATION
A. Verify substrate and surface conditions are in accordance with weather barrier manufacturer recommended tolerances prior to installation of weather barrier and accessories.

3.2 INSTALLATION – WEATHER BARRIER
A. Install weather barrier over exterior face of exterior wall substrate in accordance with manufacturer recommendations.

B. Install weather barrier prior to installation of windows and doors.

C. Start weather barrier installation at a building corner, leaving 6-12 inches of weather barrier extended beyond corner to overlap.

D. Install weather barrier in a horizontal manner starting at the lower portion of the wall surface with subsequent layers installed in a shingling manner to overlap lower layers. Maintain weather barrier plumb and level.

E. Sill Plate Interface: Extend lower edge of weather barrier over sill plate interface 3-6 inches. Secure to foundation with elastomeric sealant as recommended by weather barrier manufacturer.

F. Window and Door Openings: Extend weather barrier completely over openings.
G. Overlap weather barrier
   1. Exterior corners: minimum 12 inches.
   2. Seams: minimum 6 inches.

H. Weather Barrier Attachment:
   1. Attach weather barrier to studs through exterior sheathing. Secure using weather barrier manufacturer recommended fasteners, space 12-18 inches vertically on center along stud line, and 24 inch on center, maximum horizontally.
   2. Attach weather barrier to masonry. Secure using weather barrier manufacturer recommended fasteners, spaced 12-18 inches vertically on center and 24 inches maximum horizontally. Weather barrier may be temporarily attached to masonry using recommended adhesive, placed in vertical strips spaced 24 inches on center, when coordinated on the project site.
   I. Apply 4 inch by 7 inch piece of DuPont™ StraightFlash™ to weather barrier membrane prior to the installation cladding anchors.

3.3 SEAMING
   A. Seal seams of weather barrier with seam tape at all vertical and horizontal overlapping seams.
   B. Seal any tears or cuts as recommended by weather barrier manufacturer.

3.4 OPENING PREPARATION (for use with non-flanged windows – all cladding types)
   A. Flush cut weather barrier at edge of sheathing around full perimeter of opening.
   B. Cut a head flap at 45-degree angle in the weather barrier at window head to expose 8 inches of sheathing. Temporarily secure weather barrier flap away from sheathing with tape.

3.5 FLASHING (for use with non-flanged windows – all cladding types)
   A. Cut 9-inch wide DuPont™ FlexWrap™ a minimum of 12 inches longer than width of sill rough opening. Apply primer as required by manufacturer.
   B. Cover horizontal sill by aligning DuPont™ FlexWrap™ edge with inside edge of sill. Adhere to rough opening across sill and up jambs a minimum of 6 inches. Secure flashing tightly into corners by working in along the sill before adhering up the jambs.
   C. Fan DuPont™ FlexWrap™ at bottom corners onto face of wall. Firmly press in place. Mechanically fasten fanned edges.
   D. Apply 9-inch wide strips of DuPont™ StraightFlash™ at jambs. Align flashing with interior edge of jamb framing. Start DuPont™ StraightFlash™ at head of opening and lap sill flashing down to the sill.
   E. Spray-apply primer to top 6 inches of jambs and exposed sheathing.
   F. Install DuPont™ FlexWrap™ at opening head using same installation procedures used at sill. Overlap jamb flashing a minimum of 2 inches.
   G. Coordinate flashing with window installation.
   H. On exterior, install backer-rod in joint between window frame and flashed rough framing. Apply sealant at jambs and head, leaving sill unsealed. Apply sealants in accordance with sealant manufacturer’s instructions and ASTM C 1193.
   I. Position weather barrier head flap across head flashing. Adhere using 4-inch wide DuPont™ StraightFlash™ over the 45-degree seams.
   J. Tape top of window in accordance with manufacturer recommendations.
   K. On interior, install backer rod in joint between frame of window and flashed rough framing. Apply sealant around entire window to create air seal. Apply sealant in accordance with sealant manufacturer’s instructions and ASTM C 1193.

3.6 OPENING PREPARATION (for use with flanged windows)
   A. Cut weather barrier in a modified “I-cut” pattern.
      1. Cut weather barrier horizontally along the bottom of the header.
      2. Cut weather barrier vertically 2/3 of the way down from top center of window opening.
      3. Cut weather barrier diagonally from bottom of center vertical cut to the left and right corners of the opening.
4. Fold side and bottom weather barrier flaps into window opening and fasten.
B. Cut a head flap at 45-degree angle in the weather barrier at window head to expose 8 inches of sheathing. Temporarily secure weather barrier flap away from sheathing with tape.

3.7 FLASHING (for use with flanged windows)
A. Cut 9-inch wide DuPont™ FlexWrap™ a minimum of 12 inches longer than width of sill rough opening.
B. Cover horizontal sill by aligning DuPont™ FlexWrap™ edge with inside edge of sill. Adhere to rough opening across sill and up jambs a minimum of 6 inches. Secure flashing tightly into corners by working in along the sill before adhering up the jambs.
C. Fan DuPont™ FlexWrap™ at bottom corners onto face of wall. Firmly press in place. Mechanically fasten fanned edges.
D. On exterior, apply continuous bead of sealant to wall or backside of window mounting flange across jambs and head. Do not apply sealant across sill.
E. Install window according to manufacturer’s instructions.
F. Apply 4-inch wide strips of DuPont™ StraightFlash™ at jambs overlapping entire mounting flange. Extend jamb flashing 1-inch above top of rough opening and below bottom edge of sill flashing.
G. Apply 4-inch wide strip of DuPont™ StraightFlash™ as head flashing overlapping the mounting flange. Head flashing should extend beyond outside edges of both jamb flashings.
H. Position weather barrier head flap across head flashing. Adhere using 4-inch wide DuPont™ StraightFlash™ over the 45-degree seams.
I. Tape head flap in accordance with manufacturer recommendations.
J. On interior, install backer rod in joint between frame of window and flashed rough framing. Apply sealant around entire window to create air seal. Apply sealant in accordance with sealant manufacturer’s instructions and ASTM C 1193.

3.8 FIELD QUALITY CONTROL
A. Notify manufacturer’s designated representative to obtain [required] periodic observations of weather barrier assembly installation.

3.9 PROTECTION
A. Protect installed weather barrier from damage.
DIVISION 07 – THERMAL AND MOISTURE PROTECTION

SECTION 072600 - VAPOR RETARDERS

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. Polyethylene vapor retarders.
   B. Related Requirements:
      1. Section 033000 “Cast-in-Place Concrete” for underslab vapor retarders for specification of underslab vapor retarders.
      2. Section 072100 “Thermal Insulation” for vapor retarders integral with insulation products.

1.3 ACTION SUBMITTALS
   A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 POLYETHYLENE VAPOR RETARDERS
   A. Polyethylene Vapor Retarders: ASTM D 4397, 6-mil- (0.15-mm) thick sheet, with maximum permeance rating of 0.1 perm (5.7 ng/Pa x s x sq. m).

2.2 ACCESSORIES
   A. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.
   B. Adhesive for Vapor Retarders: Product recommended by vapor-retarder manufacturer and has demonstrated capability to bond vapor retarders securely to substrates indicated.
   C. Vapor-Retarder Fasteners: Pancake-head, self-tapping steel drill screws; with fender washers.

PART 3 - EXECUTION

3.1 PREPARATION
   A. Clean substrates of substances that are harmful to vapor retarders, including removing projections capable of puncturing vapor retarders.

3.2 INSTALLATION OF VAPOR RETARDERS ON FRAMING
   A. Place vapor retarders on side of construction indicated on Drawings.
   B. Extend vapor retarders to extremities of areas to protect from vapor transmission. Secure vapor retarders in place with adhesives, vapor retarder fasteners, or other anchorage system as recommended by manufacturer. Extend vapor retarders to cover miscellaneous voids in insulated substrates, including those filled with loose-fiber insulation.
   C. Seal vertical joints in vapor retarders over framing by lapping no fewer than two studs and sealing with vapor-retarder tape according to vapor-retarder manufacturer’s written instructions. Locate all joints over framing members or other solid substrates.
   D. Seal joints caused by pipes, conduits, electrical boxes, and similar items penetrating vapor retarders with vapor-retarder tape to create an airtight seal between penetrating objects and vapor retarders.
   E. Repair tears or punctures in vapor retarders immediately before concealment by other work. Cover with vapor-retarder tape or another layer of vapor retarders.
3.3 PROTECTION
A. Protect vapor retarders from damage until concealed by permanent construction.
DIVISION 07 – THERMAL AND MOISTURE PROTECTION

SECTION 074213.53 – STEEL PREFINISHED UNVENTILATED AND VENTILATED SOFFIT PANELS

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 metal soffit panels.
   B. Related Sections:
      1. Section 074113.13 "Formed Metal Roof Panels" for lap-seam metal roof panels.

1.3 ACTION SUBMITTALS
   A. Product Data: For each type of product.
      1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.
   B. Shop Drawings:
      1. Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.
      2. Accessories: Include details of flashing, trim, and anchorage systems, at a scale of not less than 1-1/2 inches per 12 inches (1:10).
   C. Samples for Initial Selection: For each type of metal panel indicated with factory-applied color finishes.
      1. Include similar Samples of trim and accessories involving color selection.

1.4 CLOSEOUT SUBMITTALS
   A. Maintenance Data: For metal panels to include in maintenance.

1.5 DELIVERY, STORAGE, AND HANDLING
   A. Deliver components, metal panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.
   B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.
   C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.
   D. Retain strippable protective covering on metal panels during installation.

1.6 FIELD CONDITIONS
   A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal panels to be performed according to manufacturers’ written instructions and warranty requirements.

1.7 COORDINATION
   A. Coordinate metal panel installation with rain drainage work, flashing, trim, construction of walls, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.8 WARRANTY
   A. Special Warranty: Manufacturer’s standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.
      1. Failures include, but are not limited to, the following:
a. Structural failures including rupturing, cracking, or puncturing.
b. Deterioration of metals and other materials beyond normal weathering.

2. Warranty Period: Two years from date of Substantial Completion.

B. Special Warranty on Panel Finishes: Manufacturer’s standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
   a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
   b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
   c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E 1592:

1. Wind Loads: As indicated on Drawings.

B. Air Infiltration: Air leakage of not more than 0.06 cfm/sq. ft. (0.3 L/s per sq. m) when tested according to ASTM E 283 at the following test-pressure difference:

C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

2.2 METAL SOFFIT PANELS

A. General: Provide metal soffit panels designed to be installed by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners in side laps. Include accessories required for weathertight installation.

B. Flush-Profile Metal Soffit Panels: Solid and Perforated panels formed with vertical panel edges and intermediate stiffening ribs symmetrically spaced between panel edges; with flush joint between panels.

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. Rollex Corporation
   b. Firestone Building Products.
   c. MBCI; a division of NCI Group, Inc.
   d. McElroy Metal, Inc.
   e. Metal Sales Manufacturing Corporation.
   f. Petersen Aluminum Corporation.

2. Material: Aluminum 3105 alloy

3. Aluminum Sheet: Coil-coated sheet, ASTM B 209 (ASTM B 209M), alloy as standard with manufacturer, with temper as required to suit forming operations and structural performance required.
   a. Thickness: (Soffits) 0.019 inch.
   b. Thickness: (Fascia) 0.024 inch.
   c. Surface: Smooth, flat finish.
   e. Color: As selected by Architect from manufacturer’s full range.


5. Panel Height: 0.875 inch (22 mm).

2.3 MISCELLANEOUS MATERIALS

A. Miscellaneous Metal Subframing and Furring: ASTM C 645, cold-formed, metallic-coated steel sheet, ASTM A 653/A 653M, G90 (Z275 hot-dip galvanized) coating designation or ASTM A 792/A 792M,
Farley Municipal Building
206 1st Street N., Farley, Iowa 52046
ARCHITECT PROJECT #1728.01

SPECIFICATIONS:

Class AZ50 (Class AZM150) aluminum-zinc-alloy coating designation unless otherwise indicated. Provide manufacturer’s standard sections as required for support and alignment of metal panel system.

B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.

C. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Finish flashing and trim with same finish system as adjacent metal panels.

D. Panel Fasteners: Self-tapping screws designed to withstand design loads. Provide exposed fasteners with heads matching color of metal panels by means of plastic caps or factory-applied coating. Provide EPDM or PVC sealing washers for exposed fasteners.

E. Panel Sealants: Provide sealant types recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.
   1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.
   2. Joint Sealant: ASTM C 920; elastomeric polyurethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended in writing by metal panel manufacturer.

2.4 FABRICATION

A. General: Fabricate and finish metal panels and accessories at the factory, by manufacturer’s standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

B. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.

C. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer’s recommendations and recommendations in SMACNA’s “Architectural Sheet Metal Manual” that apply to design, dimensions, metal, and other characteristics of item indicated.
   1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
   3. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
   4. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
   5. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
   6. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal panel manufacturer.
      a. Size: As recommended by SMACNA’s “Architectural Sheet Metal Manual” or metal soffit panel manufacturer for application but not less than thickness of metal being secured.

2.5 FINISHES

A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

C. Steel Panels and Accessories:
1. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers’ written instructions.

2. Concealed Finish: Apply pretreatment and manufacturer’s standard white or light-colored acrylic or polyester backer finish consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil (0.013 mm).

D. Aluminum Panels and Accessories:
1. Two-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers’ written instructions.

PART 3 - EXECUTION

3.1 EXAMINATION
A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal panel supports, and other conditions affecting performance of the Work.

1. Examine framing to verify that girts, angles, channels, studs, and other structural panel support members and anchorage have been installed within alignment tolerances required by metal panel manufacturer.

2. Examine sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal panel manufacturer.
   a. Verify that air- or water-resistive barriers been installed over sheathing or backing substrate to prevent air infiltration or water penetration.

B. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION
A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C 754 and metal panel manufacturer’s written recommendations.

3.3 METAL PANEL INSTALLATION
A. General: Install metal panels according to manufacturer’s written instructions in orientation, sizes, and locations indicated. Install panels perpendicular to supports unless otherwise indicated. Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.

1. Shim or otherwise plumb substrates receiving metal panels.

2. Flash and seal metal panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal panels are installed.

3. Install screw fasteners in predrilled holes.

4. Locate and space fastenings in uniform vertical and horizontal alignment.

5. Install flashing and trim as metal panel work proceeds.

6. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.

7. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.

B. Fasteners:
1. Aluminum Panels: Use aluminum or stainless-steel fasteners for surfaces exposed to the exterior; use aluminum or galvanized-steel fasteners for surfaces exposed to the interior.

C. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal panel manufacturer.

D. Lap-Seam Metal Panels: Fasten metal panels to supports with fasteners at each lapped joint at location and spacing recommended by manufacturer.

1. Apply panels and associated items true to line for neat and weathertight enclosure.
2. Provide metal-backed washers under heads of exposed fasteners bearing on weather side of metal panels.
3. Locate and space exposed fasteners in uniform vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of washer.
4. Install screw fasteners with power tools having controlled torque adjusted to compress washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.

E. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.
1. Install components required for a complete metal panel system including trim, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by metal panel manufacturer; or, if not indicated, provide types recommended by metal panel manufacturer.

F. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that are permanently watertight.
1. Install exposed flashing and trim that is without buckling, and tool marks, and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to achieve waterproof performance.
2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet (3 m) with no joints allowed within 24 inches (610 mm) of corner or intersection. Where lapped expansion provisions cannot be used or would not be waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with mastic sealant (concealed within joints).

3.4 CLEANING AND PROTECTION
A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed unless otherwise indicated in manufacturers written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.
B. After metal panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.
C. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION
DIVISION 07 – THERMAL AND MOISTURE PROTECTION

SECTION 074610 - METAL SIDING

PART 1 GENERAL

1.1 SECTION INCLUDES
   A. Steel siding for exterior walls.
   B. Trim, flashings, accessories, and fasteners for steel siding.

1.2 RELATED REQUIREMENTS
   A. Section 072500 - Weather Barriers:
   B. Section 076200 - Sheet Metal Flashing and Trim: Product requirements for metal flashings and trim associated with metal siding for placement by this section.
   C. Section 079200 - Joint Sealants: Sealing joints between siding and adjacent construction and fixtures.

1.3 REFERENCE STANDARDS

1.4 SUBMITTALS
   A. See Section 013000 - Administrative Requirements, for submittal procedures.
   B. Product Data: Manufacturer’s data sheets on each product to be used, including:
      1. Preparation instructions and recommendations.
      2. Siding materials, underlayment, flashings, fasteners and accessories.
      3. Dimensions, physical properties, and typical details.
      4. Storage and handling requirements and recommendations.
      5. Installation methods.
   C. Shop Drawings: Indicate layout, methods of attachment, provisions for movement, flashing, trim, edge and field conditions, interface with adjacent materials, locations of cutouts or special shapes, existing construction, and details.
   D. Samples: For each finish product specified, 1 complete sets of color chips representing manufacturer’s full range of available colors and patterns and including the following:
      E. Manufacturer’s Qualification Statement.
      F. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner’s name and registered with manufacturer.

1.5 QUALITY ASSURANCE
   A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than five years of documented experience.

1.6 DELIVERY, STORAGE, AND HANDLING
   A. Deliver and store products in manufacturer’s unopened packaging bearing brand name and manufacturer’s identification until ready for installation.
   B. Verify quantities and condition immediately upon receipt; remove damaged materials from site, and coordinate with manufacturer to replace with new materials meeting specified requirements.
C. Store products off the ground, within manufacturer’s temperature and environmental limits, away from moisture, protected from traffic and construction activities, and minimize on-site storage prior to installation.

1.7 WARRANTY
A. See Section 017800 - Closeout Submittals, for additional warranty requirements.
B. Correct defective Work within a five year period after Date of Substantial Completion.
C. Manufacturer’s warranty on panel finishes to cover the following:
   1. Color fading more than 5 Hunter color-difference units when tested according to ASTM D2244.
   2. Chalking in excess of a No. 6 rating when tested according to ASTM D4214.
   3. Cracking, checking, peeling, or failure of paint to adhere to metal substrate.
   4. Warranty Period: Based on specific finish system.
      a. PVDF (Polyvinylidene Fluoride): 30 years.

PART 2 PRODUCTS

2.1 MANUFACTURERS
A. Steel Siding and Accessories:
   2. Substitutions: See Section 016000 - Product Requirements.

2.2 STEEL SIDING
A. Horizontal Steel Siding, Type AP1-1653 CF Wall:
   1. Factory-formed steel siding.
   2. Material: Precoated steel sheet, 24 Gage, 0.025 inch minimum base metal thickness.
   3. Profile: 16” panel coverage, 1” panel height, 5 1/3” rib spacing.
   4. Length: 12 feet (3.66 m), minimum. Provide longest length possible to minimize vertical joints in siding.
   5. Finish: Shop pre-coated with manufacturer’s standard PVDF (polyvinylidene fluoride) coating system.
   6. Color: As selected by Architect from manufacturer’s full range of available colors.
B. Steel Siding Accessories:
   1. Fasteners: #12-11 Low Profile Wood Screw; non-staining, of size and strength to securely and rigidly retain the work.
   2. Provide coordinating accessories made of same material as required for complete and proper installation whether or not specifically shown on drawings.
      a. Starter Strip.
      b. Corner Post.
      c. J-Channels.
      d. Window and Door Trim.
      e. Drip Cap.
      f. Color: Match adjacent siding or soffit panels.

2.3 MATERIALS
A. Precoated Steel Sheet: Aluminum-zinc alloy-coated steel sheet, ASTM A792/A792M, Commercial Steel (CS)) or Forming Steel (FS), with AZ50/AZM150 coating; continuous-coil-coated on exposed surfaces with specified finish coating, and with manufacturer’s standard panel back coating.

2.4 LINER PANELS:
A. Panel Rib Liner Panels; 36 inch (915 mm) wide net coverage, with 1.3/16 inch (30 mm) high major ribs with minor ribs spaced between the major ribs.
B. Material: Galvanized steel with galvalume aluminum/zinc alloy coating (approximately 55% aluminum, 45% zinc, ASTM A 792). If indicated area is a wash bay, panels shall have G90/Z275 galvanized coating. See plans for locations.
C. Thickness: 29 gage.
D. Length: Continuous from sill to ceiling on walls and entire ceiling with no seams.
E. Provide full height liner panels.

PART 3 EXECUTION

3.1 EXAMINATION
A. Examine substrate conditions before beginning installation.
B. Verify dimensions and acceptable substrate condition.
C. Verify weather resistant barrier (WRB) has been installed over substrate, and refer to Section 072500 for requirements.
D. Do not proceed with installation until unacceptable conditions have been corrected.
E. If substrate preparation is responsibility of another installer, notify Architect of unsatisfactory conditions before proceeding.

3.2 INSTALLATION
A. Install steel siding, trim and accessories in accordance with manufacturer’s written instructions.
B. Attach siding using manufacturers recommended fasteners, sealants, and adhesives, allowing for thermal expansion.
C. Horizontal Clapboard: Work from base of installation to top; stagger lap joints in horizontal siding in uniform pattern as successive courses of siding are installed.
D. Install joint sealants as specified in 079200 for a watertight installation.
E. Where dissimilar materials are in contact, prevent galvanic action as recommended by manufacturer.

3.3 CLEANING
A. Clean exposed sheet metal work at completion of installation: Remove grease and oil films, excess joint sealer, handling marks, and debris from installation, leaving work clean and unmarked, free from dents, creases, waves, scratch marks, or other damage to finish.
B. Remove excess materials and debris from project site

3.4 PROTECTION
A. Protect installed products until completion of project.
B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

END OF SECTION
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. Adhered polyvinyl-chloride (PVC) roofing system.
   2. Roof insulation.
B. Related Requirements:
   1. Section 061000 "Rough Carpentry" for wood nailers, curbs, and blocking; and for wood-based,
      structural-use roof deck panels.
   2. Section 061600 "Sheathing" for wood-based, structural-use roof deck panels.
   3. Section 076200 "Sheet Metal Flashing and Trim" for metal roof flashings and counterflashings.
   4. Section 079200 "Joint Sealants" for joint sealants, joint fillers, and joint preparation.

1.3 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.

1.4 PREINSTALLATION MEETINGS
A. Preinstallation Roofing Conference: Conduct conference at Project site.
   1. Review methods and procedures related to roofing installation, including manufacturer’s written
      instructions.
   2. Review and finalize construction schedule, and verify availability of materials, Installer’s personnel,
      equipment, and facilities needed to make progress and avoid delays.
   3. Examine deck substrate conditions and finishes for compliance with requirements, including flatness
      and fastening.
   4. Review structural loading limitations of roof deck during and after roofing.
   5. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs,
      and condition of other construction that affects roofing system.
   6. Review governing regulations and requirements for insurance and certificates if applicable.
   7. Review temporary protection requirements for roofing system during and after installation.
   8. Review roof observation and repair procedures after roofing installation.

1.5 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. Insulation fastening patterns for corner, perimeter, and field-of-roof locations.
C. Samples for Verification: For the following products:
   1. Sheet roofing, of color required.
   2. Walkway pads or rolls, of color required.

1.6 INFORMATIONAL SUBMITTALS
A. Qualification Data: For Installer and manufacturer.
B. 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.

C. Product Test Reports: For components of roofing system, for tests performed by manufacturer and witnessed by a qualified testing agency.

D. Research/Evaluation Reports: For components of roofing system, from ICC-ES.

E. Field quality-control reports.

F. Sample Warranties: For manufacturer’s special warranties.

1.7 CLOSEOUT SUBMITTALS
   A. Maintenance Data: For roofing system to include in maintenance manuals.

1.8 QUALITY ASSURANCE
   A. The roofing supplied shall be applied only by a roofing applicator authorized by the manufacturer prior to bidding that has a minimum of 5 year’s experience with the systems specified and has completed a minimum of 5 projects in the last two years with that system.

   B. Upon completion of the installation and the delivery to Manufacturer by the Applicator of certification that all work has been done in strict accordance with the contract specifications and Manufacturer’s requirements, a Technical Representative will review the installed roof system.

   C. There shall be no deviation made from the Project Specification or the approved shop drawings without prior written approval by the Owner, the Owner’s Representative and Membrane Manufacturer.

   D. All work pertaining to the installation of membrane and flashings shall only be completed by Applicator personnel trained and authorized by Membrane Manufacturer in those procedures.

1.9 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.

1.10 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.

1.11 WARRANTY
   A. Special Warranty: Manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period.

      1. Upon successful completion of the work the following warranties shall be obtained:

         a. 15 year full systems warranty, Non Pro-Rated.

         b. Roofing applicator warranty, Non Pro-Rated in effect for 2 years.

PART 2 - PRODUCTS
   A. Source Limitations: Obtain components including roof insulation and fasteners for roofing system from same manufacturer as membrane roofing or manufacturer approved by membrane roofing manufacturer.
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.
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: System shall be designed to meet a minimum wind design requirement of the most recent version of ASCE 7.

2.3 PVC ROOFING
   1. Basis-of-Design Product: Subject to compliance with requirements, provide Sika Sarnafil; G 410.
   2. Thickness: 72 mil minimum, 80 mil nominal as certified by the manufacturer.
   3. Exposed Face Color: EnergySmart white, initial reflectivity of 0.83, initial emissivity 0.90, solar reflective index (SRI) of >104.

2.4 AUXILIARY 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 sheet flashing of same material, type, reinforcement, thickness, and color as PVC sheet.
C. Bonding Adhesive: Manufacturer’s standard.
D. Slip Sheet: Manufacturer’s standard, of thickness required for application.
E. Metal Termination Bars: Manufacturer’s standard, predrilled stainless-steel or aluminum bars, approximately 1 by 1/8 inch (25 by 3 mm) thick; with anchors.
F. Metal Battens: Manufacturer’s standard, aluminum-zinc-alloy-coated or zinc-coated steel sheet, approximately 1 inch wide by 0.05 inch (25 mm wide by 1.3 mm) thick, prepunched.
G. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Global 4470, designed for fastening roofing to substrate, and acceptable to roofing system manufacturer.
H. 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 ROOF INSULATION
A. General: Preformed roof insulation boards manufactured or approved by PVC roofing manufacturer, selected from manufacturer’s standard sizes suitable for application, of thicknesses indicated.
B. Polyisocyanurate 20PSI minimum.

2.6 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 and cover boards 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:
D. Insulation Board Adhesive: Millenium Oly Bond by OMG or approved by membrane 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.
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.

3.3 ROOFING INSTALLATION, GENERAL
A. Install roofing system according to roofing system manufacturer’s written instructions.
B. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at end of workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.

3.4 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.

3.5 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. Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water.
D. 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 (6 mm) with insulation.
1. Cut and fit insulation within 1/4 inch (6 mm) of nailers, projections, and penetrations.
E. Adhered Insulation: Install each layer of insulation and adhere to substrate as follows:
   1. Set each layer of insulation in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.

3.6 ADHERED ROOFING INSTALLATION
A. Adhere roofing over area to receive roofing according to roofing system manufacturer’s written instructions. Unroll roofing and allow to relax before retaining.
   1. Install sheet according to ASTM D 5036.
B. Start installation of roofing in presence of roofing system manufacturer’s technical personnel.
C. Accurately align roofing, and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.
D. 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.
E. In addition to adhering, mechanically fasten roofing securely at terminations, penetrations, and perimeter of roofing.
F. Apply roofing with side laps shingled with slope of roof deck where possible.
G. 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.
H. 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 FIELD QUALITY CONTROL
A. Prior to demobilization from the site, the work shall be reviewed by the Owner’s Representative and the Applicator. All defects noted and non-compliances with the Specifications or the recommendations of Sika Sarnafil shall be itemized in a punch list. These items must be corrected immediately by the Applicator to the satisfaction of the Owner’s Representative and Membrane Manufacturer prior to demobilization.

3.9 PROTECTING AND CLEANING
A. Protect roofing system from damage and wear during remainder of construction period. When remaining construction does not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, 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 and deterioration 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.

END OF SECTION
DIVISION 07 – THERMAL AND MOISTURE PROTECTION

SECTION 076200 - SHEET METAL FLASHING AND TRIM

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. Formed roof-drainage sheet metal fabrications.
   B. Related Requirements:
      1. Section 061000 “Rough Carpentry” for wood nailers, curbs, and blocking.
      2. Section 077200 “Roof Accessories” for set-on-type curbs, equipment supports, roof hatches, vents, and other manufactured roof accessory units.

1.3 COORDINATION
   A. Coordinate sheet metal flashing and trim layout and seams with sizes and locations of penetrations to be flashed, and joints and seams in adjacent materials.
   B. Coordinate sheet metal flashing and trim installation with adjoining roofing and wall materials, joints, and seams to provide leakproof, secure, and noncorrosive installation.

1.4 ACTION SUBMITTALS
   A. Product Data: For each type of product.
      1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each manufactured product and accessory.
   B. Shop Drawings: For sheet metal flashing and trim.
      1. Include plans, elevations, sections, and attachment details.
      2. Detail fabrication and installation layouts, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled work.
      3. Include identification of material, thickness, weight, and finish for each item and location in Project.
      4. Include details for forming, including profiles, shapes, seams, and dimensions.
      5. Include details for joining, supporting, and securing, including layout and spacing of fasteners, cleats, clips, and other attachments. Include pattern of seams.
      6. Include details of termination points and assemblies.
      7. Include details of expansion joints and expansion-joint covers, including showing direction of expansion and contraction from fixed points.
      8. Include details of roof-penetration flashing.
      9. Include details of edge conditions, including eaves, ridges, valleys, rakes, crickets, and counterflashings as applicable.
     10. Include details of special conditions.
     11. Include details of connections to adjoining work.
   C. Samples for Initial Selection: For each type of sheet metal and accessory indicated with factory-applied finishes.
     1. Anodized Aluminum Samples: Samples to show full range to be expected for each color required.

1.5 INFORMATIONAL SUBMITTALS
   A. Qualification Data: For fabricator.
   B. Sample Warranty: For special warranty.
1.6 CLOSEOUT SUBMITTALS
A. Maintenance Data: For sheet metal flashing and trim, and its accessories, to include in maintenance manuals.

1.7 QUALITY ASSURANCE
A. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.

1.8 DELIVERY, STORAGE, AND HANDLING
A. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage. Store sheet metal flashing and trim materials away from uncured concrete and masonry.
B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to extent necessary for period of sheet metal flashing and trim installation.

1.9 WARRANTY
A. Special Warranty on Finishes: Manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.
1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
   a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
   b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
   c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SHEET METALS
A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.
B. Aluminum Sheet: ASTM B 209 (ASTM B 209M), alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required; with smooth, flat surface.
   a. Color: As selected by Architect from full range of industry colors and color densities.
2. Exposed Coil-Coated Finish:
   a. Two-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers’ written instructions.
3. Concealed Finish: Pretreat with manufacturer’s standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with minimum total dry film thickness of 0.5 mil (0.013 mm).

2.2 MISCELLANEOUS MATERIALS
A. General: Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.
B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.
1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
   a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.
b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.

c. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.

2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.

C. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.

D. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane, polysulfide or silicone polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

E. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.

F. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.

G. Bituminous Coating: Cold-applied asphalt emulsion according to ASTM D 1187.


2.3 FABRICATION, GENERAL

A. General: Custom fabricate sheet metal flashing and trim to comply with details shown and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required. Fabricate sheet metal flashing and trim in shop to greatest extent possible.

1. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.

2. Obtain field measurements for accurate fit before shop fabrication.

3. Form sheet metal flashing and trim to fit substrates without excessive oil canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.

4. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.

B. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines indicated on Drawings and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.

C. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to tolerances specified in MCA’s “Guide Specification for Residential Metal Roofing.”

D. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.

1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with butyl sealant concealed within joints.

2. Use lapped expansion joints only where indicated on Drawings.

E. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal to provide for proper installation of elastomeric sealant according to cited sheet metal standard.

F. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.

G. Seams: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use. Rivet joints where necessary for strength.

H. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints where necessary for strength.

I. Do not use graphite pencils to mark metal surfaces.

2.4 ROOF-DRAINAGE SHEET METAL FABRICATIONS

A. Hanging Gutters: Fabricate to cross section required, complete with end pieces, outlet tubes, and other accessories as required. Fabricate in minimum 96-inch- (2400-mm-) long sections. Furnish flat-stock gutter brackets and flat-stock gutter spacers and straps fabricated from same metal as gutters, of size
recommended by cited sheet metal standard but with thickness not less than twice the gutter thickness. Fabricate expansion joints, expansion-joint covers gutter bead reinforcing bars and gutter accessories from same metal as gutters. Shop fabricate interior and exterior corners.

1. Gutter Profile: Style J according to cited sheet metal standard.
2. Expansion Joints: Butt type with cover plate.
3. Accessories: Valley baffles.
4. Gutters with Girth 16 to 20 Inches (410 to 510 mm): Fabricate from the following materials:
   a. Aluminum: 0.040 inch (1.02 mm) thick.

B. Downspouts: Fabricate rectangular downspouts to dimensions indicated, complete with mitered elbows. Furnish with metal hangers from same material as downspouts and anchors. Shop fabricate elbows.
1. Fabricated Hanger Style: Fig 1-35B according to SMACNA's "Architectural Sheet Metal Manual."
2. Fabricate from the following materials:
   a. Aluminum: 0.024 inch (0.61 mm) thick.

2.5 STEEP-SLOPE ROOF SHEET METAL FABRICATIONS

A. Apron, Step, Cricket, and Backer Flashing: Fabricate from the following materials:
   1. Aluminum: 0.032 inch (0.81 mm) thick.

B. Drip Edges: Fabricate from the following materials:
   1. Aluminum: 0.032 inch (0.81 mm) thick.

C. Eave, Rake Flashing: Fabricate from the following materials:
   1. Aluminum: 0.032 inch (0.81 mm) thick.

D. Counterflashing: Shop fabricate interior and exterior corners. Fabricate from the following materials:
   1. Aluminum: 0.032 inch (0.81 mm) thick.

E. Flashing Receivers: Fabricate from the following materials:
   1. Aluminum: 0.032 inch (0.81 mm) thick.

F. Roof-Penetration Flashing: Fabricate from the following materials:
   1. Aluminum-Zinc Alloy-Coated Steel: 0.028 inch (0.71 mm)

PART 3 • EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, substrate, and other conditions affecting performance of the Work.
   1. Verify compliance with requirements for installation tolerances of substrates.
   2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
   3. Verify that air- or water-resistant barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.

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

3.2 INSTALLATION, GENERAL

A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
   1. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
   2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
   3. Space cleats not more than 12 inches (300 mm) apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
   4. Install exposed sheet metal flashing and trim with limited oil canning, and free of buckling and tool marks.
   5. Torch cutting of sheet metal flashing and trim is not permitted.
   6. Do not use graphite pencils to mark metal surfaces.
B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.
   1. Coat concealed side of uncoated-aluminum sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.
   2. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.
C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at maximum of 10 feet (3 m) with no joints within 24 inches (600 mm) of corner or intersection.
   1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with sealant concealed within joints.
D. Fasteners: Use fastener sizes that penetrate wood blocking or sheathing not less than 1-1/4 inches (32 mm) for nails and not less than 3/4 inch (19 mm) for wood screws.
E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.
F. Seal joints as required for watertight construction.
   1. Use sealant-filled joints unless otherwise indicated. Embed hooked flanges of joint members not less than 1 inch (25 mm) into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is between 40 and 70 deg F (4 and 21 deg C), set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F (4 deg C).
   2. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."
G. Rivets: Rivet joints where necessary for strength.

3.3 ROOF-DRAINAGE SYSTEM INSTALLATION
A. General: Install sheet metal roof-drainage items to produce complete roof-drainage system according to cited sheet metal standard unless otherwise indicated. Coordinate installation of roof perimeter flashing with installation of roof-drainage system.
B. Hanging Gutters: Join sections with joints sealed with sealant. Provide for thermal expansion. Attach gutters at eave or fascia to firmly anchor them in position. Provide end closures and seal watertight with sealant. Slope to downspouts.
   1. Fasten gutter spacers to front and back of gutter.
   2. Anchor and loosely lock back edge of gutter to continuous eave or apron flashing.
   3. Anchor gutter with gutter brackets spaced not more than 24 inches (600 mm) apart to roof deck, unless otherwise indicated, and loosely lock to front gutter bead.
   4. Install gutter with expansion joints at locations indicated, but not exceeding, 50 feet (15.24 m) apart. Install expansion-joint caps.
C. Downspouts: Join sections with 1-1/2-inch (38-mm) telescoping joints.
   1. Provide hangers with fasteners designed to hold downspouts securely to walls. Locate hangers at top and bottom and at approximately 60 inches (1500 mm) o.c.
   2. Provide elbows at base of downspout to direct water away from building.
   3. Connect downspouts to underground drainage system if specified.
D. Splash Pans: Install where downspouts discharge on low-slope roofs. Set in elastomeric sealant compatible with the substrate.
E. Expansion-Joint Covers: Install expansion-joint covers at locations and of configuration indicated. Lap joints minimum of 4 inches (100 mm) in direction of water flow.

3.4 ROOF FLASHING INSTALLATION
A. General: Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer’s written installation instructions, and cited sheet metal standard. Provide concealed fasteners where possible, and set units true to line, levels, and slopes. Install work with laps, joints, and seams that are permanently watertight and weather resistant.
SPECIFICATIONS: Farley Municipal Building  
206 1st Street N., Farley, Iowa 52046  
ARCHITECT PROJECT #1728.01

B. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in cited sheet metal standard unless otherwise indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate at staggered 3-inch (75-mm) centers.

C. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending minimum of 4 inches (100 mm) over base flashing. Install stainless-steel draw band and tighten.

D. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4 inches (100 mm) over base flashing. Lap counterflashing joints minimum of 4 inches (100 mm). Secure in waterproof manner by means of snap-in installation and sealant or lead wedges and sealant unless otherwise indicated.

E. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with elastomeric sealant and clamp flashing to pipes that penetrate roof.

3.5 ERECTION TOLERANCES
A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines indicated on Drawings and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.

3.6 CLEANING AND PROTECTION
A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
B. Clean off excess sealants.
C. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer’s written installation instructions. On completion of sheet metal flashing and trim installation, remove unused materials and clean finished surfaces as recommended by sheet metal flashing and trim manufacturer. Maintain sheet metal flashing and trim in clean condition during construction.
D. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION
SECTION 077200 - ELECTRICAL POWER ATTIC EXHAUST VENTILATOR

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. Electrically powered attic exhaust ventilators.
2. Accessories.
B. Related Sections:
1. Section 07 54 19 - PVC Roofing
2. Section 07 60 00 - Sheet Metal Flashing and Trim
3. Section 07 90 00 - Joint Sealants
4. Mechanical; Division 22.
5. Electrical; Division 26.

1.3 REFERENCE STANDARDS
A. American Society for Testing and Materials:
B. National Fire Protection Association:
1. NFPA 70 - National Electrical Code.
C. Institute of Electrical and Electronics Engineers:
D. Underwriters Laboratories Inc.:
1. UL 507 - Electric Fans.

1.4 PERFORMANCE REQUIREMENTS
A. General Performance: Electrically powered attic exhaust ventilators shall withstand exposure to weather and resist thermally induced movement without failure, rattling, leaking, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.

1.5 QUALITY ASSURANCE
A. Certifications:
1. Passed Miami-Dade County test requirements for structural uplift and wind driven rain infiltration. Miami-Dade County Approved - NOA No.: 11-0602.02 expires 08/017/2016.
B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
C. Comply with NFPA 70.
E. Comply with UL 507, “Electric Fans”.

1.6 ACTION SUBMITTALS
A. Product Data: For electrically powered attic exhaust ventilator indicated.
B. Sample: For each exposed product and for each color and texture specified, prepared on Samples of size to adequately show color.
1.7 INFORMATIONAL SUBMITTALS
   A. Coordination Drawings: Roof plans, drawn to scale, and coordinating penetrations and roof-mounted items. Show the following:
      1. Size and location of electrical powered attic exhaust ventilator specified in this Section.
      2. Method of attaching electrical powered attic exhaust ventilator to roof or building structure.
      3. Other roof mounted items including mechanical and electrical equipment, ductwork, piping, and conduit.
   B. Product Certificates: For specified electrical power attic exhaust ventilator, from manufacturer.

1.8 CLOSEOUT SUBMITTALS
   A. Operation and Maintenance Data: For electrical powered attic exhaust ventilator specified, include in operation and maintenance manuals.

1.9 DELIVERY, STORAGE AND HANDLING
   A. Store materials in a dry, well-ventilated, weathertight place.

1.10 COORDINATION
   A. Coordinate layout and installation of electrical powered attic exhaust ventilator with roofing membrane and base flashing and interfacing and adjoining construction to provide a leak proof, weathertight, secure, and noncorrosive installation.
   B. Coordinate dimensions with rough-in information or Shop Drawings of equipment to be supported.

1.11 WARRANTY
   A. Manufacturer’s standard limited 5-year warranty for materials and workmanship.

PART 2 - PRODUCTS

2.1 MANUFACTURER
   A. Basis of Design: Lomanco, Incorporated, 2101 West Main Street, P.O. Box 519, Jacksonville, Arkansas 72076, 1-800-643-5593 phone, (501) 982-1258 fax, www.lomanco.com is specified.

2.2 ELECTRICALLY POWERED ATTIC EXHAUST VENTILATOR
   A. Model “LOMANCOOL 2000TH Power Ventilator”.
   B. Description: Pan-Style, self-flashing, roof mounted, electrically powered attic exhaust ventilator with one-piece dome, one-piece base, and one-piece continuous rain shield. Brackets riveted to rain shield and base, dome attached to brackets with screws, and screen is secured in place around rain shield and covers vent opening.
   C. Materials and Components:
      1. Aluminum: Conform to ASTM B 209/ B209M.
         a. Base: 0.032” aluminum coiled sheet.
         b. Rain Shield: 0.019” aluminum coiled sheet.
         c. Dome: 0.032” aluminum coiled sheet.
         d. Fan Blade: 0.039” aluminum coiled sheet.
         e. Panel Mounting Brackets: 0.061” aluminum coiled sheet.
         f. Shaft: 0.500” diameter aluminum extrusion.
      2. Galvanized Steel: Conform to ASTM A123/A 123M.
         a. Bracket: 0.061” galvanized coiled sheet.
         b. Fan Blade: 0.036” galvanized coiled sheet.
      4. Fan Blade: 5 blade design, stamped and formed as one-piece; comply with UL 507.
      5. Thermostat/Humidistat Combo: Adjustable thermostat and humidistat combo, factory set to 85°F and 60% RH. (Includes a “push to test” switch)
      6. Screen: Manufacturer’s standard, 8x8 galvanized grill cloth.
   D. Dimensions: Overall 20” x 23” x 7-3/4”, Opening Size - 14”.
2.3 FINISHES:
A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
C. Manufacturer’s standard “Valspar Super Flex” polyester coating with minimum 0.8 top coat and minimum 0.3 wash coat. Colors Available: Brown, White, Black, Weathered Bronze and Milled finished aluminum.

PART 3 - EXECUTION

3.1 EXAMINATION
A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions, and other conditions affecting performance of the Work.
B. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION
A. General: Install electrical powered attic exhaust ventilators according to manufacturer’s written instructions.
1. Install ventilators level, plumb, true to line and elevation, and without warping, jogs in alignment, excessive oil canning, buckling, or tool marks.
2. Anchor ventilators securely in place so they are capable of resisting indicated loads.
3. Use fasteners, separators, sealants, and other miscellaneous items as required to complete installation of ventilators and fit them to substrates.
4. Install ventilator to resist exposure to weather without failing, rattling, leaking, or loosening of fasteners and seals.
B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.
1. Coat concealed side of ventilator with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
2. Underlayment: Where installing ventilator directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet, or install a course of polyethylene sheet.
C. Electrically Powered Attic Exhaust Ventilator Installation: Verify that ventilators operate properly and have unrestricted airflow. Clean, lubricate, and adjust operating mechanisms.
D. Seal joints with elastomeric or butyl sealant as required by electrical powered attic exhaust ventilator manufacturer. Comply with requirements of Section 07 90 00 - Joint Sealants.

3.3 REPAIR AND CLEANING
A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing according to ASTM A 780.
B. Touch up factory-primed surfaces with compatible primer ready for field painting according to Section 09 91 13 - Exterior Painting and Section 09 91 23 - Interior Painting.
C. Clean exposed surfaces according to manufacturer's written instructions.
D. Clean off excess sealants.
E. Replace electrical power attic exhaust ventilators that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

END OF SECTION
SPECIFICATIONS: Farley Municipal Building  
206 1st Street N., Farley, Iowa 52046  
ARCHITECT PROJECT #1728.01

DIVISION 07 – THERMAL AND MOISTURE PROTECTION

SECTION 079200 - JOINT SEALANTS

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. Silicone joint sealants.
   2. Latex joint sealants.
B. Related Requirements:
   1. Section 321373 “Concrete Paving Joint Sealants” for sealing joints in paved roads, parking lots, walkways, and curbing.

1.3 ACTION SUBMITTALS
A. Product Data: For each joint-sealant product.
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. Joint-Sealant Schedule: Include the following information:
   1. Joint-sealant application, joint location, and designation.
   2. Joint-sealant manufacturer and product name.

1.4 FIELD CONDITIONS
A. Do not proceed with installation of joint sealants under the following conditions:
   1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F (5 deg C).
   2. When joint substrates are wet.
   3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
   4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.5 WARRANTY
A. Special Installer’s Warranty: Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
   1. Warranty Period: Two years from date of Substantial Completion.
B. Special Manufacturer’s Warranty: Manufacturer agrees to furnish joint sealants to repair or replace those joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
   1. Warranty Period: Five years from date of Substantial Completion.
C. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:
   1. Movement of the structure caused by stresses on the sealant exceeding sealant manufacturer’s written specifications for sealant elongation and compression.
   2. Disintegration of joint substrates from 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 JOINT SEALANTS, GENERAL
   A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.
   B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer’s full range.

2.2 SILICONE JOINT SEALANTS
   A. Silicone, S, NS, 100/50, NT: Single-component, nonsag, plus 100 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 100/50, Use NT.
      1. Manufacturers: Subject to compliance with requirements, provide products by the following:
         a. GE Construction Sealants; Momentive Performance Materials Inc.

2.3 LATEX JOINT SEALANTS
   A. Acrylic Latex: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.
      1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
         a. BASF Corporation; Construction Systems.
         b. Tremco Incorporated.

2.4 JOINT-SEALANT BACKING
   A. Sealant Backing Material, General: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
      1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
         a. BASF Corporation; Construction Systems.
         b. Construction Foam Products; a division of Nomaco, Inc.
   B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell 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. Provide self-adhesive tape where applicable.

2.5 MISCELLANEOUS MATERIALS
   A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
   B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.
   C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION
   A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting performance of the Work.
   B. Proceed with installation only after unsatisfactory conditions have been corrected.
3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
   1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
   2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
      a. Unglazed surfaces of ceramic tile.
      b. Exterior insulation and finish systems.
   3. Remove laitance and form-release agents from concrete.
   4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:

B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
   1. Do not leave gaps between ends of sealant backings.
   2. Do not stretch, twist, puncture, or tear sealant backings.
   3. Remove absorbent sealant backings that have become wet before sealant application, and replace them with dry materials.

D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
   1. Place sealants so they directly contact and fully wet joint substrates.
   2. Completely fill recesses in each joint configuration.
   3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
   1. Remove excess sealant from surfaces adjacent to joints.
   2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
   3. Provide concave joint profile per Figure 8A in ASTM C 1193 unless otherwise indicated.
3.4 CLEANING
   A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with
      cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints
      occur.

3.5 PROTECTION
   A. Protect joint sealants during and after curing period from contact with contaminating substances and from
      damage resulting from construction operations or other causes so sealants are without deterioration or
      damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut
      out, remove, and repair damaged or deteriorated joint sealants immediately so installations with repaired
      areas are indistinguishable from original work.

3.6 JOINT-SEALANT SCHEDULE
   A. Joint-Sealant Application:
      1. Joint Locations:
         a. Isolation and contraction joints in cast-in-place concrete slabs.
         b. Tile control and expansion joints.
         c. Joints between different materials listed above.
         d. Other joints as indicated on Drawings.
         e. Construction joints in cast-in-place concrete.
         f. Control and expansion joints in unit masonry.
         g. Joints in dimension stone cladding.
         h. Perimeter joints between materials listed above and frames of doors, windows and louvers.
         i. Control and expansion.
PART 1 - GENERAL

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

1.2 SUMMARY
   A. Section includes hollow-metal work.
   B. Tornado Door Systems
   C. Related Requirements:
      1. Section 087100 "Door Hardware" for door hardware for hollow-metal doors.

1.3 DEFINITIONS
   A. Minimum Thickness: Minimum thickness of base metal without coatings according to NAAMM-HMMA 803 or SDI A250.8.

1.4 COORDINATION
   A. Coordinate anchorage installation for hollow-metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

1.5 ACTION SUBMITTALS
   A. Product Data: For each type of product.
      1. Include construction details, material descriptions, core descriptions, fire-resistance ratings, and finishes.
   B. Shop Drawings: Include the following:
      1. Elevations of each door type.
      2. Details of doors, including vertical- and horizontal-edge details and metal thicknesses.
      3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
      4. Locations of reinforcement and preparations for hardware.
      5. Details of each different wall opening condition.
      6. Details of anchorages, joints, field splices, and connections.
      7. Details of accessories.
      8. Details of moldings, removable stops, and glazing.
      9. Details of conduit and preparations for power, signal, and control systems.
   C. Schedule: Provide a schedule of hollow-metal work prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final Door Hardware Schedule.

1.6 DELIVERY, STORAGE, AND HANDLING
   A. Deliver hollow-metal work palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use nonvented 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 hollow-metal work vertically under cover at Project site with head up. Place on minimum 4-inch (102-mm) high wood blocking. Provide minimum 1/4-inch (6-mm) space between each stacked door to permit air circulation.
PART 2 - PRODUCTS

2.1 MANUFACTURERS
A. Manufacturers Standard Doors: 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; ASSA ABLOY.
   2. Curries Company; ASSA ABLOY.
   4. Steelcraft; an Allegion brand.
B. Manufacturers Tornado Storm Doors: Subject to compliance with requirement5s, available manufacturers offering products that may be incorporated into the work include, but are not limited to the following:
   1. Steelcraft PW-Series storm doors and frames; an Allegion brand.
   2. Ceco StormPro series storm doors and frames; ASSA ABLOY.
C. Source Limitations: Obtain hollow-metal work from single source from single manufacturer.

2.2 REGULATORY REQUIREMENTS
A. Tornado Doors: Design Door and Frame Systems for Federal Emergency Management Agency (FEMA) community shelters and other areas of refuge to resist the design wind pressures and missile impact loads as detailed in Design and Construction Guidance for Community Safe Rooms - FEMA 361. Door and Frame Systems shall also be listed in compliance with ANSI / ICC 500 - Standard for the Design and Construction of Storm Shelters.

2.3 EXTERIOR HOLLOW-METAL DOORS AND FRAMES
A. Construct exterior doors and frames to comply with the standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.
B. Commercial Doors and Frames: NAAMM-HMMA 861. At locations indicated in the Door and Frame Schedule.
   1. Physical Performance: Level A according to SDI A250.4.
   2. Doors:
      a. Type: As indicated in the Door and Frame Schedule.
      b. Thickness: 1-3/4 inches (44.5 mm.)
      c. Face: Metallic-coated steel sheet, minimum thickness of 0.053 inch (1.30 mm), 16-gage, with minimum G60 ((Z180) or) A60 (ZF180) coating.
      d. Edge Construction: Continuously welded with no visible seam.
      e. Core: Polystyrene, Polyurethane, or Polyisocyanurate.
         1) Thermal-Rated Doors: Provide doors fabricated with thermal-resistance value (U-value) of not more than U.39 when tested according to ASTM C 1363.
   3. Frames:
      a. Materials: Metallic-coated steel sheet, minimum thickness of 0.067 inch (1.7 mm), 14-gage, with minimum G60 ((Z180) or) A60 (ZF180) coating.
      b. Construction: Full profile welded.

2.4 INTERIOR HOLLOW-METAL DOORS AND FRAMES
A. Construct interior doors and frames to comply with the standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.
B. Commercial Doors and Frames: NAAMM-HMMA 861. At locations indicated in the Door and Frame Schedule.
   1. Physical Performance: Level A according to SDI A250.4.
   2. Doors:
      a. Type: As indicated in the Door and Frame Schedule.
      b. Thickness: 1-3/4 inches (44.5 mm.)
2.5 STORM DOOR HOLLOW METAL DOORS AND FRAMES

A. Tornado Door Systems: Comply with Federal Emergency Management Agency (FEMA) 361 Guidelines and provides the highest level of security and safety for tornado shelters and severe storm areas of refuge.

1. Doors:
   a. Face sheets: 14 gage (1.7 mm) galvannealed steel having an A60 zinc-iron alloy coating conforming to ASTM designations A653 and A924.
   b. Hinge and lock edges:
      c. Continuous vertical mechanical joints with edge seams welded, filled and ground smooth.
      d. Bevel edges 1/8 inch (3 mm) in 2 inches (50 mm). Square edges are not acceptable.
      e. Hinge reinforcements: Minimum 7 gage (4.2 mm) galvannealed steel, projection welded to the edge of the door.
      f. Top and bottom steel reinforcement channels, galvannealed 14 gage (1.7 mm), projection welded to both face sheets on 4 inches (102 mm) centers.
      g. Reinforce door faces with 18 gage (1.0 mm) vertical stiffeners manufactured from Galvannealed steel conforming to ASTM A 653 and ASTM A 924 and welded to each face sheet.
      h. Reinforced lock stiles with full-height 12 gage (2.3 mm) lock reinforcing channels.

2. Frames:
   a. Flush Frames: knocked down for field assembly or set-up and welded with temporary shipping bars. Factory die-mitered corner connections reinforced with four integral tabs to secure and interlock at jambs to head. Unless otherwise indicated, frame will have 2” faces and 5/8” stops. Frame depths per the architectural door schedule.
   b. Frames: Zinc-Iron Alloy-Coated galvannealed steel, ASTM A 653, Class A60, 14 gage 0.067” (1.7mm) steel.
   c. Include galvannealed components and internal reinforcements with galvannealed frames.
   d. Provide frames with a minimum of six wall anchors and two adjustable base anchors of manufacturer’s standard design.
   e. Provide welded 3 sided frames as follows:
      1) Full profile welded:
      2) Weld miter joints between head and jamb faces completely along their length either internally or externally.
      3) Internally weld perimeter profile joints full length of soffit and rabbets with hairline seams on external meeting surfaces. Grind and finish face joints smooth.
   f. Prepare frames to receive inserted type door silencers (3) per strike jamb on single doors, and (2) per head for pair of doors. Stick-on silencers are not permitted.
   g. Frame Hardware Reinforcements:
      1) Mortise hinge reinforcement: minimum 7 gage [0.180” (4.7mm)].
      2) Provide high frequency hinge reinforcement for top hinge on all exterior, cross corridor, and stairwell frames, in accordance with SDI 111-H, Example “A” Application, where full mortise hinges are specified.
      3) Strike reinforcements: minimum 16 gage [0.053” (1.3mm)] and prepared for an ANSI-A115.1-2 strike.
4) Closer reinforcement: minimum 14 gage [0.067” (1.7mm)] steel.
5) Projection weld hinge and strike reinforcements to the door frame.
6) Provide metal plaster guards for all mortised cutouts.
7) Include galvanized hardware reinforcements in all galvannealed frames.

2.6 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 (1.0 mm) thick, with corrugated or perforated straps not less than 2 inches (51 mm) wide by 10 inches (254 mm) long; or wire anchors not less than 0.177 inch (4.5 mm) thick.
2. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch (1.0 mm) thick.
3. Compression Type for Drywall Slip-on Frames: Adjustable compression anchors.
4. Postinstalled Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch (9.5-mm) diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.
B. Floor Anchors: Formed from same material as frames, minimum thickness of 0.042 inch (1.0 mm), and as follows:
1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.
2. Separate Topping Concrete Slabs: Adjustable-type anchors with extension clips, allowing not less than 2-inch (51-mm) height adjustment. Terminate bottom of frames at finish floor surface.

2.7 MATERIALS
A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.
C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B.
D. Frame Anchors: ASTM A 879/A 879M, Commercial Steel (CS), 04Z (12G) coating designation; mill phosphatized.
1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.
E. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.
F. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow-metal frames of type indicated.
G. Grout: ASTM C 476, except with a maximum slump of 4 inches (102 mm), as measured according to ASTM C 143/C 143M.
H. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.
I. Glazing: Comply with requirements in Section 088000 “Glazing.”
J. Bituminous Coating: Cold-applied asphalt mastic, compounded for 15-mil (0.4-mm) dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.8 FABRICATION
A. Fabricate hollow-metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for metal thickness. Where practical, fit and assemble units in manufacturer’s plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.
B. Hollow-Metal Doors:
1. Steel-Stiffened Door Cores: Provide minimum thickness 0.026 inch (0.66 mm), steel vertical stiffeners of same material as face sheets extending full-door height, with vertical webs spaced not more than 6 inches (152 mm) apart. Spot weld to face sheets no more than 5 inches (127 mm) o.c. Fill spaces between stiffeners with glass- or mineral-fiber insulation.

2. Fire Door Cores: As required to provide fire-protection ratings indicated.

3. Vertical Edges for Single-Acting Doors: Provide beveled or square edges at manufacturer’s discretion.

4. Top Edge Closures: Close top edges of doors with flush closures of same material as face sheets.

5. Bottom Edge Closures: Close bottom edges of doors where required for attachment of weather stripping with end closures or channels of same material as face sheets.

6. Exterior Doors: Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.

7. 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 (19 mm) beyond edge of door on which astragal is mounted or as required to comply with published listing of qualified testing agency.

C. Hollow-Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.

1. Sidelite and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.

2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.

3. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.

4. Floor Anchors: Weld anchors to bottoms of jambs with at least four spot welds per anchor; however, for slip-on drywall frames, provide anchor clips or countersunk holes at bottoms of jambs.

5. Jamb Anchors: Provide number and spacing of anchors as follows:
   a. Masonry Type: Locate anchors not more than 16 inches (406 mm) from top and bottom of frame. Space anchors not more than 32 inches (813 mm) o.c., to match coursing, and as follows:
      1) Two anchors per jamb up to 60 inches (1524 mm) high.
      2) Three anchors per jamb from 60 to 90 inches (1524 to 2286 mm) high.
      3) Four anchors per jamb from 90 to 120 inches (2286 to 3048 mm) high.
      4) Four anchors per jamb plus one additional anchor per jamb for each 24 inches (610 mm) or fraction thereof above 120 inches (3048 mm) high.
   b. Stud-Wall Type: Locate anchors not more than 18 inches (457 mm) from top and bottom of frame. Space anchors not more than 32 inches (813 mm) o.c. and as follows:
      1) Three anchors per jamb up to 60 inches (1524 mm) high.
      2) Four anchors per jamb from 60 to 90 inches (1524 to 2286 mm) high.
      3) Five anchors per jamb from 90 to 96 inches (2286 to 2438 mm) high.
      4) Five anchors per jamb plus one additional anchor per jamb for each 24 inches (610 mm) or fraction thereof above 96 inches (2438 mm) high.
   c. Compression Type: Not less than two anchors in each frame.
   d. Postinstalled Expansion Type: Locate anchors not more than 6 inches (152 mm) from top and bottom of frame. Space anchors not more than 26 inches (660 mm) o.c.

6. Head Anchors: Two anchors per head for frames more than 42 inches (1067 mm) wide and mounted in metal-stud partitions as recommended by manufacturer.

7. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Keep holes clear during construction.
   a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
   b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.

D. Fabricate concealed stiffeners and edge channels from either cold- or hot-rolled steel sheet.
E. Hardware Preparation: Factory prepare hollow-metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to SDI A250.6, the Door Hardware Schedule, and templates.
   1. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
   2. Comply with applicable requirements in SDI A250.6 and BHMA A156.115 for preparation of hollow-metal work for hardware.
F. Stops and Moldings: Provide stops and moldings around glazed lites and louvers where indicated. Form corners of stops and moldings with mitered hairline joints.
   1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow-metal work.
   2. Multiple Glazed Lites: Provide fixed and removable stops and moldings so that each glazed lite is capable of being removed independently.
   3. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
   4. Provide loose stops and moldings on inside of hollow-metal work.
   5. Coordinate rabbet width between fixed and removable stops with glazing and installation types indicated.

2.9 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.

2.10 ACCESSORIES
   A. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.
   B. Grout Guards: Formed from same material as frames, not less than 0.016 inch (0.4 mm) thick.

PART 3 - EXECUTION

3.1 EXAMINATION
   A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
   B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.
   C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION
   A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.
   B. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

3.3 INSTALLATION
   A. General: Install hollow-metal work plumb, rigid, properly aligned, and securely fastened in place. Comply with Drawings and manufacturer’s written instructions.
   B. Hollow-Metal Frames: Install hollow-metal frames for doors, transoms, sidelites, borrowed lites, and other openings, of size and profile indicated. Comply with SDI A250.11 or NAAMM-HMMA 840 as required by standards specified.
      1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
         a. At fire-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 stops located on secure side of opening.
d. Install door silencers in frames before grouting.
e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
f. Check plumb, square, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
g. Field apply bituminous coating to backs of frames that will be filled with grout containing antifreezing agents.

2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.
a. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.


4. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.

5. Concrete Walls: Solidly fill space between frames and concrete with mineral-fiber insulation.

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. In-Place Metal or Wood-Stud Partitions: Secure slip-on drywall frames in place according to manufacturer's written instructions.

8. Installation Tolerances: Adjust hollow-metal door frames for squareness, alignment, twist, and plumb to the following tolerances:
a. Squareness: Plus or minus 1/16 inch (1.6 mm), measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
b. Alignment: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a horizontal line parallel to plane of wall.
c. Twist: Plus or minus 1/16 inch (1.6 mm), measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
d. Plumbness: Plus or minus 1/16 inch (1.6 mm), measured at jambs at floor.

C. Hollow-Metal Doors: Fit hollow-metal doors accurately in frames, within clearances specified below. Shim as necessary.

1. Non-Fire-Rated Steel Doors:
a. Between Door and Frame Jambs and Head: 1/8 inch (3.2 mm) plus or minus 1/32 inch (0.8 mm).
b. Between Edges of Pairs of Doors: 1/8 inch (3.2 mm) to 1/4 inch (6.3 mm) plus or minus 1/32 inch (0.8 mm).
c. At Bottom of Door: [3/4 inch (19.1 mm)] [5/8 inch (15.8 mm)] plus or minus 1/32 inch (0.8 mm).
d. Between Door Face and Stop: 1/16 inch (1.6 mm) to 1/8 inch (3.2 mm) plus or minus 1/32 inch (0.8 mm).

2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.

3. Smoke-Control Doors: Install doors and gaskets according to NFPA 105.

D. Glazing: Comply with installation requirements in Section 088000 "Glazing" and with hollow-metal manufacturer's written instructions.

1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches (230 mm) o.c. and not more than 2 inches (51 mm) o.c. from each corner.

3.4 ADJUSTING AND CLEANING

A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow-metal work that is warped, bowed, or otherwise unacceptable.

B. Remove grout and other bonding material from hollow-metal work immediately after installation.

C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.
D. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint according to manufacturer’s written instructions.

E. Touchup Painting: Cleaning and touchup painting of abraded areas of paint are specified in painting Sections.

END OF SECTION
DIVISION 08 – OPENINGS

SECTION 081416 - FLUSH WOOD DOORS

PART 1 - GENERAL

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

1.2 SUMMARY
   A. Section Includes:
      1. Solid-core doors with wood-veneer faces.
      2. Factory finishing flush wood doors.
      3. Factory fitting flush wood doors to frames and factory machining for hardware.
   B. Related Requirements:
      1. Section 064800 "Wood Frames" for wood door frames including fire-rated wood door frames.
      2. Section 088000 "Glazing" for glass view panels in flush wood doors.
      3. Section 099300 "Staining and Transparent Finishing" for field finishing doors.

1.3 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.
   C. Samples for Initial Selection: For factory-finished doors.

1.4 INFORMATIONAL SUBMITTALS
   A. Sample Warranty: For special warranty.
   B. Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.

1.5 DELIVERY, STORAGE, AND HANDLING
   A. Comply with requirements of referenced standard and manufacturer’s written instructions.
   B. Package doors individually in cardboard cartons and wrap bundles of doors in plastic sheeting.
   C. Mark each door on top and bottom rail with opening number used on Shop Drawings.

1.6 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.

PART 2 - PRODUCTS

2.1 MANUFACTURERS
   A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may
      be incorporated into the Work include, but are not limited to the following:
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1. Algoma Hardwoods, Inc.
2. Graham Wood Doors; ASSA ABLOY Group company.
3. Mohawk Flush Doors, Inc.

B. Source Limitations: Obtain flush wood doors from single manufacturer.

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”
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.
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. Temperature-Rise Limit: At vertical exit enclosures and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F (250 deg C) above ambient after 30 minutes of standard fire-test exposure.
3. Cores: Provide core specified or mineral core as needed to provide fire-protection rating indicated.
4. Edge Construction: Provide edge construction with intumescent seals concealed by outer stile. Comply with specified requirements for exposed edges.
   a. Finish steel edges and astragals to match door hardware (locksets or exit devices).
C. Smoke- and Draft-Control Door Assemblies: Listed and labeled for smoke and draft control, based on testing according to UL 1784.
D. Structural-Composite-Lumber-Core Doors:
      a. Screw Withdrawal, Face: 700 lbf (3100 N).
E. 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.
      a. 5-inch (125-mm) top-rail blocking.
      b. 5-inch (125-mm) bottom-rail blocking, in doors indicated to have protection plates.
      c. 5-inch (125-mm) midrail blocking, in doors indicated to have armor plates.
      d. 5-inch (125-mm) midrail blocking, in doors indicated to have exit devices.
   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: Premium, with Grade A faces.
   2. Species: Red oak.
   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. Transom Match: As indicated.
   8. Exposed Vertical and Top Edges: Same species as faces - edge Type A.
   10. Construction: Five or seven plies. Stiles and rails are bonded to core, then entire unit is abrasive planed before veneering.

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2.4 LIGHT FRAMES AND LOUVERS
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 (1.2-mm) 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 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. 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.
C. 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 Section 088000 "Glazing."

2.6 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.
B. Factory finish doors that are indicated to receive transparent finish.
C. Transparent Finish:
   1. Grade: Premium.
   2. Finish: AWI’s, AWMAC’s, and WI’s “Architectural Woodwork Standards” System 9, UV curable, acrylated epoxy, polyester, or urethane or System 11, catalyzed polyurethane.
   3. Staining: As selected by Architect from manufacturer’s full range.
   4. Effect: Semifilled finish, produced by applying an additional finish coat to partially fill the wood pores.
   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 jambs.
   2. Reject doors with defects.
B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION
A. Hardware: For installation, see Section 087100 "Door Hardware."
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B. Installation Instructions: Install doors to comply with manufacturer’s written instructions and referenced quality standard, and as indicated.
   1. Install fire-rated doors according to NFPA 80.
   2. Bevel fire-rated doors 1/8 inch in 2 inches (3-1/2 degrees) at lock edge; trim stiles and rails only to extent permitted by labeling agency.

C. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.
D. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

3.3 ADJUSTING
A. Operation: Rehang or replace doors that do not swing or operate freely.
B. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if Work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION
DIVISION 08 - OPENINGS

SECTION 083613 - SECTIONAL OVERHEAD DOORS

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 SECTION INCLUDES
   A. Insulated Sectional Overhead Doors.
   B. Non-Insulated Sectional Overhead Doors.
   C. Electric Operators and Controls.
   D. Operating Hardware, tracks, and support.

1.3 RELATED SECTIONS
   A. Section 03300 - Cast-In-Place Concrete: Prepared opening in concrete. Execution requirements for placement of anchors in concrete wall construction.
   B. Section 04810 - Unit Masonry Assemblies: Prepared opening in masonry. Execution requirements for placement of anchors in masonry wall construction.
   C. Section 05500 - Metal Fabrications: Steel frame and supports.
   D. Section 06114 - Wood Blocking and Curbing: Rough wood framing and blocking for door opening.
   E. Section 07900 - Joint Sealers: Perimeter sealant and backup materials.
   F. Section 16130 - Raceway and Boxes: Empty conduit from control station to door operator.
   G. Section 16150 - Wiring Connections: Electrical service to door operator.

1.4 REFERENCES

1.5 DESIGN / PERFORMANCE REQUIREMENTS
   A. Wind Loads: Design and size components to withstand loads caused by pressure and suction of wind acting normal to plane of wall as calculated in accordance with applicable code.
      1. Design pressure of 20 lb/sq ft.
   B. Wiring Connections: Requirements for electrical characteristics.
      1. 115 volts, single phase, 60 Hz.
   C. Single-Source Responsibility: Provide doors, tracks, motors, and accessories from one manufacturer for each type of door. Provide secondary components from source acceptable to manufacturer of primary components.

1.6 SUBMITTALS
   A. Submit under provisions of Section 013000.
   B. Product Data: Manufacturer’s data sheets on each product to be used, including:
      1. Preparation instructions and recommendations.
      2. Storage and handling requirements and recommendations.
      3. Installation methods.
   C. Shop Drawings: Indicate plans and elevations including opening dimensions and required tolerances, connection details, anchorage spacing, hardware locations, and installation details.
   D. Manufacturer’s Certificates: Certify products meet or exceed specified requirements.
   E. Operation and Maintenance Data.

1.7 QUALITY ASSURANCE
A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum five years documented experience.
B. Installer Qualifications: Authorized representative of the manufacturer with minimum five years documented experience.
C. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories, Inc. acceptable to authority having jurisdiction as suitable for purpose specified.

1.8 DELIVERY, STORAGE, AND HANDLING
A. Store products in manufacturer’s unopened labeled packaging until ready for installation.
B. Protect materials from exposure to moisture until ready for installation.
C. Store materials in a dry, ventilated weathertight location.

1.9 PROJECT CONDITIONS
A. Pre-Installation Conference: Convene a pre-installation conference just prior to commencement of field operations, to establish procedures to maintain optimum working conditions and to coordinate this work with related and adjacent work.

1.10 WARRANTY
A. Warranty: Manufacturer’s limited door and operators System warranty for 10 year against delamination of polyurethane foam from steel face and all other components for 3 years or 20,000 cycles, whichever comes first.

PART 2 PRODUCTS

2.1 MANUFACTURERS
A. Acceptable Manufacturer: Overhead Door Corp., 2501 S. State Hwy. 121, Suite 200, Lewisville, TX 75067. ASD. Tel. Toll Free: (800) 275-3290. Phone: (469) 549-7100. Fax: (972) 906-1499. Web Site: www.overheaddoor.com. E-mail: sales@overheaddoor.com
B. Requests for substitutions will be considered in accordance with provisions of Section 01600.

2.2 INSULATED SECTIONAL OVERHEAD DOORS
A. Insulated Steel Sectional Overhead Doors: 592 Series Thermacore Insulated Steel Doors by Overhead Door Corporation. Units shall have the following characteristics:
1. Door Assembly: Metal/foam/metal sandwich panel construction, with PVC thermal break and weather-tight ship-lap design meeting joints.
   a. Panel Thickness: 2 inches (51 mm).
   b. Exterior Surface: Ribbed, textured.
   c. Exterior Steel: .015 inch (.38 mm), hot-dipped galvanized.
   d. End Stiles: 16 gauge with thermal break.
   e. Spring Counterbalance: Sized to weight of the door, with a helically wound, oil tempered torsion spring mounted on a steel shaft; cable drum of diecast aluminum with high strength galvanized aircraft cable. Sized with a minimum 7 to 1 safety factor.
      1) High cycle spring: 25,000 cycles.
   f. Insulation: CFC-free and HCFC-free polyurethane, fully encapsulated.
   g. Thermal Values: R-value of 17.50; U-value of 0.057.
   h. Air Infiltration: 0.08 cfm at 15 mph; 0.08 cfm at 25 mph.
   i. Full Glazed Aluminum Sash Panels:
      1) ½” tempered insulating glass.
2. Finish and Color:
   a. Two coat baked-on polyester:
      1) Interior color, white.
3. Windload Design: Provide to meet the Design/Performance requirements specified.
5. Weatherstripping:
   a. EPDM bulb-type strip at bottom section.
   b. Flexible Jamb seals.
   c. Flexible Header seal.

6. Track: Provide track as recommended by manufacturer to suit loading required and clearances available.
   a. Size:
      1) 2 inch (51 mm).
   b. Type:
      1) High lift.

7. Electric Motor Operation: Provide UL listed electric operator, size and type as recommended by manufacturer to move door in either direction at not less than 2/3 foot nor more than 1 foot per second. Operator shall meet UL325/2010 requirements for continuous monitoring of safety devices.
   a. Entrapment Protection: Required for momentary contact, includes radio control operation.
      1) Electric sensing edge monitored to meet UL 325/2010.
      2) Photoelectric sensors monitored to meet UL 325/2010.
   b. Operator Controls:
      1) Push-button operated control stations with open, close, and stop buttons.
      2) Surface mounting.
      3) Interior location.
   c. Special Operation:
      1) Radio control operation.

PART 3 EXECUTION

3.1 EXAMINATION
   A. Do not begin installation until openings have been properly prepared.
   B. Verify wall openings are ready to receive work and opening dimensions and tolerances are within specified limits.
   C. Verify electric power is available and of correct characteristics.
   D. If preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION
   A. Clean surfaces thoroughly prior to installation.
   B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION
   A. Install overhead doors and track in accordance with approved shop drawings and the manufacturer’s printed instructions.
   B. Coordinate installation with adjacent work to ensure proper clearances and allow for maintenance.
   C. Anchor assembly to wall construction and building framing without distortion or stress.
   D. Securely brace door tracks suspended from structure. Secure tracks to structural members only.
   E. Fit and align door assembly including hardware.
   F. Coordinate installation of electrical service. Complete power and control wiring from disconnect to unit components.

3.4 CLEANING AND ADJUSTING
   A. Adjust door assembly to smooth operation and in full contact with weatherstripping.
   B. Clean doors, frames and glass.
   C. Remove temporary labels and visible markings.
3.5 PROTECTION
   A. Do not permit construction traffic through overhead door openings after adjustment and cleaning.
   B. Protect installed products until completion of project.
   C. Touch-up, damaged coatings and finishes and repair minor damage before Substantial Completion.

END OF SECTION
DIVISION 08 – OPENINGS

SECTION 084113 · ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 · GENERAL

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

1.2 SUMMARY
A. Section Includes:
   1. Exterior storefront framing.
   2. Exterior manual-swing entrance doors.
   3. Exterior storefront framed fixed windows.

1.3 ACTION SUBMITTALS
A. Product Data: For each type of product.
   1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
B. Shop Drawings: For aluminum-framed entrances and storefronts. Include plans, elevations, sections, full-size details, and attachments to other work.
   1. Include details of provisions for assembly expansion and contraction and for draining moisture occurring within the assembly to the exterior.
   2. Include full-size isometric details of each vertical-to-horizontal intersection of aluminum-framed entrances and storefronts, showing the following:
      a. Joinery, including concealed welds.
      b. Anchorage.
      c. Expansion provisions.
      d. Glazing.
      e. Flashing and drainage.
   3. Show connection to and continuity with adjacent thermal, weather, air, and vapor barriers.
C. Samples for Initial Selection: For units with factory-applied color finishes.

1.4 CLOSEOUT SUBMITTALS
A. Maintenance Data: For aluminum-framed entrances and storefronts to include in maintenance manuals.

1.5 QUALITY ASSURANCE
A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
B. 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.

1.6 WARRANTY
A. Special Warranty: Installer agrees to repair or replace components of aluminum-framed entrances and storefronts 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, metal finishes, and other materials beyond normal weathering.
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2. Water penetration through fixed glazing and framing areas.  
3. Failure of operating components.

2. Warranty Period: 10 years 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. 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: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. EFCO Corporation.
2. Kawneer North America; an Alcoa company.
3. Tubelite Inc.

B. Source Limitations: Obtain all components of aluminum-framed entrance and storefront system, including framing and accessories, from single manufacturer.

2.2 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.
4. Finish: Baked-enamel or powder-coat finish.
5. Fabrication Method: Field-fabricated stick system.

B. Backer Plates: Manufacturer’s standard, continuous backer plates for framing members, if not integral, where framing abuts adjacent construction.

C. Brackets and Reinforcements: Manufacturer’s standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.

D. Materials:

1. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
   c. Extruded Structural Pipe and Tubes: ASTM B 429/B 429M.
   d. Structural Profiles: ASTM B 308/B 308M.
2. Steel Reinforcement: Manufacturer’s standard zinc-rich, corrosion-resistant primer complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM, and prepare surfaces according to applicable SSPC standard.
   a. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
   b. Cold-Rolled Sheet and Strip: ASTM A 1008/A 1008M.
   c. Hot-Rolled Sheet and Strip: ASTM A 1011/A 1011M.

2.3 ENTRANCE DOOR SYSTEMS

A. Entrance Doors: Manufacturer’s standard glazed entrance doors for manual-swing operation.
1. Door Construction: 1-3/4-inch (44.5-mm) overall thickness, with minimum 0.125-inch (3.2-mm) 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: Medium stile; 3-1/2-inch (88.9-mm) nominal width.

2.4 ENTRANCE DOOR HARDWARE
A. Entrance Door Hardware: Hardware not specified in this Section is specified in Section 087100 “Door Hardware.”
   1. Entrance Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and products complying with BHMA standard referenced.
   2. Sequence of Operation: Provide electrified door hardware function, sequence of operation, and interface with other building control systems indicated.
   3. Opening-Force Requirements:
      a. Egress Doors: Not more than 15 lbf (67 N) to release the latch and not more than 30 lbf (133 N) to set the door in motion.
      b. Accessible Interior Doors: Not more than 5 lbf (22.2 N) to fully open door.
B. Designations: Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of entrance door hardware are indicated in "Entrance Door Hardware Sets" Article. Products are identified by using entrance door hardware designations as follows:
   1. Named Manufacturers’ Products: Manufacturer and product designation are listed for each door hardware type required for the purpose of establishing minimum requirements. Manufacturers’ names are abbreviated in "Entrance Door Hardware Sets" Article.
   2. References to BHMA Standards: Provide products complying with these standards and requirements for description, quality, and function.
C. Weather Stripping: Manufacturer’s standard replaceable components.
   1. Compression Type: Made of ASTM D 2000, molded neoprene, or ASTM D 2287, molded PVC.

2.5 GLAZING
A. Glazing: Comply with Section 088000 "Glazing."
B. Glazing Gaskets: Manufacturer’s standard sealed-corner pressure-glazing system of black, resilient elastomeric glazing gaskets, setting blocks, and shims or spacers.
C. Glazing Sealants: As recommended by manufacturer.
D. Weatherseal Sealants: ASTM C 920 for Type S; Grade NS; Class 25; Uses NT, G, A, and O; chemically curing silicone formulation that is compatible with structural sealant and other system components with which it comes in contact; recommended by structural-sealant, weatherseal-sealant, and structural-sealant-glazed storefront manufacturers for this use.

2.6 ACCESSORIES
A. Fasteners and Accessories: Manufacturer’s standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.
   1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
   2. Reinforce members as required to receive fastener threads.
   3. Use exposed fasteners with countersunk Phillips screw heads, finished to match framing system.
B. Anchors: Three-way adjustable anchors with minimum adjustment of 1 inch (25.4 mm) that accommodate fabrication and installation tolerances in material and finish compatible with adjoining materials and recommended by manufacturer.
C. Concealed Flashing: Manufacturer’s standard corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials.
D. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for 30-mil (0.762-mm) thickness per coat.
2.7 FABRICATION
A. Form or extrude aluminum shapes before finishing.
B. Fabricate components that, when assembled, have the following characteristics:
   1. Profiles that are sharp, straight, and free of defects or deformations.
   2. Accurately fitted joints with ends cope or mitered.
   3. Physical and thermal isolation of glazing from framing members.
   4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
   5. Provisions for field replacement of glazing from interior.
   6. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
C. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.
D. Structural-Sealant-Glazed Framing Members: Include accommodations for using temporary support device to retain glazing in place while structural sealant cures.
E. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.
   1. At exterior doors, provide compression weather stripping at fixed stops.
F. Entrance Doors: Reinforce doors as required for installing entrance door hardware.
   1. At pairs of exterior doors, provide sliding-type weather stripping retained in adjustable strip and mortised into door edge.
   2. At exterior doors, provide weather sweeps applied to door bottoms.
G. Entrance Door Hardware Installation: Factory install entrance door hardware to the greatest extent possible. Cut, drill, and tap for factory-installed entrance door hardware before applying finishes.
H. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.8 ALUMINUM FINISHES
A. Color Anodic Finish: AAMA 611, AA-M12C22A32/A34, Class II, 0.010 mm or thicker.
   1. Color: Dark bronze.

2.9 SOURCE QUALITY CONTROL
A. Structural Sealant: Perform quality-control procedures complying with ASTM C 1401 recommendations including, but not limited to, assembly material qualification procedures, sealant testing, and assembly fabrication reviews and checks.

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. Seal perimeter and other joints watertight unless otherwise indicated.
B. Metal Protection:
1. Where aluminum is in contact with dissimilar metals, protect against galvanic action by painting contact surfaces with materials recommended by manufacturer for this purpose or by installing nonconductive spacers.
2. Where aluminum is in contact with concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
C. Set continuous sill members and flashing in full sealant bed as specified in Section 079200 "Joint Sealants" to produce weathertight installation.
D. Install components plumb and true in alignment with established lines and grades.
E. Install operable units level and plumb, securely anchored, and without distortion. Adjust weather-stripping contact and hardware movement to produce proper operation.
F. Install glazing as specified in Section 088000 "Glazing."
G. Entrance Doors: Install doors to produce smooth operation and tight fit at contact points.
1. Exterior Doors: Install to produce weathertight enclosure and tight fit at weather stripping.
2. Field-Installed Entrance Door Hardware: Install surface-mounted entrance door hardware according to entrance door hardware manufacturers’ written instructions using concealed fasteners as possible.

3.3 ERECTION TOLERANCES
A. Erection Tolerances: Install aluminum-framed entrances and storefronts to comply with the following maximum tolerances:
1. Plumb: 1/8 inch in 10 feet (3.2 mm in 3 m); 1/4 inch in 40 feet (6.35 mm in 12.2 m).
2. Level: 1/8 inch in 20 feet (3.2 mm in 6 m); 1/4 inch in 40 feet (6.35 mm in 12.2 m).
3. Alignment:
   a. Where surfaces abut in line or are separated by reveal or protruding element up to 1/2 inch (12.7 mm) wide, limit offset from true alignment to 1/16 inch (1.6 mm).
   b. Where surfaces are separated by reveal or protruding element from 1/2 to 1 inch (12.7 to 25.4 mm) wide, limit offset from true alignment to 1/8 inch (3.2 mm).
   c. Where surfaces are separated by reveal or protruding element of 1 inch (25.4 mm) wide or more, limit offset from true alignment to 1/4 inch (6 mm).
4. Location: Limit variation from plane to 1/8 inch in 12 feet (3.2 mm in 3.6 m); 1/2 inch (12.7 mm) over total length.
DIVISION 08 – OPENINGS

SECTION 085668 – BULLET-RESISTANT STAINLESS STEEL TRANSACTION WINDOWS

PART 1 GENERAL

1.1 SUMMARY
   A. Section Includes:
      1. Bullet-resistant stainless steel transaction window assemblies.
   B. Related Sections:
      1. Division 01: Administrative, procedural, and temporary work requirements.

1.2 REFERENCES
   A. American Welding Society (AWS) D1.6/D1.6M - Structural Welding Code - Stainless Steel.
   B. ASTM International (ASTM) A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
   C. Underwriters Laboratories (UL) 752 - Bullet Resisting Equipment.

1.3 SYSTEM DESCRIPTION
   A. Design Requirements:
      1. Provide window frames of “non-ricochet type” intended to permit capture and retention of attacking projectile, lessening potential of random injury or lateral penetration.
      2. Two way "natural voice" communication permitted by design of vertical side frames and glazing technique.

1.4 SUBMITTALS
   A. Submittals for Review:
      1. Shop Drawings: Include window profiles and sizes, type and spacing of frame anchors, reinforcement size and locations, details of joints and connections, and welding details.
      2. Product Data: Include product description for window assemblies including bullet-resistant ratings.
   B. Closeout Submittals:
      1. Maintenance Data: Include instructions for cleaning of glazed panels.

1.5 QUALITY ASSURANCE
   A. Transaction Window Assemblies: Ballistic Level 3, tested to UL 752.

1.6 DELIVERY, STORAGE AND HANDLING
   A. Store window assemblies upright in protected, dry area, off ground or floor, with at least 1/4 inch space between individual units.
   B. Do not cover with non vented coverings that create excessive humidity.
   C. Remove wet coverings immediately.

PART 2 PRODUCTS

2.1 MANUFACTURERS
   B. Substitutions: Under provisions of Division 01.

2.2 MATERIALS
   A. Stainless Steel Sheet:
      1. ASTM A666, cold rolled, free from scale, pitting, coil breaks, and other surface defects.
   B. Ballistic Steel: Hi-Hard Ballistic Steel, of UL Ballistic Level equal to specified frame ballistic protection level.
C. Glazing:
   1. UL Listed Multi-ply polycarbonate.
   2. Bottom edge of glazing panel provided with 18 gage stainless steel cap.

2.3 FABRICATION
A. Frames:
   1. Fabricate from 12 gage stainless steel lined with ballistic steel.
   2. Weld frame corners; knock-down and mechanical joints not acceptable.
   3. Frame modules capable of being joined with other frame modules to form continuous line.
   4. Install glass in frames at factory.
B. Shelf: Minimum 2 inches thick with recessed dip tray, full width of window x minimum 12 inches deep, centered under glazing, covered with 18 gage stainless steel.
C. Dip Tray: Model RMDT1016, 16 gage stainless steel, 10 x 16 inches to outside edge of flanges, clear 1-5/8 inch open depth under glazing.
D. Welding: In accordance with AWS D1.6/D1.6M. Grind exposed welds flush and smooth.
E. Finish work neat and free from defects.
F. Allowable Tolerances: Plus or minus 1/16 inch for frame opening width, height, diagonal dimensions, and overall width and height (outside to outside).

2.4 FINISHES
A. Stainless Steel: No. 3 brushed finish.

2.5 Voice Port Covers / Speakers:
A. Provide passive voice with ballistic steel voice port in glazing.

PART 3 EXECUTION
3.1 INSTALLATION
A. Install window assemblies in accordance with manufacturer’s instructions and approved Shop Drawings.
B. Set plumb, square, and level.
C. Secure to adjacent construction using fastener type best suited to application.
D. Field alterations to window assemblies not permitted unless approved in advance by manufacturer and Architect.
PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY
A. This Section includes commercial door hardware for the following:
1. Swinging doors.
2. Sliding doors.
3. Other doors to the extent indicated.
B. Door hardware includes, but is not necessarily limited to, the following:
1. Mechanical door hardware.
2. Electromechanical door hardware.
3. Cylinders specified for doors in other sections.
C. Related Sections:
1. Division 08 Section “Door Hardware Schedule”.
2. Division 08 Section “Hollow Metal Doors and Frames”.
3. Division 08 Section “Flush Wood Doors”.
4. Division 08 Section “Access Control Hardware”.
D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.
6. NFPA 105 - Installation of Smoke Door Assemblies.
7. State Building Codes, Local Amendments.
E. Standards: All hardware specified herein shall comply with the following industry standards:
1. ANSI/BHMA Certified Product Standards - A156 Series
2. UL10C – Positive Pressure Fire Tests of Door Assemblies

1.3 SUBMITTALS
A. Product Data: Manufacturer’s product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.
B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
1. Format: Comply with scheduling sequence and vertical format in DHI’s “Sequence and Format for the Hardware Schedule.”
2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.
3. Content: Include the following information:
   a. Type, style, function, size, label, hand, and finish of each door hardware item.
   b. Manufacturer of each item.
   c. Fastenings and other pertinent information.
SPECIFICATIONS: Farley Municipal Building
206 1st Street N., Farley, Iowa 52046
ARCHITECT PROJECT #1728.01

d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
e. Explanation of abbreviations, symbols, and codes contained in schedule.
f. Mounting locations for door hardware.
g. Door and frame sizes and materials.
h. Warranty information for each product.

4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.

C. Shop Drawings: Details of electrified access control hardware indicating the following:
1. Wiring Diagrams: Upon receipt of approved schedules, submit detailed system wiring diagrams for power, signaling, monitoring, communication, and control of the access control system electrified hardware. Differentiate between manufacturer-installed and field-installed wiring. Include the following:
   a. Elevation diagram of each unique access controlled opening showing location and interconnection of major system components with respect to their placement in the respective door openings.
   b. Complete (risers, point-to-point) access control system block wiring diagrams.
   c. Wiring instructions for each electronic component scheduled herein.

2. Electrical Coordination: Coordinate with related sections the voltages and wiring details required at electrically controlled and operated hardware openings.

D. Keying Schedule: After a keying meeting with the owner has taken place prepare a separate keying schedule detailing final instructions. Submit the keying schedule in electronic format. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner must approve submitted keying schedule prior to the ordering of permanent cylinders/cores.

E. Informational Submittals:
1. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.

F. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Submittals.

1.4 QUALITY ASSURANCE
A. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.
B. Installer Qualifications: A minimum 3 years documented experience installing both standard and electrified door hardware 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.
C. Door Hardware Supplier Qualifications: Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor by the manufacturers of the primary materials with a warehousing facility in Project’s vicinity. Supplier to have on staff a certified Architectural Hardware Consultant (AHC) available during the course of the Work to consult with Contractor, Architect, and Owner concerning both standard and electromechanical door hardware and keying.
D. Source Limitations: Obtain each type and variety of door hardware specified in this section from a single source unless otherwise indicated.
   1. Electrified modifications or enhancements made to a source manufacturer’s product line by a secondary or third party source will not be accepted.
2. Provide electromechanical door hardware from the same manufacturer as mechanical door hardware, unless otherwise indicated.

E. Severe Storm Shelter Openings: Provide complete door systems for hurricane or tornado resistant storm shelters and other areas of refuge complying and tested according to FEMA P-361 (2015), Design and Construction Guidance for Community Safe Rooms; and ICC 500 (2014), ICC/NSSA Standard for the Design and Construction of Storm Shelters.

F. Each unit to bear third party permanent label demonstrating compliance with the referenced standards.

G. Keying Conference: Conduct conference to comply with requirements in Division 01 Section “Project Meetings.” Keying conference to incorporate the following criteria into the final keying schedule document:
   1. Function of building, purpose of each area and degree of security required.
   2. Plans for existing and future key system expansion.
   3. Requirements for key control storage and software.
   4. Installation of permanent keys, cylinder cores and software.
   5. Address and requirements for delivery of keys.

H. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section “Project Meetings” with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.
   1. Prior to installation of door hardware, conduct a project specific training meeting to instruct the installing contractors’ personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware (including electromechanical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.
   2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.
   3. Review sequence of operation narratives for each unique access controlled opening.
   4. Review and finalize construction schedule and verify availability of materials.
   5. Review the required inspecting, testing, commissioning, and demonstration procedures

I. At completion of installation, provide written documentation that components were applied to manufacturer's instructions and recommendations and according to approved schedule.

1.5 DELIVERY, STORAGE, AND HANDLING
   A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.
   B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.
   C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the “Keying Conference”.

1.6 COORDINATION
   A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.
   B. Door Hardware and Electrical Connections: Coordinate the layout and installation of scheduled electrified door hardware and related access control equipment with required connections to source power junction boxes, low voltage power supplies, detection and monitoring hardware, and fire and detection alarm systems.
   C. Door and Frame Preparation: Doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.
1.7 WARRANTY

A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:
   1. Structural failures including excessive deflection, cracking, or breakage.
   2. Faulty operation of the hardware.
   3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
   4. Electrical component defects and failures within the systems operation.

C. Standard Warranty Period: One year from date of Substantial Completion, unless otherwise indicated.

D. Special Warranty Periods:
   1. Seven years for heavy duty cylindrical (bored) locks and latches.
   2. Five years for exit hardware.
   3. Five years for motorized electric latch retraction exit devices.
   4. Two years for electromechanical door hardware.

1.8 MAINTENANCE SERVICE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner’s continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

A. General: Provide door hardware for each door to comply with requirements in Door Hardware Sets and each referenced section that products are to be supplied under.

B. Designations: Requirements for quantity, item, size, finish or color, grade, function, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Sets at the end of Part 3. Products are identified by using door hardware designations, as follows:
   1. Named Manufacturer’s Products: Product designation and manufacturer are listed for each door hardware type required for the purpose of establishing requirements. Manufacturers’ names are abbreviated in the Door Hardware Schedule.

C. Substitutions: Requests for substitution and product approval for inclusive mechanical and electromechanical door hardware in compliance with the specifications must be submitted in writing and in accordance with the procedures and time frames outlined in Division 01, Substitution Procedures. Approval of requests is at the discretion of the architect, owner, and their designated consultants.

2.2 HANGING DEVICES

A. Hinges: ANSI/BHMA A156.1 certified butt hinges with number of hinge knuckles and other options as specified in the Door Hardware Sets.
   1. Quantity: Provide the following hinge quantity:
      a. Two Hinges: For doors with heights up to 60 inches.
      b. Three Hinges: For doors with heights 61 to 90 inches.
      c. Four Hinges: For doors with heights 91 to 120 inches.
      d. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.
   2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:
SPECIFICATIONS: Farley Municipal Building
206 1st Street N., Farley, Iowa 52046
ARCHITECT PROJECT #1728.01

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a. Widths up to 3’0”: 4-1/2” standard or heavy weight as specified.
b. Sizes from 3’1” to 4’0”: 5” standard or heavy weight as specified.

3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:
a. Exterior Doors: Heavy weight, non-ferrous, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate standard weight.
b. Interior Doors: Standard weight, steel, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate heavy weight.

4. Hinge Options: Comply with the following:
a. Non-removable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for the all out-swinging lockable doors.

5. Manufacturers:
a. Ives (IV).
b. McKinney Products; ASSA ABLOY Architectural Door Accessories (MK).
c. Stanley Hardware (ST).

B. Continuous Geared Hinges: ANSI/BHMA A156.26 Grade 1-600 certified continuous geared hinge. with minimum 0.120-inch thick extruded 6060 T6 aluminum alloy hinge leaves and a minimum overall width of 4 inches. Hinges are non-handed, reversible and fabricated to template screw locations. Factory trim hinges to suit door height and prepare for electrical cut-outs.

1. Manufacturers:
a. Ives (IV).
b. McKinney Products; ASSA ABLOY Architectural Door Accessories (MK).
c. Pemko Products; ASSA ABLOY Architectural Door Accessories (PE).

2.3 POWER TRANSFER DEVICES

A. Concealed Quick Connect Electric Power Transfers: Provide concealed wiring pathway housing mortised into the door and frame for low voltage electrified door hardware. Furnish with Molex™ standardized plug connectors and sufficient number of concealed wires (up to 12) to accommodate the electrified functions specified in the Door Hardware Sets. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Wire nut connections are not acceptable.

1. Manufacturers:
a. Pemko Products; ASSA ABLOY Architectural Door Accessories (PE) – EL-CEPT Series.
b. Securitron (SU) - EL-CEPT Series.
c. Von Duprin (VD) - EPT-10 Series.

B. Electric Door Wire Harnesses: Provide electric/data transfer wiring harnesses with standardized plug connectors to accommodate up to twelve (12) wires. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Provide sufficient number and type of concealed wires to accommodate electric function of specified hardware. Provide a connector for through-door electronic locking devices and from hinge to junction box above the opening. Wire nut connections are not acceptable. Determine the length required for each electrified hardware component for the door type, size and construction, minimum of two per electrified opening.

1. Provide one each of the following tools as part of the base bid contract:
a. McKinney Products; ASSA ABLOY Architectural Door Accessories (MK) - Electrical Connecting Kit: QCR001.
b. Von Duprin (VD) – Electrical Connecting Kit.
c. McKinney Products; ASSA ABLOY Architectural Door Accessories (MK) - Connector Hand Tool: QC-R003.
d. Von Duprin (VD) – Connector Hand Tool.

2. Manufacturers:
b. Von Duprin (VD) – Connect Series.

C. Provide mortar guard enclosure on steel frames installed at masonry openings for each electrical hinge specified.
2.4 DOOR OPERATING TRIM

A. Door Push Plates and Pulls: ANSI/BHMA A156.6 certified door pushes and pulls of type and design specified in the Hardware Sets. Coordinate and provide proper width and height as required where conflicting hardware dictates.
   1. Push/Pull Plates: Minimum .050 inch thick, size as indicated in hardware sets, with beveled edges, secured with exposed screws unless otherwise indicated.
   2. Offset Pull Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door and offset of 90 degrees unless otherwise indicated.
   3. Fasteners: Provide manufacturer’s designated fastener type as indicated in Hardware Sets.

B. Manufacturers:
   a. Ives (IV).
   b. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).
   c. Trimco (TC).

2.5 CYLINDERS AND KEYING

A. General: Cylinder manufacturer to have minimum (10) years experience designing secured master key systems and have on record a published security keying system policy.

B. Source Limitations: Obtain each type of keyed cylinder and keys from the same source manufacturer as locksets and exit devices, unless otherwise indicated.

C. Cylinders: Original manufacturer cylinders complying with the following:
   1. Mortise Type: Threaded cylinders with rings and cams to suit hardware application.
   2. Rim Type: Cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
   3. Bored-Lock Type: Cylinders with tailpieces to suit locks.
   4. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.
   5. Keyway: Manufacturer’s Standard.

D. Patented Cylinders: ANSI/BHMA A156.5, Grade 1, certified cylinders employing a utility patented and restricted keyway requiring the use of patented controlled keys. Provide bump resistant, fixed core cylinders as standard with solid recessed cylinder collars. Cylinders are to be factory keyed where permanent keying records will be established and maintained.
   1. Provide a 6 pin multi-level master key system comprised of patented controlled keys and security and high security cylinders operated by one (1) key of the highest level. Geographical exclusivity to be provided for all security and high security cylinders and UL437 certification where specified.
      a. Level 1 Cylinders: Provide utility patented controlled keyway cylinders that are furnished with patented keys available only from authorized distribution.
      b. Refer to hardware sets for specified levels.

E. Keying System: Each type of lock and cylinders to be factory keyed.
   1. Conduct specified "Keying Conference" to define and document keying system instructions and requirements.
   2. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner.
   3. New System: Key locks to a new key system as directed by the Owner.

F. Key Quantity: Provide the following minimum number of keys:
   1. Change Keys per Cylinder: Two (2)
   2. Master Keys (per Master Key Level/Group): Five (5).

G. Construction Keying: Provide construction master keyed cylinders.

H. Key Registration List (Bitting List):
1. Provide keying transcript list to Owner’s representative in the proper format for importing into key control software.

2. Provide transcript list in writing or electronic file as directed by the Owner.

I. Key Control Cabinet: Provide a key control system including envelopes, labels, and tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet. Key control cabinet shall have expansion capacity of 150% of the number of locks required for the project.

1. Manufacturers:
   a. Lund Equipment (LU).
   b. MMF Industries (MM).
   c. Telkee (TK).

2.6 MECHANICAL LOCKS AND LATCHING DEVICES

A. Multi-Point Locksets, FEMA: Three-point locking system device engineered for in-swinging and out-swinging door applications on windstorm safe shelter rooms. Extra heavy duty steel component construction securing the door to the frame at top, bottom and center latch positions. All three latching points are automatically activated when the device is locked. Multi-Point Deadlocking System shall be used only with doors, frames and associated hardware that have been engineered, tested and approved for a complete opening assembly system.

1. ANSI-BHMA listed to A156.37 Grade 1 for multi-point locks:
   a. Lever torque to retract all bolts less than 28 in.lb.
   b. Cycle tested to 800,000 cycles.

2. NFPA 80 and NFPA 101 life safety requirements.

3. UL10B or UL10C, 3-hour fire rated openings.

4. Latchbolt Construction:
   a. Center Bolt to be one piece, ¾” throw anti-friction stainless steel latch and one piece, 1” throw, hardened stainless steel deadbolt; 2-3/4” standard backset.
   b. Top and Bottom Bolts to be ¾” x ¾” stainless steel square latchbolt with ¾” projection.

5. Independent top and bottom bolt projection shall be field adjustable:
   a. From the center mortise pocket.
   b. Ability to make field adjustments while the door is in the hung position without the removal of the door.
   c. Top and Bottom Bolts and the Center Mortise Case shall be factory installed into the door assembly.

6. Bottom strike shall be offset and reversible to accommodate alignment issues due to rough opening tolerances.

7. Devices must be able to accommodate sectional rose and lever trim to match the design style and architectural finishes of the balance of the lockset and latches as specified.

8. Devices must be available with electronic access control options for higher or everyday use and traceability.

9. Devices must be available with rod-dogging indicator options:
   a. Operated by single-point latching for non-emergency or normal use of the space.
   b. Ability to hold rods in a retracted state.
   c. Day-to-day operations with mortise lock only.
   d. Indicator to show status.

10. Manufacturers:
    a. Corbin Russwin Hardware (RU) - FE6600 Series.
    b. Sargent Manufacturing (SA) - FM7300 Series.
    c. VonDuprin (VD) – Equivalent Tornado Multi Point Lock.

B. Cylindrical Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.2, Series 4000, Grade 1 certified.

1. Furnish with solid cast levers, standard 2 3/4” backset, and 1/2” (3/4” at rated paired openings) throw brass or stainless steel latchbolt.
2. Locks are to be non-handed and fully field reversible.
3. Extended cycle test: Locks to have been cycle tested in accordance with ANSI/BHMA 156.2 requirements to 2 million cycles.
4. Manufacturers:
   a. Corbin Russwin Hardware (RU) – CL3300 Series.
   b. Sargent Manufacturing (SA) – 10 Line.
   c. Schlage (SC) – ND Series.

2.7 LOCK AND LATCH STRIKES
A. Strikes: Provide 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, unless otherwise indicated, and as follows:
   1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
   2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
   3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.
   4. Double-lipped strikes: For locks at double acting doors. Furnish with retractable stop for rescue hardware applications.
B. Standards: Comply with the following:
   2. Strikes for Bored Locks and Latches: BHMA A156.2.
   3. Strikes for Auxiliary Deadlocks: BHMA A156.36.

2.8 ELECTRIC STRIKES
A. Standard Electric Strikes: Heavy duty, cylindrical and mortise lock electric strikes conforming to ANSI/BHMA A156.31, Grade 1, UL listed for both Burglary Resistance and for use on fire rated door assemblies. Stainless steel construction with dual interlocking plunger design tested to exceed 3000 lbs. of static strength and 350 ft-lbs. of dynamic strength. Strikes tested for a minimum 1 million operating cycles. Provide strikes with 12 or 24 VDC capability and supplied standard as fail-secure unless otherwise specified. Provide latchbolt and latchbolt strike monitoring indicating both the position of the latchbolt and locked condition of the strike where specified.
   1. Manufacturers:
      a. Folger Adam EDC (FO).
      b. HES (HS).
      c. Von Duprin (VD).
B. Surface Mounted Rim Electric Strikes: Surface mounted rim exit device electric strikes conforming to ANSI/BHMA A156.31, Grade 1, and UL Listed for both Burglary Resistance and for use on fire rated door assemblies. Construction includes internally mounted solenoid with two heavy-duty, stainless steel locking mechanisms operating independently to provide tamper resistance. Strikes tested for a minimum of 500,000 operating cycles. Provide strikes with 12 or 24 VDC capability supplied standard as fail-secure unless otherwise specified. Option available for latchbolt and latchbolt strike monitoring indicating both the position of the latchbolt and locked condition of the strike. Strike requires no cutting to the jamb prior to installation.
   1. Manufacturers:
      a. HES (HS) - 9400 Series
      b. HES (HS) - 9500/9600 Series.
C. Provide electric strikes with in-line power controller and surge suppressor by the same manufacturer as the strike with the combined products having a five year warranty.

2.9 CONVENTIONAL EXIT DEVICES
A. General Requirements: All exit devices specified herein shall meet or exceed the following criteria:
1. At doors not requiring a fire rating, provide devices complying with NFPA 101 and listed and labeled for "Panic Hardware" according to UL305. Provide proper fasteners as required by manufacturer including sex nuts and bolts at openings specified in the Hardware Sets.

2. Where exit devices are required on fire rated doors, provide devices complying with NFPA 80 and with UL labeling indicating "Fire Exit Hardware". Provide devices with the proper fasteners for installation as tested and listed by UL. Consult manufacturer’s catalog and template book for specific requirements.

3. Except on fire rated doors, provide exit devices with hex key dogging device to hold the pushbar and latch in a retracted position. Provide optional keyed cylinder dogging on devices where specified in Hardware Sets.

4. Devices must fit flat against the door face with no gap that permits unauthorized dogging of the push bar. The addition of filler strips is required in any case where the door light extends behind the device as in a full glass configuration.

5. Electromechanical Options: Subject to same compliance standards and requirements as mechanical exit devices, electrified devices to be of type and design as specified in hardware sets. Include any specific controllers when conventional power supplies are not sufficient to provide the proper inrush current.

   a. Lock Trim Design: As indicated in Hardware Sets, provide finishes and designs to match that of the specified locksets.
   b. Where function of exit device requires a cylinder, provide a cylinder (Rim or Mortise) as specified in Hardware Sets.

7. Vertical Rod Exit Devices: Where surface or concealed vertical rod exit devices are used at interior openings, provide as less bottom rod (LBR) unless otherwise indicated. Provide dust proof strikes where thermal pins are required to project into the floor.

8. Narrow Stile Applications: At doors constructed with narrow stiles, or as specified in Hardware Sets, provide devices designed for maximum 2” wide stiles.


10. Extended cycle test: Devices to have been cycle tested in ordinance with ANSI/BHMA 156.3 requirements to 9 million cycles.

11. Rail Sizing: Provide exit device rails factory sized for proper door width application.

12. Through Bolt Installation: For exit devices and trim as indicated in Door Hardware Sets.

B. Conventional Push Rail Exit Devices (Heavy Duty): ANSI/BHMA A156.3, Grade 1 certified panic and fire exit hardware devices furnished in the functions specified in the Hardware Sets. Exit device latch to be stainless steel, pullman type, with deadlock feature.

1. Manufacturers:
   a. Corbin Russwin Hardware (RU) - ED4000 / ED5000 Series.
   b. Sargent Manufacturing (SA) - 80 Series.
   c. Von Duprin (VD) - 35A/98 XP Series.

2.10 DOOR CLOSERS

A. All door closers specified herein shall meet or exceed the following criteria:

1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers including installation and adjusting information on inside of cover.

2. Standards: Closers to comply with UL-10C for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.

3. Cycle Testing: Provide closers which have surpassed 15 million cycles in a test witnessed and verified by UL.

4. Size of Units: Comply with manufacturer’s written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers
are indicated for doors required to be accessible to the physically handicapped, provide units complying with ANSI ICC/A117.1.

5. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.

6. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics.

7. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates as required for proper installation. Provide through-bolt and security type fasteners as specified in the hardware sets.

B. Door Closers, Surface Mounted (Large Body Cast Iron): ANSI/BHMA A156.4, Grade 1 surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control.

1. Manufacturers:
   a. Corbin Russwin Hardware (RU) - DC8000 Series.
   b. LCN Closers (LC) - 4040XP Series.
   c. Norton Door Controls (NO) – 9500 Series.
   d. Sargent Manufacturing (SA) - 281 Series.

C. Door Closers, Surface Mounted (Commercial Duty): ANSI/BHMA 156.4, Grade 1 certified surface mounted, institutional grade door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable backcheck, closing sweep, and latch speed control valves. Provide non-handed units standard.

1. Manufacturers:
   a. Corbin Russwin Hardware (RU) - DC6000 Series.
   b. LCN Closers (LC) – 1450 Series.
   c. Norton Door Controls (NO) - 8500 Series.
   d. Sargent Manufacturing (SA) - 1431 Series.

2.11 ARCHITECTURAL TRIM

A. Door Protective Trim

1. General: Door protective trim units to be of type and design as specified below or in the Hardware Sets.

2. Size: Fabricate protection plates (kick, armor, or mop) not more than 2" less than door width (LDW) on stop side of single doors and 1" LDW on stop side of pairs of doors, and not more than 1" less than door width on pull side. Coordinate and provide proper width and height as required where conflicting hardware dictates. Height to be as specified in the Hardware Sets.

3. Where plates are applied to fire rated doors with the top of the plate more than 16" above the bottom of the door, provide plates complying with NFPA 80. Consult manufacturer’s catalog and template book for specific requirements for size and applications.

4. Protection Plates: ANSI/BHMA A156.6 certified protection plates (kick, armor, or mop), fabricated from the following:
   a. Stainless Steel: 300 grade, 050-inch thick.

5. Options and fasteners: Provide manufacturer’s designated fastener type as specified in the Hardware Sets. Provide countersunk screw holes.

6. Manufacturers:
   a. Ives (IV).
   b. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).
   c. Trimco (TC).

2.12 DOOR STOPS AND HOLDERS

A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.
B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 certified door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.
   1. Manufacturers:
      a. Ives (IV).
      b. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).
      c. Trimco (TC).

C. Overhead Door Stops and Holders: ANSI/BHMA A156.6, Grade 1 certified overhead stops and holders to be surface or concealed types as indicated in Hardware Sets. Track, slide, arm and jamb bracket to be constructed of extruded bronze and shock absorber spring of heavy tempered steel. Provide non-handed design with mounting brackets as required for proper operation and function.
   1. Manufacturers:
      a. Glynn Johnson (GJ).
      b. Rixson Door Controls (RF).
      c. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).
      d. Sargent Manufacturing (SA).

2.13 ARCHITECTURAL SEALS

A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.

B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.
   1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.

C. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.

D. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated.

E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.

F. Manufacturers:
   1. Pemko Products; ASSA ABLOY Architectural Door Accessories (PE).
   2. Reese Enterprises, Inc. (RE).

2.14 ELECTRONIC ACCESSORIES

A. Power Supplies: Provide Nationally Recognized Testing Laboratory Listed 12VDC or 24VDC (field selectable) filtered and regulated power supplies. Include battery backup option with integral battery charging capability in addition to operating the DC load in event of line voltage failure. Provide the least number of units, at the appropriate amperage level, sufficient to exceed the required total draw for the specified electrified hardware and access control equipment.
   1. Manufacturers:
      a. Security Door Controls (SD) · 630 Series.
      b. Securitron (SU) · BPS Series.
      c. Von Duprin (VD) · PS.
2.15 FABRICATION
A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

2.16 FINISHES
A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.
B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer’s standards, but in no case less than specified by referenced standards for the applicable units of hardware.
C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION
A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.
B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.2 PREPARATION
A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.

3.3 INSTALLATION
A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer’s written instructions and according to specifications.
   1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.
B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:
   2. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
   3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."
   4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.
C. Retrofitting: Install door hardware to comply with manufacturer’s published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.
D. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."
E. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.
3.4 FIELD QUALITY CONTROL
   A. Field Inspection: Supplier will perform a final inspection of installed door hardware and state in report whether work complies with or deviates from requirements, including whether door hardware is properly installed, operating and adjusted.

3.5 ADJUSTING
   A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

3.6 CLEANING AND PROTECTION
   A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.
   B. Clean adjacent surfaces soiled by door hardware installation.
   C. Clean operating items as necessary to restore proper finish. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

3.7 DEMONSTRATION
   A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

3.8 DOOR HARDWARE SETS
   A. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.
   B. The supplier is responsible for handing and sizing all products and providing the correct option for the appropriate door type and material where more than one is presented in the hardware sets. Quantities listed are for each pair of doors, or for each single door.
   C. Manufacturer's Abbreviations:

   1. MK - McKinney
   2. PE - Pemko
   3. SA - SARGENT
   4. HS - HES
   5. RO - Rockwood
   6. RF - Rixson
   7. SU - Securitron
   8. OT - OTHER
### Hardware Sets

#### Set: 1.0

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<tr>
<th>Description</th>
<th>Model/Details</th>
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<tbody>
<tr>
<td>1 Continuous Hinge</td>
<td>DFM83SLI-HD1</td>
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<tr>
<td>1 Exit Device (nightlatch)</td>
<td>DG1 AD8504 Less Pull</td>
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<td>1 Pull</td>
<td>RM201 Mtg-Type 1XHD</td>
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<td>1 Conc Overhead Stop</td>
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<tr>
<td>1 Door Closer</td>
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<td>1 Drop Plate</td>
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<td>1 Threshold</td>
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<tr>
<td>1 Rain Guard</td>
<td>346D TKSP</td>
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<tr>
<td>1 Door Sweep</td>
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Notes: Exit device to be dogged down for push/pull operation. Weather stripping by aluminum frame mfg.

#### Set: 2.0

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<td>1 Surf Overhead Stop</td>
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<td>1 Continuous Hinge</td>
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<td>1 Exit Device (nightlatch)</td>
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<td>1 Electric Strike</td>
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<tr>
<td>1 Spacer</td>
<td>9600-108 (qty as required)</td>
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<td>1 SMART Pac Bridge Rectifier</td>
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<td>Door Closer</td>
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<td>Set Of Wiring Diagrams</td>
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Notes: Door normally closed, latched and secure. Free egress at all times. Entry by card reader releases electric strike allowing door to be pulled open. Door position switch, request to exit switch and electrical wiring by security contractor. Weather stripping by aluminum frame mfg.

**Set: 4.0**

Doors: 105A

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<td>US10BE SA</td>
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<td>Exit Device (exit only)</td>
<td>AD8410</td>
<td>US10BE SA</td>
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<td>RM201 Mtg-Type 1XHD</td>
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<td>613E RF</td>
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Notes: Exit devices to be dogged down for push/pull operation. Weather stripping and astragal by aluminum frame mfg.

**Set: 5.0**

Doors: 121B

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<td>10G04 LL</td>
</tr>
<tr>
<td>1 SMART Pac Bridge Rectifier</td>
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</tr>
<tr>
<td>1 electric strike</td>
<td>1006 x J Option</td>
</tr>
<tr>
<td>1 electrolynx adaptor</td>
<td>2004M</td>
</tr>
<tr>
<td>1 door closer</td>
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</tr>
<tr>
<td>1 kick plate</td>
<td>K1050 10&quot; x 1 1/2&quot; LDW CSK BEV</td>
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<tr>
<td>1 wall stop</td>
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</tr>
<tr>
<td>1 electrolynx harness</td>
<td>QC-C1500P (Frame - EPT to Power/Controller)</td>
</tr>
<tr>
<td>1 power supply</td>
<td>BPS-24-1</td>
</tr>
<tr>
<td>1 set of wiring diagrams</td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**
- Door normally closed, latched and secure.
- Free egress at all times.
- Entry by card reader releases electric strike allowing door to be pulled open.
- Door position switch, request to exit switch and electrical wiring by security contractor.

### Set: 7.0

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>doors: 105B, 106, 111B, 117B</td>
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<tr>
<td>3 hinge</td>
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<tr>
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<tr>
<td>1 SMART Pac Bridge Rectifier</td>
<td>2005M3</td>
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<tr>
<td>1 electric strike</td>
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<td>1 electrolynx adaptor</td>
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<tr>
<td>1 kick plate</td>
<td>K1050 10&quot; x 1 1/2&quot; LDW CSK BEV</td>
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<tr>
<td>1 electrolynx harness</td>
<td>QC-C1500P (Frame - EPT to Power/Controller)</td>
</tr>
<tr>
<td>1 power supply</td>
<td>BPS-24-1</td>
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<td>1 set of wiring diagrams</td>
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### Set: 8.0

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<td>DG1 NB8706 ETL</td>
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<td>1 set of wiring diagrams</td>
<td></td>
</tr>
</tbody>
</table>
Notes: Door normally closed, latched and secure. 
Free egress at all times. 
Entry by card reader releases outside, lever trim. 
Door position switch, request to exit switch and electrical wiring by security contractor.

### Set: 9.0

<table>
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<tr>
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<tbody>
<tr>
<td>3 Hinge</td>
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<tr>
<td>1 Storeroom Lock</td>
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<tr>
<td>1 Surf Overhead Stop</td>
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### Set: 10.0

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<tr>
<td>1 Door Closer</td>
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<td>1 Kick Plate</td>
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<tr>
<td>1 Wall Stop</td>
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</table>

### Set: 12.0

<table>
<thead>
<tr>
<th>Doors: 111A, 115</th>
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<tbody>
<tr>
<td>3 Hinge</td>
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<tr>
<td>1 Classroom Lock</td>
</tr>
<tr>
<td>1 Wall Stop</td>
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### Set: 13.0

<table>
<thead>
<tr>
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<tr>
<td>3 Hinge</td>
</tr>
<tr>
<td>1 Storeroom Lock</td>
</tr>
<tr>
<td>1 SMART Pac Bridge Rectifier</td>
</tr>
<tr>
<td>1 Electric Strike</td>
</tr>
</tbody>
</table>
**SPECIFICATIONS:**
Farley Municipal Building
206 1st Street N., Farley, Iowa 52046
ARCHITECT PROJECT #1728.01

1 ElectroLynx Adaptor 2004M HS
1 Surf Overhead Stop 10X36 630 RF
1 Door Closer 1431 P3A EN SA
1 Kick Plate K1050 10" x 1 1/2" LDW CSK BEV US32D RO
1 ElectroLynx Harness QC1500P (Frame - EPT to Power/Controller) MK
1 Power Supply BPS-24-1 SU
1 Set Of Wiring Diagrams OT

Notes: Door normally closed, latched and secure.
Free egress at all times.
Entry by card reader releases electric strike allowing door to be pulled open.
Door position switch, request to exit switch and electrical wiring by security contractor.

**Set: 14.0**

Doors: 113

1 All Hardware by Door Mfg. OT

**Set: 15.0**

Doors: 114, 122

3 Hinge TA2714 4-1/2" x 4-1/2" US26D MK
1 Storeroom Lock DG1 10G04 LL US26D SA
1 Wall Stop 400 US26D RO

**Set: 16.0**

Doors: 116

3 Hinge TA2714 4-1/2" x 4-1/2" US26D MK
1 Privacy Lock 10U65 LL US26D SA
1 Wall Stop 403 US26D RO

**Set: 17.0**

Doors: 117A

3 Hinge TA2714 4-1/2" x 4-1/2" US26D MK
1 Storeroom Lock 10G04 LL US26D SA
1 SMART Pac Bridge Rectifier 2005M3 HS
1 Electric Strike 1006 x J Option 630 HS
1 ElectroLynx Adaptor 2004M HS
1 Door Closer 1431 O EN SA
1 Kick Plate K1050 10" x 2" LDW CSK BEV US32D RO
SPECIFICATIONS: Farley Municipal Building
206 1st Street N., Farley, Iowa 52046
ARCHITECT PROJECT #1728.01

1 Wall Stop 400 US26D RO
1 Threshold 253x3AFG PE
1 Gasketing 316APK TKSP PE
1 Sweep 315CN TKSP PE
1 ElectroLynx Harness QC-C1500P (Frame - Elec. Strike to Power/Controller) MK
1 Power Supply BPS-24-1 SU
1 Set Of Wiring Diagrams OT

Notes: Door normally closed, latched and secure.
Free egress at all times.
Enter by card reader releases electric strike allowing door to be pulled open.
Door position switch, request to exit switch and electrical wiring by security contractor.

Set: 18.0

Doors: 119

1 Continuous Hinge MCK-HG305 US32D MK
1 Multi-Point Lock DG1 FM7318 LNL 188 US26D SA
1 Wall Stop 400 US26D RO

Set: 19.0

Doors: 123

3 Hinge TA2714 4-1/2" x 4-1/2" US26D MK
1 Privacy Lock 10U65 LL US26D SA
1 Door Closer 1431 O EN SA
1 Kick Plate K1050 10" x 2" LDW CSK BEV US32D RO
1 Wall Stop 403 US26D RO

Set: 20.0

Doors: 124

3 Hinge TA2714 4-1/2" x 4-1/2" US26D MK
1 Passage Latch 10U15 LL US26D SA
1 Surf Overhead Stop 10-X36 630 RF

Set: 21.0

Doors: 125A, 125B

3 Hinge TA2714 4-1/2" x 4-1/2" US26D MK
1 Classroom Lock DG1 10G37 LL US26D SA
1 Door Closer w/ Hold Open 1431 PH10 EN SA
<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Model</th>
<th>Finish</th>
<th>Style</th>
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<td>US32D</td>
<td>RO</td>
<td></td>
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<tr>
<td>1 Wall Stop</td>
<td>400</td>
<td>US26D</td>
<td>RO</td>
<td></td>
</tr>
</tbody>
</table>
PART 1 - GENERAL

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

1.2 SUMMARY
A. Section includes:
   1. Glass for windows, doors, interior borrowed lites, storefront framing.
   2. Glazing sealants and accessories.
B. Related Requirements:
   1. Section 088300 "Mirrors."

1.3 DEFINITIONS
A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.
B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.
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 ACTION SUBMITTALS
A. Product Data: For each type of product.
B. Glass Samples: For each type of glass product other than clear monolithic vision glass; 12 inches (300 mm) square.
   1. Insulating glass.

1.6 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. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the National Glass Association’s Certified Glass Installer Program.

1.7 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.

1.8 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 (4.4 deg C).

1.9 WARRANTY
A. 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: 10 years from date of Substantial Completion.
2. This warranty shall include labor and other miscellaneous materials required to warrant the repair.

PART 2 - PRODUCTS

2.1 MANUFACTURERS
   A. Source Limitations for Glass: Obtain from single source from single manufacturer for each glass type.
      1. Obtain tinted glass from single source from single manufacturer.
      2. Obtain reflective-coated glass from single source from single manufacturer.
   B. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.

2.2 GLASS PRODUCTS
   A. Clear Annealed Float Glass: ASTM C 1036, Type I, Class 1 (clear), Quality-Q3.
   B. Fully Tempered Float Glass: ASTM C 1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.

2.3 INSULATING GLASS
   A. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E 2190. All insulated glazing shall be Low E / Argon. Nominal thickness of 6.0 mm.
      1. Sealing System: Dual seal, with manufacturer’s standard primary and secondary sealants.
      2. Spacer: Manufacturer’s standard spacer material and construction.

2.4 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. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer’s full range.

2.5 GLAZING TAPES
   A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C 1281 and AAMA 800 for products indicated below:
      1. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
      2. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.
   B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:
      1. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.
      2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.6 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).

2.7 FABRICATION OF GLAZING UNITS
A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.
   1. Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.
B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites to produce square edges with slight chamfers at junctions of edges and faces.
C. Grind smooth and polish exposed glass edges and corners.

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 (1270 mm).
   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 (3-mm) 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.

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 SEALANT GLAZING (WET)

A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.
C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.7 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.

3.8 MONOLITHIC GLASS SCHEDULE
A. Glass Type: Ultraclear fully tempered float glass as required, see drawings.
   2. Minimum Thickness: 6 mm.

3.9 INSULATING GLASS SCHEDULE
A. Glass Type: Clear insulating glass.
   1. Overall Unit Thickness: 1 inch (25 mm).
   2. Minimum Thickness of Each Glass Lite: 6 mm.
   3. Outdoor Lite: Fully tempered float glass as required by code, or as scheduled on drawings.
   4. Interspace Content: Argon.
   5. Indoor Lite: Fully tempered float glass as required by code, or as scheduled on drawings.
DIVISION 08 – OPENINGS

SECTION 088300 – MIRRORS

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 the following types of silvered flat glass mirrors:
   1. Annealed monolithic glass mirrors.

1.3 ACTION SUBMITTALS
A. Product Data: For each type of product.
   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.
B. Shop Drawings: Include mirror elevations, edge details, mirror hardware, and attachment details.
C. Samples: For each type of the following:
   1. Mirrors: 12 inches (300 mm) square, including edge treatment on two adjoining edges.

1.4 CLOSEOUT SUBMITTALS
A. Maintenance Data: For mirrors to include in maintenance manuals.

1.5 DELIVERY, STORAGE, AND HANDLING
A. Protect mirrors according to mirror manufacturer’s written instructions and as needed to prevent damage to mirrors from moisture, 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.

1.6 WARRANTY
A. Special Warranty: Manufacturer agrees to replace mirrors that deteriorate within specified warranty period. Deterioration of mirrors is defined as defects developed from normal use that are not attributed to mirror breakage or to maintaining and cleaning mirrors contrary to manufacturer’s written instructions. Defects include discoloration, black spots, and clouding of the silver film.
   1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS
A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
   1. D & W Incorporated.
   2. Guardian Industries Corp.; SunGuard.
B. Source Limitations for Mirrors: Obtain mirrors from single source from single manufacturer.
C. Source Limitations for Mirror Accessories: Obtain mirror glazing accessories from single source.

2.2 SILVERED FLAT GLASS MIRRORS
A. Mirrors, General: ASTM C 1503.
SPECIFICATIONS: Farley Municipal Building
206 1st Street N., Farley, Iowa 52046
ARCHITECT PROJECT #1728.01

B. Annealed Monolithic Glass Mirrors: Mirror Quality, ultraclear (low-iron) float glass with a minimum 91 percent visible light transmission.
   1. Nominal Thickness: 6.0 mm.

2.3 MISCELLANEOUS MATERIALS
   A. Setting Blocks: Elastomeric material with a Shore, Type A 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, asbestos-free, produced specifically for setting mirrors and certified by both mirror and mastic manufacturer as compatible with glass coating and substrates on which mirrors will be installed.

2.4 FABRICATION
   A. Fabricate mirrors in the shop to greatest extent possible.
   B. 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.
      1. Seal edges of mirrors with edge sealer after edge treatment to prevent chemical or atmospheric penetration of glass coating.

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 of the Work.
   B. Verify compatibility with and suitability of substrates, including compatibility of existing finishes or primers with mirror mastic.
   C. Proceed with 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 substrates 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 airspace of 1/8 inch (3 mm) between back of mirrors and mounting surface for air circulation between back of mirrors and face of mounting surface.
   C. Install mirrors with mastic and mirror hardware. 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.
      1. Mirror Clips: Place a felt or plastic pad between mirror and each clip to prevent spalling of mirror edges. Locate clips so they are symmetrically placed and evenly spaced.
      2. 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.
         c. After mastic is applied, align mirrors and press into place while maintaining a minimum airspace of 1/8 inch (3 mm) between back of mirrors and 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 prevent mirrors from being exposed to moisture from condensation or other sources for continuous periods of time.
D. Clean exposed surface of mirrors not more than four days before date scheduled for inspections that establish date of Substantial Completion. Clean mirrors as recommended in writing by mirror manufacturer.
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. Non-load-bearing steel framing systems for interior partitions.
2. Z-furring for exterior walls.
B. Related Requirements:
1. Section 054000 “Cold-Formed Metal Framing” for exterior and interior load-bearing and exterior non-load-bearing wall studs; floor joists; roof rafters and ceiling joists; and roof trusses.

1.3 ACTION SUBMITTALS
A. Product Data: For each type of product.
1. Studs and Runners: Provide documentation that framing members’ certification is according to SIFA’s “Code Compliance Certification Program for Cold-Formed Steel Structural and Non-Structural Framing Members.”

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.
C. Horizontal Deflection: For wall assemblies, limited to 1/240 of the wall height based on horizontal loading of 5 lb/sq. ft. (239 Pa).

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.
B. Studs and Runners: ASTM C 645. Use either steel studs and runners or embossed steel studs and runners.
1. Steel Studs and Runners:
   a. Minimum Base-Metal Thickness: As required by performance requirements for horizontal deflection.
   b. Depth: As indicated on Drawings.
2. Embossed Steel Studs and Runners:
   a. Minimum Base-Metal Thickness: As required by horizontal deflection performance requirements.
   b. Depth: As indicated on Drawings.
C. Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4 inches (32 mm), wall attachment flange of 7/8 inch (22 mm), minimum uncoated-metal thickness of 0.0179 inch (0.455 mm), and depth required to fit insulation thickness indicated.

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 (610 mm) 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 are required for fire-resistance ratings indicated. Protect adjacent fire-resistive materials from damage.

3.3 INSTALLATION, GENERAL
A. Installation Standard: ASTM C 754.
1. Gypsum Plaster Assemblies: Also comply with requirements in ASTM C 841 that apply to framing installation.
2. Portland Cement Plaster Assemblies: Also comply with requirements in ASTM C 1063 that apply to framing installation.
3. Gypsum Veneer Plaster Assemblies: Also comply with requirements in ASTM C 844 that apply to framing installation.
4. 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.
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 (406 mm) o.c. unless otherwise indicated.
2. Multilayer Application: 16 inches (406 mm) 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.
D. Install tracks (runners) at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts that penetrate partitions above ceiling.

E. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch (3 mm) from the plane formed by faces of adjacent framing.
DIVISION 09 – FINISHES

SECTION 092900 - GYPSUM BOARD

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. Interior gypsum board.
   2. Texture finishes.
B. Related Requirements:
   1. Section 093013 “Ceramic Tiling” for cementitious backer units installed as substrates for ceramic tile.

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 instructions, 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, 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.

PART 2 - PRODUCTS

2.1 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.

2.2 INTERIOR GYPSUM BOARD
A. Gypsum Wallboard: ASTM C 1396/C 1396M.
   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. American Gypsum.
      b. CertainTeed Corporation.
      c. Georgia-Pacific Building Products.
   2. Core: 5/8 inch (15.9 mm), Type X.
B. Mold-Resistant Gypsum Board: ASTM C 1396/C 1396M. With moisture- and mold-resistant core and paper surfaces.
   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. American Gypsum.
b. CertainTeed Corporation.
c. Georgia-Pacific Building Products.

2. Core: 5/8 inch (15.9 mm), Type X.
4. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

2.3 TRIM ACCESSORIES
A. Interior Trim: ASTM C 1047.
   1. Material: Galvanized or aluminum-coated steel sheet or rolled zinc.
   2. Shapes:
      a. Cornerbead.
      b. Bullnose bead.
      c. LC-Bead: J-shaped; exposed long flange receives joint compound.
      d. L-Bead: L-shaped; exposed long flange receives joint compound.
      e. U-Bead: J-shaped; exposed short flange does not receive joint compound.
      f. Expansion (control) joint.
      g. Curved-Edge Cornerbead: With notched or flexible flanges.

2.4 JOINT TREATMENT MATERIALS
A. General: Comply with ASTM C 475/C 475M.
   B. Joint Tape:
      1. Interior Gypsum Board: Paper.
   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 drying-type, all-purpose 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.

2.5 AUXILIARY MATERIALS
A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer’s written instructions.
   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.
   D. Thermal Insulation: As specified in Section 072100 “Thermal Insulation.”
   E. Vapor Retarder: As specified in Section 072600 “Vapor Retarders.”

2.6 TEXTURE FINISHES
A. Primer: As recommended by textured finish manufacturer.
   B. Non-Aggregate Finish: Premixed, vinyl texture finish for spray application.
      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.
         c. United States Gypsum Company.
      2. Texture: Orange peel.
PART 3 - EXECUTION

3.1 EXAMINATION
A. Examine areas and substrates including welded hollow-metal frames and support framing, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.
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 (1.5 mm) 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. Form control and expansion joints with space between edges of adjoining gypsum panels.
F. 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. (0.7 sq. m) 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- (6.4- to 9.5-mm-) wide joints to install sealant.
G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments. Provide 1/4- to 1/2-inch- (6.4- to 12.7-mm-) 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.
H. Wood Framing: Install gypsum panels over wood framing, with floating internal corner construction. Do not attach gypsum panels across the flat grain of wide-dimension lumber, including floor joists and headers. Float gypsum panels over these members or provide control joints to counteract wood shrinkage.
I. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

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. Type C: Where required for specific fire-resistance-rated assembly indicated.
B. Single-Layer Application:
   1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.
   2. On partitions/walls, apply gypsum panels horizontally (perpendicular to framing) unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
      a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
   3. On Z-shaped furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
   4. Fastening Methods: Apply gypsum panels to supports with steel drill screws.
C. Multilayer Application:
1. On 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. On Z-shaped furring members, apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over furring members.

4. Fastening Methods: Fasten base layers and face layers separately to supports with screws.

3.4 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 at locations indicated on Drawings.
   C. Interior Trim: Install in the following locations:
      1. Cornerbead: Use at outside corners.

3.5 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 4: At panel surfaces that will be exposed to view unless otherwise indicated.
         a. Primer and its application to surfaces are specified in Section 099123 "Interior Painting."

3.6 APPLYING TEXTURE FINISHES
   A. Surface Preparation and Primer: Prepare and apply primer to gypsum panels and other surfaces receiving texture finishes. Apply primer to surfaces that are clean, dry, and smooth.
   B. Texture Finish Application: Mix and apply finish using powered spray equipment, to produce a uniform texture free of starved spots or other evidence of thin application or of application patterns.
   C. Prevent texture finishes from coming into contact with surfaces not indicated to receive texture finish by covering them with masking agents, polyethylene film, or other means. If, despite these precautions, texture finishes contact these surfaces, immediately remove droppings and overspray to prevent damage according to texture-finish manufacturer’s written instructions.

3.7 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
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. Ceramic wall and floor tile.
   2. Tile backing panels.
   3. Metal edge strips.
B. Related Requirements:
   1. Section 079200 "Joint Sealants" for sealing of expansion, contraction, control, and isolation joints in tile surfaces.

1.3 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.
C. Module Size: Actual tile size plus joint width indicated.
D. Face Size: Actual tile size, excluding spacer lugs.

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.
C. Samples for Initial Selection: For tile, grout, and accessories involving color selection.

1.5 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.

1.6 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 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.

C. Source Limitations for Other Products: Obtain each of the following products specified in this Section from a single manufacturer:
   1. Metal edge strips.

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[ unless otherwise indicated].

B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TCNA installation methods specified in tile installation schedules, and other requirements specified.

C. 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 wet areas, 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: Glazed square-edged porcelain wall tile.
   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. Floor Tile: Daltile, Volume 1.0, 12x24.
      b. Wall Tile: Daltile, Volume 1.0, 12x12.
      c. Accent Wall Tile: Daltile Largo, 3x6.
   2. Thickness: 5/16”.
   5. Tile Color and Pattern:
      a. Floor Tile: Intensity Pebble.
      b. Wall Tile: Intensity Pebble.
      c. Accent Wall Tile: Light Grey LR93.
   6. Grout Color: As selected by the Architect from manufacturer’s full range.

2.4 TILE BACKING PANELS
A. Fiber-Cement Backer Board: ASTM C 1288, in maximum lengths available to minimize end-to-end butt joints.
   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. James Hardie Building Products, Inc.
   2. Thickness: 1/2 inch (12.7 mm).

2.5 SETTING MATERIALS
A. Modified Dry-Set Mortar (Thinset): ANSI A118.4.
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. Bostik, Inc.
   b. MAPEI Corporation.

2. Provide prepackaged, dry-mortar mix containing dry, dispersible, 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.

2.6 GROUT MATERIALS
   A. Water-Cleanable Epoxy Grout: ANSI A118.3.
      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. Bostik, Inc.
         b. MAPEI Corporation.

2.7 MISCELLANEOUS MATERIALS
   A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.
   B. Metal Edge Strips: Angle or L-shaped, height to match tile and setting-bed thickness, metallic or combination of metal and PVC or neoprene base, designed specifically for flooring applications; stainless-steel, ASTM A 666, 300 Series exposed-edge material.
      1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
         b. Ceramic Tool Company, Inc.
         c. Schluter Systems L.P.
   C. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.

2.8 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 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 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.

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.

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. Provide manufacturer's standard trim shapes where necessary to eliminate exposed tile edges.

E. Where accent tile differs in thickness from field tile, vary setting-bed thickness so that tiles are flush.

F. Jointing Pattern: Lay tile in grid pattern 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.

G. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:

1. Glazed wall and floor tile: 3/16 inch.

H. Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated.

I. 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.

J. Metal Edge Strips: Install where exposed edge of tile flooring meets carpet, wood, or other flooring that finishes flush with or below top of tile and no threshold is indicated.
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 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.

3.6 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.

3.7 INTERIOR CERAMIC TILE INSTALLATION SCHEDULE
   A. Interior Floor Installations, Concrete Subfloor:
      1. Ceramic Tile Installation: TCNA F115; thinset mortar; epoxy grout.
         b. Grout: Water-cleanable epoxy grout.
   B. Interior Wall Installations, Wood or Metal Studs or Furring:
      1. Ceramic Tile Installation: TCNA W244C or TCNA W244F; thinset mortar on cementitious backer units or fiber-cement backer board over vapor-retarder membrane.
         b. Grout: Water-cleanable epoxy grout.
DIVISION 09 – FINISHES

SECTION 095123 - ACOUSTICAL TILE CEILINGS

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. Acoustical tiles for interior ceilings.
   2. Fully concealed, direct-hung, suspension systems.

1.3 ACTION SUBMITTALS
A. Product Data: For each type of product.
B. Samples for Initial Selection: For components with factory-applied finishes.

1.4 CLOSEOUT SUBMITTALS
A. Maintenance Data: For finishes to include in maintenance manuals.

1.5 MAINTENANCE MATERIAL SUBMITTALS
A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Acoustical Ceiling Units: Full-size tiles equal to 2 percent of quantity installed.

1.6 DELIVERY, STORAGE, AND HANDLING
A. Deliver acoustical tiles, suspension-system components, and accessories to Project site 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 tiles, permit them to reach room temperature and a stabilized moisture content.

1.7 FIELD CONDITIONS
A. Environmental Limitations: Do not install acoustical tile ceilings until spaces are enclosed and weathertight, 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.

PART 2 - PRODUCTS

2.1 MANUFACTURERS
A. Source Limitations:
   1. Suspended Acoustical Tile Ceilings: Obtain each type of acoustical ceiling tile and its suspension system from single source from single manufacturer.

2.2 ACOUSTICAL TILES (ACT1)
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. Armstrong World Industries, Inc.
   2. CertainTeed Corporation.
B. Acoustical Tile Standard: Provide manufacturer’s standard tiles of configuration indicated that comply with ASTM E 1264 classifications as designated by type, form, pattern, acoustical rating, and light reflectance unless otherwise indicated.
   1. Basis of product: Armstrong Fine Fissured - 1732
   2. Type and Form: Type III, mineral base with painted finish; Form 2, wet formed.
   3. Pattern CE (perforated, small holes and lightly textured).

C. Color: White.

D. Light Reflectance (LR): Not less than .85.

E. Ceiling Attenuation Class (CAC): Not less than 35.

F. Noise Reduction Coefficient (NRC): Not less than 0.55.

G. Edge/Joint Detail: Angled Tegular.

H. Thickness: 5/8 inch.

I. Modular Size: 24 by 24 inches.

J. Antimicrobial Treatment: Manufacturer’s standard broad spectrum, 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, ASTM D 3274, or ASTM G 21 and evaluated according to ASTM D 3274 or ASTM G 21.

2.3 METAL SUSPENSION SYSTEM

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Armstrong World Industries, Inc.
   2. United States Gypsum Company.

B. Metal Suspension-System Standard: Provide manufacturer’s standard, direct-hung, fully concealed, metal suspension system and accessories of type, structural classification, and finish indicated that complies with applicable requirements in ASTM C 635/C 635M.
   b. Surface finish: Baked polyester paint.
   c. Face width: 15/16”
   d. Height: 1-11/16”
   e. Profile: Exposed tee.
   f. Seismic Rating: C, DEF.

2.4 ACCESSORIES

A. Attachment Devices: Size for five times the design load indicated in ASTM C 635/C 635M, Table 1, “Direct Hung,” unless otherwise indicated. Comply with seismic design requirements.

B. Wire Hangers, Braces, and Ties: Provide wires as follows:
   2. Size: Wire diameter sufficient for its stress at three times hanger design load (ASTM C 635/C 635M, Table 1, “Direct Hung”) will be less than yield stress of wire, but not less than 0.135-inch (3.5-mm) diameter wire.

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 complying with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for of suspension-system runners.
   1. Baked-Enamel or Powder-Coat Finish: Minimum dry film thickness of 1.5 mils (0.04 mm). Comply with ASTM C 635/C 635M and coating manufacturer’s written instructions for cleaning, conversion coating, and applying and baking finish.
PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, including structural framing and substrates to which acoustical tile ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine acoustical tiles before installation. Reject acoustical tiles that are wet, moisture damaged, or mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Measure each ceiling area and establish layout of acoustical tiles to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width tiles at borders unless otherwise indicated, and comply with layout shown on reflected ceiling plans.

B. Layout openings for penetrations centered on the penetrating items.

3.3 INSTALLATION OF SUSPENDED ACOUSTICAL TILE CEILINGS

A. Install suspended acoustical tile ceilings according to ASTM C 636/C 636M and manufacturer’s written instructions.

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. 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.
   3. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly to structure 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.
   4. 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.
   5. 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.
   6. Do not attach hangers to steel deck tabs.
   7. Do not attach hangers to steel roof deck. Attach hangers to structural members.
   8. 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.
   9. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.

C. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical tiles.
   1. 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.
   1. As indicated on reflected ceiling plans.

E. Install acoustical tiles in coordination with suspension system and exposed moldings and trim. Place splines or suspension-system flanges into kerfed edges of tiles so tile-to-tile joints are interlocked.
   1. Fit adjoining tiles to form flush, tight joints. Scribe and cut tiles for accurate fit at borders and around penetrations through ceiling.
2. Hold tile field in compression by inserting leaf-type, spring-steel spacers between tiles and moldings, spaced 12 inches (305 mm) o.c.

3.4 ERECTION TOLERANCES
A. Suspended Ceilings: Install main and cross runners level to a tolerance of 1/8 inch in 12 feet (3 mm in 3.6 m), non-cumulative.
B. Moldings and Trim: Install moldings and trim to substrate and level with ceiling suspension system to a tolerance of 1/8 inch in 12 feet (3 mm in 3.6 m), non-cumulative.

3.5 ADJUSTING
A. Clean exposed surfaces of acoustical tile ceilings, including trim and edge moldings. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage.
B. Remove and replace tiles and other ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.
SECTION 096513 - RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

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

1.2 SUMMARY
A. Section Includes:
   1. Resilient base.
   2. Resilient molding accessories.

1.3 ACTION SUBMITTALS
A. Product Data: For each type of product.
B. Samples for Initial Selection: For each type of product indicated.

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. Furnish not less than 10 linear feet (3 linear m) for every 500 linear feet (150 linear m) or fraction thereof, of each type, color, pattern, and size of resilient product installed.

1.5 DELIVERY, STORAGE, AND HANDLING
A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F (10 deg C) or more than 90 deg F (32 deg C).

1.6 FIELD CONDITIONS
A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F (21 deg C) or more than 95 deg F (35 deg C), in spaces to receive resilient products during the following time periods:
   1. 48 hours before installation.
   2. During installation.
   3. 48 hours after installation.
B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F (13 deg C) or more than 95 deg F (35 deg C).
C. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 THERMOPLASTIC-RUBBER BASE
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. Flexco.
   2. Johnsonite; A Tarkett Company.
B. Product Standard: ASTM F 1861, Type TP (rubber, thermoplastic).
   2. Style and Location:
      a. Style B, Cove: Provide in all areas scheduled.
C. Thickness: 0.125 inch (3.2 mm).
D. Height: 4 inches (102 mm) unless otherwise indicated on the drawings.
E. Lengths: Coils in manufacturer’s standard length.
F. Outside Corners: Job formed.
G. Inside Corners: Job formed.
H. Colors: 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 resilient-product manufacturer for applications indicated.
B. Metal Edge Strips: Extruded aluminum with mill finish of width shown, of height required to protect exposed edges of flooring, and in maximum available lengths to minimize running joints.
C. Floor Polish: Provide protective, liquid floor-polish products recommended by resilient stair-tread 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.
  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 resilient products.
B. Proceed with installation only after unsatisfactory conditions have been corrected.
  1. Installation of resilient products indicates acceptance of surfaces and conditions.

3.2 PREPARATION
A. Prepare substrates according to manufacturer’s written instructions to ensure adhesion of resilient products.
B. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.
C. Do not install resilient products 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 products and installation materials into spaces where they will be installed.
D. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient products.

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 practical 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 and form with returns not less than 3 inches (76 mm).
    a. Form without producing discoloration (whitening) at bends.
  2. Inside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches (76 mm).
    a. Miter or cope corners to minimize open joints.
3.4 CLEANING AND PROTECTION
   A. Comply with manufacturer’s written instructions for cleaning and protecting 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 horizontal surfaces thoroughly.
      3. Damp-mop horizontal 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. Floor Polish: Remove soil, visible adhesive, and surface blemishes from resilient stair treads before applying liquid floor polish.
      1. Apply two coat(s).
   E. Cover resilient products subject to wear and foot traffic until Substantial Completion.
DIVISION 09 – FINISHES

SECTION 096519 - RESILIENT TILE FLOORING

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. Luxury vinyl floor tile.

1.3 ACTION SUBMITTALS
   A. Product Data: For each type of product.
   B. Shop Drawings: For each type of floor tile. Include floor tile layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
      1. Show details of special patterns.
   C. Samples: Full-size units of each color and pattern of floor tile required.
   D. Samples for Initial Selection: For each type of floor tile indicated.
   E. Product Schedule: For floor tile.

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. Engage an installer who employs workers for this Project who are trained or certified by floor tile manufacturer for installation techniques required.

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 (10 deg C) or more than 90 deg F (32 deg C). 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 (21 deg C) or more than 95 deg F (35 deg C), 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 (13 deg C) or more than 95 deg F (35 deg C).
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

2.2 LUXURY VINYL FLOOR TILE (LVT)
A. Products: Subject to compliance with requirements, available products that may be incorporated in the project are as follows:
2. All other products shall be approved prior to bidding.
B. Color: Winter Oak SX5W5021.
C. Construction: LVT with micro-beveled edges (non-ortho phthalate construction).
D. Size: 5.91" x 39.37".
E. Overall Thickness: .0.197 inches.
F. Wearlayer Thickness: .020 inches (20 mils).
G. Warranty: 10 year commercial warranty.

2.3 INSTALLATION MATERIALS
A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by floor tile manufacturer for applications indicated.
B. Adhesives: Water-resistant type recommended by floor tile and adhesive manufacturers to suit floor tile and substrate conditions indicated.

PART 3 - EXECUTION

3.1 EXAMINATION
A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
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. 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.
C. 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. 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.
C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.

D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.

E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.

F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent marking device.

G. 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 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.

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 floor tile until Substantial Completion.
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 modular carpet tile and walk-off carpet tile.
B. Related Requirements:
   1. Section 096513 "Resilient Base and Accessories for resilient wall base and accessories installed with carpet tile.

1.3 ACTION SUBMITTALS
A. Product Data: For each type of product.
   1. Include manufacturer's written data on physical characteristics, durability, and fade resistance.
   2. Include manufacturer’s written installation recommendations for each type of substrate.
B. Shop Drawings: For carpet tile installation, plans showing the following:
   1. Carpet tile type, color, and dye lot.
   2. Type of installation.
   3. Pattern of installation.
   4. Pattern type, location, and direction.
   5. Type, color, and location of insets and borders.
   6. Type, color, and location of edge, transition, and other accessory strips.
   7. 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.
D. Samples for Initial Selection: For each type of carpet tile.
   1. Include Samples of exposed edge, transition, and other accessory stripping involving color or finish selection.
E. Samples for Verification: 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 (300-mm) long Samples.
F. Product Schedule: For carpet tile. Use same designations indicated on Drawings.

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.

1.5 MAINTENANCE MATERIAL SUBMITTALS
A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Carpet Tile: Full-size units equal to 5 percent of amount installed for each type indicated, but not less than 10 sq. yd. (8.3 sq. m).
SPECIFICATIONS: Farley Municipal Building
206 1st Street N., Farley, Iowa 52046
ARCHITECT PROJECT #1728.01

1.6 QUALITY ASSURANCE
A. Installer Qualifications: An experienced installer who is certified by the International Certified Floorcovering Installers Association at the Commercial II certification level.

1.7 DELIVERY, STORAGE, AND HANDLING
A. Comply with CRI's "CRI Carpet Installation Standard."

1.8 FIELD CONDITIONS
A. Comply with CRI's "CRI Carpet Installation Standard" for temperature, humidity, and ventilation limitations.
B. Environmental Limitations: Do not deliver or install carpet tiles until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at levels planned for building occupants during the remainder of the construction period.
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 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, the following:
      a. More than 10 percent edge raveling, snags, and runs.
      b. Dimensional instability.
      c. Excess static discharge.
      d. Loss of tuft-bind strength.
      e. Loss of face fiber.
      f. Delamination.
   3. Warranty Period: 10> years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CARPET TILE
A. Basis of project design: Subject to compliance with requirements, provide Shaw Contract, Places Collection, Sky Tile 5T174. All other products must gain prior approval before bidding.
B. Color: Market 72505.
C. Pattern: Brick
D. Construction: Multi-level patterned loop.
E. Face Fiber: eco solution q nylon.
F. Dye method: 100% Solution Dyed.
G. Gauge: 1/12.
H. Stitches per inch: 9 per inch.
I. Pile thickness: .089 inches.
J. Tufted yarn weight: 17 oz/sq. yd.
K. Size: 24 by 24 inches.

2.2 INSTALLATION ACCESSORIES
A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.
B. Adhesives: Water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit products and subfloor conditions indicated, that comply with flammability requirements for installed carpet tile, and are recommended by carpet tile manufacturer for releasable installation.
C. Metal Edge/Transition Strips: Extruded aluminum with mill finish of profile and width shown, of height required to protect exposed edge of carpet, and of maximum lengths to minimize running joints.

PART 3 - EXECUTION

3.1 EXAMINATION
A. Examine 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.
B. Examine carpet tile for type, color, pattern, and potential defects.
C. Concrete Slabs: Verify that finishes comply with requirements specified in Section 033000 "Cast-in-Place Concrete" and that surfaces are free of cracks, ridges, depressions, scale, and foreign deposits.
D. Wood Subfloors: Verify the following:
   1. Underlayment over subfloor complies with requirements specified in Section 061600 "Sheathing."
   2. Underlayment surface is free of irregularities and substances that may interfere with adhesive bond or show through surface.
   3. Underlayment surface is flat, smooth, evenly planed, tightly jointed, and free of irregularities, gaps greater than 1/8 inch, protrusions more than 1/32 inch, and substances that may interfere with adhesive bond or show through surface.
E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION
A. General: Comply with CRI's "Carpet Installation Standards" and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile.
B. 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 (3 mm) wide or wider, and protrusions more than 1/32 inch (0.8 mm) unless more stringent requirements are required by manufacturer’s written instructions.
C. Concrete Substrates: 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 adhesive and carpet tile manufacturers.
D. Broom and vacuum clean substrates to be covered immediately before installing carpet tile.

3.3 INSTALLATION
A. General: Comply with CRI’s "CRI Carpet Installation Standard,” Section 18, "Modular Carpet" and with carpet tile manufacturer’s written installation instructions.
B. Installation Method: Glue down; install every tile with full-spread, releasable, pressure-sensitive adhesive.
C. Maintain dye-lot integrity. Do not mix dye lots in same area.
D. Maintain pile-direction patterns recommended in writing by carpet tile manufacturer.
E. 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.
F. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
G. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on carpet tile as marked on subfloor. Use nonpermanent, nonstaining marking device.
H. Install pattern parallel to walls and borders.

3.4 CLEANING AND PROTECTION
A. Perform the following operations immediately after installing carpet tile:
   1. Remove excess adhesive 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's "Carpet Installation Standard," Section 20, "Protecting Indoor Installations."

C. Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet tile manufacturer.

END OF SECTION
PART 1 - GENERAL

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

1.2 SUMMARY
   A. Section includes surface preparation and the application of paint systems on the following exterior substrates:
      1. Steel and iron.
      2. Galvanized metal.
   B. Related Requirements:
      1. Section 051200 "Structural Steel Framing" for shop priming of metal substrates.
      2. Section 055000 "Metal Fabrications" for shop priming metal fabrications.
      3. Section 055213 "Pipe and Tube Railings" for shop painting pipe and tube railings.
      4. Section 099300 "Staining and Transparent Finishing" for surface preparation and the application of wood stains and transparent finishes on exterior wood substrates.

1.3 DEFINITIONS
   A. MPI Gloss Level 1: Not more than five units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.
   B. MPI Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
   C. MPI Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.
   D. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.
   E. MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.
   F. MPI Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.4 ACTION SUBMITTALS
   A. Product Data: For each type of product. Include preparation requirements and application instructions.
   B. Samples for Initial Selection: For each type of topcoat product.
      1. Submit Samples on rigid backing, 8 inches (200 mm) square.
      2. Apply coats on Samples in steps to show each coat required for system.
      3. Label each coat of each Sample.
      4. Label each Sample for location and application area.

1.5 MAINTENANCE MATERIAL SUBMITTALS
   A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
      1. Paint: 5 percent, but not less than 1 gal. (3.8 L) of each material and color applied.

1.6 DELIVERY, STORAGE, AND HANDLING
   A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F (7 deg C).
      1. Maintain containers in clean condition, free of foreign materials and residue.
      2. Remove rags and waste from storage areas daily.
1.7 FIELD CONDITIONS
A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F (10 and 35 deg C).
B. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS
A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
   2. Benjamin Moore & Co.
   4. PPG Architectural Finishes, Inc.
   5. Sherwin-Williams Company (The).
   6. Zinsser; Rust-Oleum Corporation.
B. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to products listed in the Exterior Painting Schedule for the paint category indicated.

2.2 PAINT, GENERAL
A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products Lists."
B. Material Compatibility:
   1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
   2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.
C. Colors: As selected by Architect from manufacturer’s full range.
   1. Ten percent of surface area will be painted with deep tones.

PART 3 - EXECUTION

3.1 EXAMINATION
A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
   1. Fiber-Cement Board: 12 percent.
   2. Wood: 15 percent.
C. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.
D. Proceed with coating application only after unsatisfactory conditions have been corrected.
   1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION
A. Comply with manufacturer’s written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.
B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.

C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
   1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

D. Steel Substrates: Remove rust, loose mill scale, and shop primer if any. Clean using methods recommended in writing by paint manufacturer but not less than the following:
   1. SSPC-SP 2.

E. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

F. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

3.3 APPLICATION

A. Apply paints according to manufacturer’s written instructions and recommendations in “MPI Architectural Painting Specification Manual.”
   1. Use applicators and techniques suited for paint and substrate indicated.
   2. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.
   3. Paint both sides and edges of exterior doors and entire exposed surface of exterior door frames.
   4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
   5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

B. Tint undercoats same color as topcoat, but tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

E. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
   1. Paint the following work where exposed to view:
      a. Equipment, including panelboards[ and switch gear].
      b. Uninsulated metal piping.
      c. Uninsulated plastic piping.
      d. Pipe hangers and supports.
      e. Metal conduit.
      f. Plastic conduit.
      g. Tanks that do not have factory-applied final finishes.

3.4 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.
3.5  EXTERIOR PAINTING SCHEDULE
   A.  Steel Substrates:
       1.  Alkyd System: Including exposed steel, iron or cast iron, galvanized steel, and aluminum not otherwise finished:
           a.  Prime Coat: Shop primer specified in Division 5 section where substrate is specified.
           c.  Topcoat: Alkyd, exterior, semi-gloss (Gloss Level 5).
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DIVISION 09 – FINISHES

SECTION 099123 - INTERIOR PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes surface preparation and the application of paint systems on the following interior substrates:
   1. Steel and iron.
   2. Galvanized metal.
   3. Wood.
   5. Spray-textured ceilings.
   6. ASJ insulation covering.

B. Related Requirements:
   1. Section 051200 "Structural Steel Framing" for shop priming structural steel.
   2. Section 055000 "Metal Fabrications" for shop priming metal fabrications.
   3. Section 055113 "Metal Pan Stairs" for shop priming metal pan stairs.
   4. Section 055213 "Pipe and Tube Railings" for shop painting pipe and tube railings.
   5. Section 099300 "Staining and Transparent Finishing" for surface preparation and the application of wood stains and transparent finishes on interior wood substrates.

1.3 DEFINITIONS

A. MPI Gloss Level 1: Not more than five units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.
B. MPI Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
C. MPI Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
D. MPI Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.
E. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.
F. MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.
G. MPI Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.
B. Samples for Initial Selection: For each type of topcoat product.
C. Samples for Verification: For each type of paint system and in each color and gloss of topcoat.
   1. Submit Samples on rigid backing, 8 inches (200 mm) square.
   2. Apply coats on Samples in steps to show each coat required for system.
   3. Label each coat of each Sample.
   4. Label each Sample for location and application area.
D. Product List: Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules. Include color designations.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Paint: 5> percent, but not less than 1 gal. (3.8 L) of each material and color applied.

1.6 DELIVERY, STORAGE, AND HANDLING
A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F (7 deg C).
   1. Maintain containers in clean condition, free of foreign materials and residue.
   2. Remove rags and waste from storage areas daily.

1.7 FIELD CONDITIONS
A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F (10 and 35 deg C).
B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS
2.1 MANUFACTURERS
A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
   2. Benjamin Moore & Co.
   4. PPG Architectural Finishes, Inc.
   5. Pratt & Lambert.
   7. Zinsser; Rust-Oleum Corporation.
B. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to products listed in the Interior Painting Schedule for the paint category indicated.

2.2 PAINT, GENERAL
A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products Lists."
B. Material Compatibility:
   1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
   2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.
C. Colors: As selected by Architect from manufacturer’s full range.
   1. Thirty percent of surface area will be painted with deep tones.

PART 3 - EXECUTION
3.1 EXAMINATION
A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
   1. Concrete: 12 percent.
   2. Masonry (Clay and CMUs): 12 percent.
   3. Wood: 15 percent.
   4. Gypsum Board: 12 percent.
C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
3.2 PREPARATION

A. Comply with manufacturer’s written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
   1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
   1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer’s written instructions.

E. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceeds that permitted in manufacturer’s written instructions.

F. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer.

G. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

H. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

I. Aluminum Substrates: Remove loose surface oxidation.

J. Wood Substrates:
   1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
   2. Sand surfaces that will be exposed to view, and dust off.
   3. Prime edges, ends, faces, undersides, and backsides of wood.
   4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

3.3 APPLICATION

A. Apply paints according to manufacturer’s written instructions and to recommendations in "MPI Manual."
   1. Use applicators and techniques suited for paint and substrate indicated.
   2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
   3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
   4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
   5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

E. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:

1. Paint the following work where exposed in equipment rooms:
   a. Equipment, including panelboards and switch gear.
   b. Uninsulated metal piping.
   c. Uninsulated plastic piping.
   d. Pipe hangers and supports.
   e. Metal conduit.
   f. Plastic conduit.
   g. Tanks that do not have factory-applied final finishes.

2. Paint the following work where exposed in occupied spaces:
   a. Equipment, including panelboards.
   b. Uninsulated metal piping.
   c. Uninsulated plastic piping.
   d. Pipe hangers and supports.
   e. Metal conduit.
   f. Plastic conduit.
   g. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
   h. Other items as directed by Architect.

3. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

3.4 FIELD QUALITY CONTROL

A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.

1. Contractor shall touch up and restore painted surfaces damaged by testing.

2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer’s written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer’s written recommendations.

3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 INTERIOR PAINTING SCHEDULE

A. Steel Substrates including interior structural mainframes, exposed steel structure:

1. Quick-Drying Enamel System:
   a. Prime Coat: Primer, alkyd, quick dry, for metal or galvanized metal.
   b. Intermediate Coat: Alkyd, quick dry, matching top coat.
   c. Topcoat: Alkyd, quick dry, semi-gloss (Gloss Level 5).

B. Gypsum Board Substrates and Plaster:

1. Latex System:
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c. Topcoat: Latex, interior, (Gloss level 3).

C. Gypsum Board Substrates and Plaster:
   1. Epoxy System:
      c. Topcoat: Epoxy, interior, (Gloss level 5).

D. Gypsum Board Ceiling Substrates:
   1. Latex System: Spray applied.
      c. Topcoat: Latex, interior, (Gloss level 1).

E. Insulation – Covering Substrates: Including pipe and duct coverings in all exposed areas outside mechanical or utility spaces.
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DIVISION 10 - SPECIALTIES

SECTION 101419 - DIMENSIONAL LETTER SIGNAGE

PART 1 - GENERAL

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

1.2 SUMMARY
A. Section Includes:
   1. Cast dimensional characters.

1.3 DEFINITIONS
A. Illuminated: Illuminated by lighting source integrally constructed as part of the sign unit.

1.4 ACTION SUBMITTALS
A. Product Data: For each type of product.
B. Shop Drawings: For signs.
   1. Include fabrication and installation details and attachments to other work.
   2. Show sign mounting heights, locations of supplementary supports to be provided by other installers, and accessories.
   3. Show message list, typstyles, graphic elements, and layout for each sign at least half size.
C. Samples for Initial Selection: For each type of sign assembly, exposed component, and exposed finish.
   1. Include representative Samples of available typstyles and graphic symbols.
D. Samples for Verification: For each type of sign assembly showing all components and with the required finish(es), in manufacturer’s standard size unless otherwise indicated and as follows:
E. Product Schedule: For dimensional letter signs. Use same designations indicated on Drawings or specified.

1.5 CLOSEOUT SUBMITTALS
A. Maintenance Data: For signs to include in maintenance manuals.

1.6 WARRANTY
A. Special Warranty: 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 finishes beyond normal weathering.
      b. Separation or delamination of sheet materials and components.
   2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 DIMENSIONAL CHARACTERS
A. Cast Characters: Characters with uniform faces, sharp corners, and precisely formed lines and profiles, and as follows:
   1. Gemini Incorporated.
   2. Character Material: Cast aluminum.
   3. Character Height: 18”.
   4. Thickness: 2”.
   5. Finishes:
      a. Baked-Enamel or Powder-Coat Finish: Manufacturer’s full color range as selected by the Architect.
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2.2 DIMENSIONAL CHARACTER MATERIALS
A. Aluminum Castings: Painted, #514 Alloy, sprayed with a 2-part hardened polyurethane, bead-blasted returns, baked.
B. Paints and Coatings for Sheet Materials: Inks, dyes, and paints that are recommended by manufacturer for optimum adherence to surface and are UV and water resistant for colors and exposure indicated.

2.3 ACCESSORIES
A. Fasteners and Anchors: Manufacturer’s standard as required for secure anchorage of signs, noncorrosive and compatible with each material joined, and complying with the following:
1. Use concealed fasteners and anchors unless indicated to be exposed.
2. Sign Mounting Fasteners:
   a. Concealed Studs: Concealed (blind), threaded studs welded or brazed to back of sign material, screwed into back of sign assembly, or screwed into tapped lugs cast integrally into back of cast sign material, unless otherwise indicated.

2.4 FABRICATION
A. General: Provide manufacturer’s standard sign assemblies according to requirements indicated.
1. Preassemble signs and assemblies in the shop to greatest extent possible. Disassemble signs and assemblies only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation; apply markings in locations concealed from view after final assembly.
2. Mill joints to a tight, hairline fit. Form assemblies and joints exposed to weather to resist water penetration and retention.
3. Comply with AWS for recommended practices in welding and brazing. Provide welds and brazes behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded and brazed connections of flux, and dress exposed and contact surfaces.
4. Conceal connections if possible; otherwise, locate connections where they are inconspicuous.
5. Internally brace dimensional characters for stability, to meet structural performance loading without oil-canning or other surface deformation, and for securing fasteners.
6. Provide rabbets, lugs, and tabs necessary to assemble components and to attach to existing work. Drill and tap for required fasteners. Use concealed fasteners where possible; use exposed fasteners that match sign finish.
7. Castings: Fabricate castings free of warp, cracks, blowholes, pits, scale, sand holes, and other defects that impair appearance or strength. Grind, wire brush, sandblast, and buff castings to remove seams, gate marks, casting flash, and other casting marks before finishing.

2.5 GENERAL FINISH REQUIREMENTS
A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
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.

2.6 ALUMINUM FINISHES
A. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils (0.04 mm). Comply with coating manufacturer’s written instructions for cleaning, conversion coating, and applying and baking finish.
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.
B. Verify that sign-support surfaces are within tolerances to accommodate signs without gaps or irregularities between backs of signs and support surfaces unless otherwise indicated.
C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION
A. General: Install signs using mounting methods indicated and according to manufacturer’s written instructions.
   1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
   2. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.
   3. Corrosion Protection: Coat concealed surfaces of exterior aluminum in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.
B. Mounting Methods:
   1. Concealed Studs: Using a template, drill holes in substrate aligning with studs on back of sign. Remove loose debris from hole and substrate surface.
      a. Masonry Substrates: Fill holes with adhesive. Leave recess space in hole for displaced adhesive. Place sign in position and push until flush to surface, embedding studs in holes. Temporarily support sign in position until adhesive fully sets.
      b. Thin or Hollow Surfaces: Place sign in position and flush to surface, install washers and nuts on studs projecting through opposite side of surface, and tighten.

3.3 ADJUSTING AND CLEANING
A. Remove and replace damaged or deformed characters and signs that do not comply with specified requirements. Replace characters with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.
B. Remove temporary protective coverings and strippable films as signs are installed.
C. On completion of installation, clean exposed surfaces of signs according to manufacturer’s written instructions, and touch up minor nicks and abrasions in finish. Maintain signs in a clean condition during construction and protect from damage until acceptance by Owner.

3.4 SCHEDULE
A. Provide street number identification signage to read the following:
   1. FARLEY MUNICIPAL BUILDING.

END OF SECTION
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. Room-identification signs.
B. Related Requirements:
1. Section 265219 "Emergency and Exit Lighting" for illuminated, self-luminous, and photoluminescent exit sign units.

1.3 DEFINITIONS
A. Accessible: In accordance with the accessibility standard.
B. Illuminated: Illuminated by lighting source integrally constructed as part of the sign unit.

1.4 ACTION SUBMITTALS
A. Product Data: For each type of product.
B. Shop Drawings: For panel signs.
   1. Include fabrication and installation details and attachments to other work.
   2. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
   3. Show message list, typestyles, graphic elements, including raised characters and Braille, and layout for each sign at least half size.
C. Samples for Initial Selection: For each type of sign assembly, exposed component, and exposed finish.
   1. Include representative Samples of available typestyles and graphic symbols.
D. Sign Schedule: Use same designations specified or indicated on Drawings or in a sign schedule.

1.5 CLOSEOUT SUBMITTALS
A. Maintenance Data: For signs to include in maintenance manuals.
B. Special Warranty: 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 finishes beyond normal weathering.
      b. Deterioration of embedded graphic image.
      c. Separation or delamination of sheet materials and components.
   2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SIGNS
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. ASI Sign Systems, Inc.
   2. Best Sign Systems, Inc.
B. Room-Identification Sign: Sign with smooth, uniform surfaces; with message and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:
2. Restroom Signs – 6” x 8” Pictogram.
   a. Type A: Door 110 – Door sign containing international symbol for men and wheelchair and word “MEN”.
   b. Type B: Door 109 – Door sign containing international symbol for women and wheelchair and word “WOMEN”.
   c. Type C: Door 116, 123 – Door sign containing international symbol for unisex and wheelchair and word “RESTROOM”.
3. Room Identification Signs – 8” x 6”.
   a. Type A: Door 108, 114 - Door sign containing the words, “MECHANICAL”.
   b. Type B: Door 106: Door sign containing the words, “COUNCIL CHAMBERS”.
   c. Type C: Door 105B: Door sign containing the words, “CITY OFFICES”.
4. Mounting: Surface mounted to wall with two-face tape or magnetic tape.
5. Text and Typeface: Accessible raised characters and Braille of typeface as selected by Architect from manufacturer’s full range. Finish raised characters to contrast with background color, and finish Braille to match background color.

2.2 DOOR INFORMATION SIGNAGE
A. Vinyl film shall be UV-resistant, with pressure-sensitive, permanent adhesive, die cut to form characters or images as indicated, suitable for exterior applications.
   1. Provide letter / numerical signage to be applied to Door 105A.
   2. Letter / numerical signage to be 6” height.
   3. Letter / numerical signage to contain the following: “206”

2.3 ACCESSORIES
A. Fasteners and Anchors: Manufacturer’s standard as required for secure anchorage of signage, noncorrosive and compatible with each material joined, and complying with the following:
   1. Use concealed fasteners and anchors unless indicated to be exposed.
B. Adhesive: As recommended by sign manufacturer.
C. Two-Face Tape: Manufacturer’s standard high-bond, foam-core tape, 0.045 inch (1.14 mm) thick, with adhesive on both sides.
D. Magnetic Tape: Manufacturer’s standard magnetic tape with adhesive on one side.

2.4 FABRICATION
A. Surface-Engraved Graphics: Machine engrave characters and other graphic devices into panel surface indicated to produce precisely formed copy, incised to uniform depth.
   1. Engraved Opaque Acrylic Sheet: Fill engraved graphics with manufacturer’s standard enamel.

2.5 GENERAL FINISH REQUIREMENTS
A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION
3.1 EXAMINATION
A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of signage work.
B. Verify that sign-support surfaces are within tolerances to accommodate signs without gaps or irregularities between backs of signs and support surfaces unless otherwise indicated.
C. Proceed with installation only after unsatisfactory conditions have been corrected.
3.2 INSTALLATION

A. General: Install signs using mounting methods indicated and according to manufacturer’s written instructions.
   1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
   2. Install signs so they do not protrude or obstruct according to the accessibility standard.
   3. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.
   4. Corrosion Protection: Coat concealed surfaces of exterior aluminum in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.

B. Room-Identification Signs and Other Accessible Signage: Install in locations on walls according to accessibility standard.

C. Mounting Methods:
   1. Two-Face Tape: Clean bond-breaking materials from substrate surface and remove loose debris. Apply tape strips symmetrically to back of sign and of suitable quantity to support weight of sign without slippage. Keep strips away from edges to prevent visibility at sign edges. Place sign in position, and push to engage tape adhesive.

3.3 ADJUSTING AND CLEANING

A. Remove and replace damaged or deformed signs and signs that do not comply with specified requirements. Replace signs with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.

B. Remove temporary protective coverings and strippable films as signs are installed.

C. On completion of installation, clean exposed surfaces of signs according to manufacturer’s written instructions, and touch up minor nicks and abrasions in finish. Maintain signs in a clean condition during construction and protect from damage until acceptance by Owner.

END OF SECTION
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. Phenolic-core toilet compartments configured as toilet enclosures and urinal screens.
   B. Related Requirements:
      1. Section 061000 "Rough Carpentry" for blocking.
      2. Section 102800 "Toilet, Bath, and Laundry Accessories" for toilet tissue dispensers, grab bars, purse
         shelves, and similar accessories mounted on toilet compartments.

1.3 ACTION SUBMITTALS
   A. Product Data: For each type of product.
      1. Include construction details, material descriptions, dimensions of individual components and profiles,
         and finishes for toilet compartments.
   B. Shop Drawings: For toilet compartments.
      1. Include plans, elevations, sections, details, and attachment details.
      2. Show locations of centerlines of toilet fixtures.
   C. Samples for Initial Selection: For each type of toilet compartment material indicated.
      1. Include Samples of hardware and accessories involving material and color selection.
   D. Product Schedule: For toilet compartments, prepared by or under the supervision of supplier, detailing
      location and selected colors for toilet compartment material.

1.4 CLOSEOUT SUBMITTALS
   A. Maintenance Data: For toilet compartments to include in maintenance manuals.

1.5 MAINTENANCE MATERIAL SUBMITTALS
   A. Furnish extra materials that match products installed and that are packaged with protective covering for
      storage and identified with labels describing contents.
      1. Door Hinges: One hinge(s) with associated fasteners.
      2. Latch and Keeper: One latch(es) and keeper(s) with associated fasteners.
      3. Door Bumper: One door bumper(s) with associated fasteners.
      4. Door Pull: One door pull(s) with associated fasteners.
      5. Fasteners: Ten fasteners of each size and type.

1.6 PROJECT CONDITIONS
   A. Field Measurements: Verify actual locations of toilet fixtures, walls, columns, ceilings, and other construction
      contiguous with toilet compartments by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS
   A. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation
      Barriers Compliance Board’s ADA-ABA Accessibility Guidelines for Buildings and Facilities for toilet
      compartments designated as accessible.
2.2 HDPE TOILET COMPARTMENTS

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. Accurate Partitions Corp.; ASI Group.
   2. General Partitions Mfg. Corp.
   4. Scranton Products.

B. Toilet Enclosure Style: Floor anchored and overhead braced. Provide additional overhead bracing at mid point of long wall of toilet enclosure and at 45 degree corner of enclosure.

C. Door, Panel, and Pilaster Construction: High density polyethylene (HDPE), fabricated from polymer resins compounded under high pressure, forming single thickness panel with eased and polished edges and no-sightline system. Provide minimum 3/4-inch- (19-mm-) thick doors and pilasters and minimum 1/2-inch- (13-mm-) thick panels.

D. Pilaster Shoes and Sleeves (Caps): Formed from stainless-steel sheet, not less than 0.031-inch (0.79-mm) nominal thickness and 3 inches (76 mm) high, finished to match hardware.

E. Brackets (Fittings):
   1. Full-Height (Continuous) Type: Manufacturer's standard design; stainless steel.

F. Panel Finish:
   1. Facing Sheet Finish: One color and pattern in each room.
   2. Color and Pattern: As selected by Architect from manufacturer's full range, with manufacturer's through-color core matching face sheet.

2.3 HARDWARE AND ACCESSORIES

A. Hardware and Accessories: Manufacturer’s standard operating hardware and accessories.
   2. Hinges: Manufacturer’s adjustable continuous, cam type that swings to a closed or partially open position, allowing emergency access by lifting door.
   3. Latch and Keeper: Manufacturer’s standard surface-mounted latch unit designed for emergency access and with combination rubber-faced door strike and keeper. Provide units that comply with regulatory requirements for accessibility at compartments designated as accessible.
   4. Coat Hook: Manufacturer’s standard combination hook and rubber-tipped bumper, sized to prevent in-swinging door from hitting compartment-mounted accessories. Supply two per stall on back of door. One is to be at handicapped required mounting height and the other at 5’-0” above finished floor. Where hook or door will strike partition or adjacent wall, supply door wall bumper at point of impact.
   5. Door Bumper: Manufacturer’s standard rubber-tipped bumper at out-swinging doors.
   6. Door Pull: Manufacturer’s standard unit at out-swinging doors that complies with regulatory requirements for accessibility. Provide units on both sides of doors at compartments designated as accessible.

B. Overhead Bracing: Manufacturer’s standard continuous, extruded-aluminum head rail with antigrip profile and in manufacturer’s standard finish.

C. Anchorages and Fasteners: Manufacturer’s standard exposed fasteners of stainless steel, finished to match the items they are securing, with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications. For concealed anchors, use stainless-steel, hot-dip galvanized-steel, or other rust-resistant, protective-coated steel compatible with related materials.

2.4 MATERIALS

A. Aluminum Castings: ASTM B 26/B 26M.
B. Aluminum Extrusions: ASTM B 221 (ASTM B 221M).
C. Stainless-Steel Sheet: ASTM A 666, Type 304, stretcher-leveled standard of flatness.
D. Stainless-Steel Castings: ASTM A 743/A 743M.
2.5 FABRICATION
A. Fabrication, General: Fabricate toilet compartment components to sizes indicated. Coordinate requirements and provide cutouts for through-partition toilet accessories where required for attachment of toilet accessories.
B. Overhead-Braced Units: Provide manufacturer’s standard corrosion-resistant supports, leveling mechanism, and anchors at pilasters to suit floor conditions. Provide shoes at pilasters to conceal supports and leveling mechanism.
C. Floor-Anchored Units: Provide manufacturer’s standard corrosion-resistant anchoring assemblies with leveling adjustment nuts at pilasters for structural connection to floor. Provide shoes at pilasters to conceal anchorage.
D. Urinal-Screen Posts: Provide manufacturer’s standard corrosion-resistant anchoring assemblies with leveling adjustment nuts at bottoms of posts. Provide shoes and sleeves (caps) at posts to conceal anchorage.
E. Door Size and Swings: 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 designated as accessible.
   1. Out-swinging doors to rest in the closed position. In-swinging doors to rest in 15 degree open position.

PART 3 - EXECUTION
3.1 EXAMINATION
A. Examine areas and conditions, with Installer present, for compliance with requirements for fastening, support, alignment, operating clearances, and other conditions affecting performance of the Work.
   1. Confirm location and adequacy of blocking and supports required for installation.
B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 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. Stirrup Brackets: Secure panels to walls and to pilasters with no fewer than three brackets attached at midpoint and near top and bottom of panel.
      a. Locate wall brackets so holes for wall anchors occur in masonry or tile joints.
      b. Align brackets at pilasters with brackets at walls.
   3. Full-Height (Continuous) Brackets: Secure panels to walls and to pilasters with full-height brackets.
      a. Locate bracket fasteners so holes for wall anchors occur in masonry or tile joints.
      b. Align brackets at pilasters with brackets at walls.
B. Overhead-Braced Units: Secure pilasters to floor and level, plumb, and tighten. Set pilasters with anchors penetrating not less than 1-3/4 inches (44 mm) into structural floor unless otherwise indicated in manufacturer’s written instructions. Secure continuous head rail to each pilaster with no fewer than two fasteners. Hang doors to align tops of doors with tops of panels, and adjust so tops of doors are parallel with overhead brace when doors are in closed position.
C. Floor-Anchored Units: Set pilasters with anchors penetrating not less than 2 inches (51 mm) into structural floor unless otherwise indicated in manufacturer’s written instructions. Hang doors and adjust so tops of doors are level with tops of pilasters when doors are in closed position.
D. Ceiling-Hung Units: Secure pilasters to supporting structure and level, plumb, and tighten. Hang doors and adjust so bottoms of doors are level with bottoms of pilasters when doors are in closed position.
E. Floor-and-Ceiling-Anchored Units: Secure pilasters to supporting structure and level, plumb, and tighten. Hang doors and adjust so doors are level and aligned with panels when doors are in closed position.
F. Urinal Screens: Attach with anchoring devices to suit supporting structure. Set units level and plumb, rigid, and secured to resist lateral impact.
3.3 ADJUSTING
A. Hardware Adjustment: Adjust and lubricate hardware according to hardware 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. Set hinges on out-swinging doors to return doors to fully closed position.

END OF SECTION
DIVISION 10 – SPECIALTIES

SECTION 102800 - TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 - GENERAL

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

1.2 SUMMARY
A. Section Includes:
   1. Public-use washroom accessories.
   2. Underlavatory guards.
   3. Custodial accessories.
B. Related Requirements:
   1. Section 088300 "Mirrors" for frameless mirrors.

1.3 COORDINATION
A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.
B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

1.4 ACTION SUBMITTALS
A. Product Data: For each type of product.
   1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
   2. Include anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
B. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.
   1. Identify locations using room designations indicated.

1.5 CLOSEOUT SUBMITTALS
A. Maintenance Data: For accessories to include in maintenance manuals.

1.6 WARRANTY
A. Manufacturer's Special Warranty for Mirrors: Manufacturer agrees to repair or replace mirrors that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, visible silver spoilage defects.
   2. Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 OWNER-FURNISHED MATERIALS
A. Owner-Furnished Materials: None.

2.2 PERFORMANCE REQUIREMENTS
A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2.3 PUBLIC-USE WASHROOM ACCESSORIES
A. Source Limitations: Obtain public-use washroom accessories 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. A & J Washroom Accessories, Inc.
   2. Bobrick Washroom Equipment, Inc. (Basis of Specification)
C. Toilet Tissue (Roll) Dispenser: Provide one at each toilet.
   1. Basis of Design Product: Bobrick B686
   2. Description: Double Roll Dispenser.
   5. Material and Finish: Stainless steel, No. 4 finish (satin).
D. Grab Bar: Provide one full set at each ADA compliant stall in restrooms 105 and 106.
   3. Material: Stainless steel, 0.05 inch thick.
      a. Finish: Smooth, No. 4 finish (satin).
   4. Outside Diameter: 1 1/2 inches.
   5. Configuration: 42” mounted horizontally, 36” mounted horizontally, 18” mounted vertically. Reference interior elevations on plans for mounting heights and locations.

2.4 UNDERLAVATORY GUARDS
A. Underlavatory Guard: Provide at all lavatories.
   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. Plumberex Specialty Products, Inc.
      b. Truebro by IPS Corporation.
   2. Description: Insulating pipe covering for supply and drain piping assemblies that prevents direct contact with and burns from piping; allow service access without removing coverings.

2.5 CUSTODIAL ACCESSORIES
A. Source Limitations: Obtain custodial accessories from single source from single manufacturer.
B. Mop and Broom Holder:
   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. AJW Architectural Products.
      b. Bobrick Washroom Equipment, Inc.
      c. Bradley Corporation.
   2. Description: Unit with shelf, hooks, holders, and rod suspended beneath shelf.
   3. Length: 36 inches (914 mm).
   5. Mop/Broom Holders: Three, spring-loaded, rubber hat, cam type.
      a. Shelf: Not less than nominal 0.05-inch- (1.3-mm-) thick stainless steel.
      b. Rod: Approximately 1/4-inch- (6-mm-) diameter stainless steel.

2.6 MATERIALS
A. Stainless Steel: ASTM A 666, Type 304, 0.031-inch (0.8-mm) minimum nominal thickness unless otherwise indicated.
B. Brass: ASTM B 19, flat products; ASTM B 16/B 16M, rods, shapes, forgings, and flat products with finished edges; or ASTM B 30, castings.
SPECIFICATIONS: Farley Municipal Building
206 1st Street N., Farley, Iowa 52046
ARCHITECT PROJECT #1728.01

C. Steel Sheet: ASTM A 1008/A 1008M, Designation CS (cold rolled, commercial steel), 0.036-inch (0.9-mm) minimum nominal thickness.
D. Galvanized-Steel Sheet: ASTM A 653/A 653M, with G60 (Z180) hot-dip zinc coating.
F. Fasteners: Screws, bolts, and other devices of same material as accessory unit and tamper-and-theft resistant where exposed, and of galvanized steel where concealed.
G. Chrome Plating: ASTM B 456, Service Condition Number SC 2 (moderate service).

2.7 FABRICATION
A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.
B. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner’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 (1112 N), when tested according to ASTM F 446.

3.2 ADJUSTING AND CLEANING
A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.
B. Remove temporary labels and protective coatings.
C. Clean and polish exposed surfaces according to manufacturer’s written instructions.

END OF SECTION
DIVISION 10 – SPECIALTIES

SECTION 104413 - FIRE PROTECTION CABINETS

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. Fire-protection cabinets for the following:
      a. Portable fire extinguishers.

1.3 ACTION SUBMITTALS
A. Product Data: For each type of product. Show door hardware, cabinet type, trim style, and panel style. Include roughing-in dimensions and details showing recessed-, semirecessed-, or surface-mounting method and relationships of box and trim to surrounding construction.
B. Shop Drawings: For fire-protection cabinets. Include plans, elevations, sections, details, and attachments to other work.
C. Product Schedule: For fire-protection cabinets. Indicate whether recessed, semirecessed, or surface mounted. Coordinate final fire-protection cabinet schedule with fire-extinguisher schedule to ensure proper fit and function.

1.4 CLOSEOUT SUBMITTALS
A. Maintenance Data: For fire-protection cabinets to include in maintenance manuals.

1.5 COORDINATION
A. Coordinate size of fire-protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.
B. Coordinate sizes and locations of fire-protection cabinets with wall depths.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS
A. Fire-Rated Fire-Protection Cabinets: Listed and labeled to comply with requirements in ASTM E 814 for fire-resistance rating of walls where they are installed.
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.

2.2 FIRE-PROTECTION CABINET
A. Cabinet Type: Suitable for fire extinguisher.
   1. Larsen’s Manufacturing (Cameo Series) ADA compliant.
B. Cabinet Construction: Nonrated
C. Cabinet Material: Cold-rolled steel sheet
   1. Shelf: Same metal and finish as cabinet.
D. Semi-recessed Cabinet: One-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend).
   1. Trim Projection: 1 ½” Square
   2. Verify wall condition where new semi-recessed cabinets are to be installed in existing walls. Cabinets are not to be recessed in concrete block or fire-rated walls. To comply with ADA
requirements, fire extinguisher cabinets must not protrude more than 4” from the wall surface into a path of travel. Notify Architect if there is a conflict.

E. Cabinet Trim Material: Steel sheet.

F. Door Material: Steel sheet.

G. Door Style: Full acrylic bubble with frame.

H. Door Glazing: Molded acrylic bubble.
   1. Acrylic Bubble Color: Clear, transparent.

I. Door Hardware: Manufacturer’s standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.
   1. Provide projecting door pull and friction latch.
   2. Provide continuous hinge, of same material and finish as trim, permitting door to open 180 degrees.

J. 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.

K. Materials:
   1. Cold-Rolled Steel: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.
      a. Finish: Baked enamel or powder coat.
      b. Color: As selected by Architect from full range of industry colors and color densities.

2.3 FABRICATION

A. Fire-Protection Cabinets: Provide manufacturer’s standard box (tub) with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.
   1. Weld joints and grind smooth.
   2. Provide factory-drilled mounting holes.
   3. Prepare doors and frames to receive locks.
   4. Install door locks at factory.

B. Cabinet Doors: Fabricate doors according to manufacturer’s standards, from materials indicated and coordinated with cabinet types and trim styles.
   1. Fabricate door frames with tubular stiles and rails and hollow-metal design, minimum 1/2 inch (13 mm) thick.
   2. Fabricate door frames of one-piece construction with edges flanged.
   3. Miter and weld perimeter door frames.

C. Cabinet Trim: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.

2.4 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM’s AMP 500, "Metal Finishes Manual for Architectural and Metal Products," for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces of fire-protection cabinets from damage by applying a strippable, temporary protective covering before shipping.

C. Finish fire-protection cabinets after assembly.

D. 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 roughing-in for 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. 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 cabinets in locations and at mounting heights indicated.
   1. Fire-Protection Cabinets: 54 inches (1372 mm) above finished floor to top of cabinet.
B. Fire-Protection Cabinets: Fasten cabinets to structure, square and plumb.
   1. Unless otherwise indicated, provide recessed fire-protection cabinets. If wall thickness is inadequate 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.

3.4 ADJUSTING AND CLEANING
A. Remove temporary protective coverings and strippable films, if any, as fire-protection cabinets 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 and mounting bracket manufacturers.
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
DIVISION 12 – FURNISHINGS

SECTION 123216 - MANUFACTURED PLASTIC-LAMINATE-FACED CASEWORK

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 plastic-laminate-faced cabinets of stock design.
B. Related Requirements:
   1. Section 061000 "Rough Carpentry" for wood blocking for anchoring casework.
   2. Section 096513 "Resilient Base and Accessories" for resilient base applied to plastic-laminate-faced casework.

1.3 DEFINITIONS
A. Definitions in the AWI's, AWMAC's, and WI's "Architectural Woodwork Standards" apply to the work of this Section.
B. MDF: Medium-density fiberboard.
C. Hardwood Plywood: A panel product composed of layers or plies of veneer, or of veneers in combination with lumber core, hardboard core, MDF core, or particleboard core, joined with adhesive, and faced both front and back with hardwood veneers.

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

1.5 ACTION SUBMITTALS
A. Product Data: For each type of product.
B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work. Show fabrication details, including types and locations of hardware. Show installation details, including field joints and filler panels. Indicate manufacturer's catalog numbers for casework.
C. Samples: For cabinet finishes.
D. Samples for Initial Selection: For cabinet finishes.
E. Samples for Verification: 8-by-10-inch (200-by-250-mm) Samples for each type of finish.

1.6 INFORMATIONAL SUBMITTALS
A. Qualification Data: For Installer.
B. Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.
C. Sample Warranty: For special warranty.

1.7 DELIVERY, STORAGE, AND HANDLING
A. Deliver casework only after painting, utility roughing-in, and similar operations that could damage, soil, or deteriorate casework have been completed in installation areas. If casework must be stored in other than installation areas, store only in areas where environmental conditions meet requirements specified in "Project Conditions" Article.
B. Keep finished surfaces covered with polyethylene film or other protective covering during handling and installation.
1.8 FIELD CONDITIONS
A. Environmental Limitations: Do not deliver or install casework until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period. Maintain temperature and relative humidity during the remainder of the construction period in range recommended for Project location by the AWI’s, AWMAC’s, and WI’s "Architectural Woodwork Standards."
B. Established Dimensions: Where casework is indicated to fit to other construction, establish dimensions for areas where woodwork is to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.
C. Locate concealed framing, blocking, and reinforcements that support casework by field measurements before being enclosed, and indicate measurements on Shop Drawings.

1.9 WARRANTY
A. Special Warranty: Manufacturer agrees to repair or replace components of casework that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Delamination of components or other failures of glue bond.
      b. Warping of components.
      c. Failure of operating hardware.
   2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS
A. Source Limitations: Obtain plastic-laminate-faced cabinets from single manufacturer.

2.2 CASEWORK, GENERAL
A. Quality Standard: Unless otherwise indicated, comply with the AWI’s, AWMAC’s, and WI’s "Architectural Woodwork Standards" for grades of casework indicated for construction, finishes, installation, and other requirements.
   1. Grade: Premium.
B. Product Designations: Drawings indicate configurations of manufactured plastic-laminate-faced cabinets by referencing designations of Casework Design Series numbering system in Appendix A of the AWI’s, AWMAC’s, and WI’s "Architectural Woodwork Standards."

2.3 CASEWORK
A. Design:
   1. Flush overlay.
B. Grain Direction for Wood Grain Plastic Laminate:
   1. Vertical on doors, horizontal on drawer fronts.
C. Exposed Materials:
   1. Plastic Laminate: Grade HGL
      a. Colors and Patterns: As selected by Architect from manufacturer’s full range.
   2. Unless otherwise indicated, provide specified edgebanding on all exposed edges.
D. Semiexposed Materials:
   1. Plastic Laminate: Grade VGS unless otherwise indicated. Provide plastic laminate for semiexposed surfaces unless otherwise indicated.
      a. Provide plastic laminate of same grade as exposed surfaces for interior faces of doors and drawer fronts and other locations where opposite side of component is exposed.
   2. Unless otherwise indicated, provide specified edgebanding on all semiexposed edges.
E. Concealed Materials:
   1. Plastic Laminate: Grade BKL.
2.4 MATERIALS
   A. Maximum Moisture Content for Lumber: 7 percent for hardwood and 12 percent for softwood.
   B. Hardwood Plywood: HPVA HP-1, particleboard core except where veneer core is indicated.
   D. Particleboard: Straw-based particleboard complying with ANSI A208.1, Grade M-2, except for density.
   E. Hardboard: ANSI A135.4, Class 1 Tempered.
   F. Plastic Laminate: High-pressure decorative laminate complying with NEMA LD 3.
      1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
         a. Formica Corporation.
         b. Wilsonart LLC.
   H. Thermoset Decorative Panels: Particleboard or medium-density fiberboard finished with thermally fused,
      melamine-impregnated decorative paper and complying with requirements of NEMA LD 3, Grade VGL, for
      Test Methods 3.3, 3.4, 3.6, 3.8, and 3.10.
   I. Edgebanding for Thermoset Decorative Panels: PVC or polyester edgebanding matching thermoset
      decorative panels.

2.5 COLORS AND FINISHES
   A. Wood Colors and Finishes: As selected by Architect from casework manufacturer’s full range.
   B. Thermoset Decorative Panel Colors, Patterns, and Finishes: As selected by Architect from casework
      manufacturer’s full range.
   C. Plastic-Laminate Colors, Patterns, and Finishes: As selected by Architect from plastic-laminate manufacturer’s
      full range.
   D. PVC Edgebanding Color: As selected from casework manufacturer’s full range.

2.6 FABRICATION
   A. Plastic-Laminate-Faced Cabinet Construction: As required by referenced quality standard, but not less than
      the following:
      1. Bottoms and Ends of Cabinets, and Tops of Wall Cabinets and Tall Cabinets: 3/4-inch (19-mm)
         particleboard.
      2. Shelves: 3/4-inch (19-mm) thick plywood or 1-inch (25-mm) thick particleboard.
      3. Backs of Cabinets: 1/2-inch (12.7-mm) thick particleboard or MDF where exposed, dadoed into
         sides, bottoms, and tops where not exposed.
      4. Drawer Fronts: 3/4-inch (19-mm) particleboard.
      5. Drawer Sides and Backs: 1/2-inch (12.7-mm) solid-wood or veneer-core hardwood plywood with
         glued dovetail or multiple-dowel joints.
      6. Drawer Bottoms: 1/4-inch (6.4-mm) hardwood plywood glued and dadoed into front, back, and
         sides of drawers. Use 1/2-inch (12.7-mm) material for drawers more than 24 inches (600 mm) wide.
      7. Doors 48 Inches (1200 mm) High or Less: 3/4 inch (19 mm) thick, with particleboard or MDF cores.
      8. Doors More Than 48 Inches (1200 mm) High: 1-1/8 inches (29 mm) thick, with particleboard cores.
   B. Filler Strips: Provide as needed to close spaces between cabinets and walls, ceilings, and indicated
      equipment. Fabricate from same material and with same finish as cabinets.

2.7 CASEWORK HARDWARE AND ACCESSORIES
   A. Hardware, General: Unless otherwise indicated, provide manufacturer’s standard satin-finish, commercial-
      quality, heavy-duty hardware.
      1. Use threaded metal or plastic inserts with machine screws for fastening to particleboard except
         where hardware is through-bolted from back side.
   B. Frameless Concealed Hinges (European Type): BHMA A156.9, Type BO1602, 135 degrees of
      opening, self-closing. Provide two hinges for doors less than 48 inches (1220 mm) high, and provide three
      hinges for doors more than 48 inches (1220 mm) high.
C. Pulls: Solid stainless-steel or chrome-plated brass wire pulls, fastened from back with two screws. For sliding doors, provide recessed stainless-steel or chrome-plated flush pulls. Provide two pulls for drawers more than 24 inches (600 mm) wide.

D. Door Catches: Zinc-plated, nylon-roller spring catch or dual, self-aligning, permanent magnet catch. Provide two catches on doors more than 48 inches (1220 mm) high.

E. Drawer Slides: BHMA A156.9, Type B05091.
   1. Heavy Duty (Grade 1HD-100 and Grade 1HD-200): Side mounted; full-overtravel-extension type; zinc-plated, steel ball-bearing slides.

F. Drawer and Hinged Door Locks: Mortise type, five-pin tumbler, brass with chrome-plated finish, and complying with BHMA A156.11, Grade 1.
   1. Provide a minimum of two keys per lock and six master keys.
   2. Provide locks on all doors and drawers.

G. Adjustable Shelf Supports: Single-pin metal shelf rests complying with BHMA A156.9, Type B04013.

PART 3 - EXECUTION

3.1 EXAMINATION
   A. Examine areas, with Installer present, for compliance with requirements for installation tolerances, location of framing and reinforcements, and other conditions affecting performance of the Work.
   B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 CASEWORK INSTALLATION
   A. Grade: Install cabinets to comply with same grade as item to be installed.
   B. Install casework level, plumb, and true; shim as required, using concealed shims. Where casework abuts other finished work, apply filler strips and scribe for accurate fit, with fasteners concealed where practical.
   C. Base Cabinets: Set cabinets straight, level, and plumb. Adjust subtops within 1/16 inch (1.5 mm) of a single plane. Align similar adjoining doors and drawers to a tolerance of 1/16 inch (1.5 mm). Bolt adjacent cabinets together with joints flush, tight, and uniform.
   D. Wall Cabinets: Hang cabinets straight, level, and plumb. Adjust fronts and bottoms within 1/16 inch (1.5 mm) of a single plane. Fasten to hanging strips, masonry, framing, wood blocking, or reinforcements in walls and partitions. Align similar adjoining doors to a tolerance of 1/16 inch (1.5 mm).
   E. Fasten cabinets to adjacent cabinets and to masonry, framing, wood blocking, or reinforcements in walls and partitions to comply with the AWI’s, AWMAC’s, and WI’s "Architectural Woodwork Standards."
   F. Install hardware uniformly and precisely. Set hinges snug and flat in mortises unless otherwise indicated. Adjust and align hardware so moving parts operate freely and contact points meet accurately. Allow for final adjustment after installation.
   G. Adjust casework and hardware so doors and drawers operate smoothly without warp or bind. Lubricate operating hardware as recommended by manufacturer.

3.3 CLEANING
   A. Repair or remove and replace defective work as directed on completion of installation.
   B. Clean finished surfaces, touch up as required, and remove or refinish damaged or soiled areas to match original factory finish, as approved by Architect.

END OF SECTION
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 plastic-laminate countertops.

1.3 ACTION SUBMITTALS
A. Product Data: For each type of product, including panel products, high-pressure decorative laminate, adhesive for bonding plastic laminate, and fire-retardant-treated materials.
1. Include data for fire-retardant treatment from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements.
B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.
1. Show locations and sizes of cutouts and holes for plumbing fixtures, faucets, soap dispensers, electrical switches and outlets, and other items installed in plastic-laminate countertops.
2. Apply AWI Quality Certification Program label to Shop Drawings.
C. Samples for Initial Selection:
1. Plastic laminates.
D. Samples for Verification:
1. Plastic laminates, 8 by 10 inches (200 by 250 mm), for each type, color, pattern, and surface finish, with one sample applied to core material and specified edge material applied to one edge.

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. Shop is a certified participant in AWI's Quality Certification Program.

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

1.6 FIELD CONDITIONS
A. Environmental Limitations: Do not deliver or install countertops until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.
B. Field Measurements: Where countertops are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
C. Established Dimensions: Where countertops are indicated to fit to other construction, establish dimensions for areas where countertops are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.
PART 2 - PRODUCTS

2.1 PLASTIC-LAMINATE COUNTERTOPS
   A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades indicated for construction, installation, and other requirements.
      1. Provide labels from AWI certification program indicating that countertops comply with requirements of grades specified.
   B. Grade: Premium.
   C. High-Pressure Decorative Laminate: NEMA LD 3, Grade HGS.
      1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
         a. Formica Corporation.
         b. Wilsonart LLC.
   D. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:
      1. As selected by Architect from manufacturer's full range in the following categories:
         a. Solid colors, gloss and matte finish.
         b. Patterns, gloss and matte finish.
   E. Edge Treatment: Same as laminate cladding on horizontal surfaces.
   F. Core Material: Particleboard made with exterior glue.
   G. Core Material at Sinks: Particleboard made with exterior glue.
   H. Core Thickness: 3/4 inch (19 mm).
      1. Build up countertop thickness to 1-1/2 inches (38 mm) at front, back, and ends with additional layers of core material laminated to top.
   I. Backer Sheet: Provide plastic-laminate backer sheet, NEMA LD 3, Grade BKL, on underside of countertop substrate.

2.2 STATIONARY COUNTER TOP BRACKETS
   A. Knape & Vogt 208 Series Ultimate L-Bracket.
      2. Provide at all bathroom counter tops as indicated on plans.

2.3 MISCELLANEOUS MATERIALS
   A. Adhesive for Bonding Plastic Laminate: Unpigmented contact cement.
      1. Adhesive for Bonding Edges: Hot-melt adhesive or adhesive specified above for faces.

2.4 FABRICATION
   A. Sand fire-retardant-treated wood lightly to remove raised grain on exposed surfaces before fabrication.
   B. Fabricate countertops to dimensions, profiles, and details indicated. Provide front and end overhang of 1 inch (25 mm) over base cabinets. Ease edges to radius indicated for the following:
      1. Solid-Wood (Lumber) Members: 1/16 inch (1.5 mm) unless otherwise indicated.
   C. 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 ample allowance for scribing, trimming, and fitting.
      1. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements before disassembling for shipment.

PART 3 - EXECUTION

3.1 PREPARATION
   A. Before installation, condition countertops to average prevailing humidity conditions in installation areas.
B. Before installing countertops, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.

3.2 INSTALLATION

A. Grade: Install countertops to comply with same grade as item to be installed.

B. Assemble countertops and complete fabrication at Project site to the extent that it was not completed in the shop.

1. Provide cutouts for appliances, plumbing fixtures, electrical work, and similar items.

2. Seal edges of cutouts by saturating with varnish.

C. Field Jointing: Where possible, make in the same manner as shop jointing, using dowels, splines, adhesives, and fasteners recommended by manufacturer. Prepare edges to be joined in shop so Project-site processing of top and edge surfaces is not required. Locate field joints where shown on Shop Drawings.

1. Secure field joints in plastic-laminate countertops with concealed clamping devices located within 6 inches (150 mm) of front and back edges and at intervals not exceeding 24 inches (600 mm). Tighten according to manufacturer’s written instructions to exert a constant, heavy-clamping pressure at joints.

D. Install countertops level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches (3 mm in 2400 mm).

E. Scribe and cut countertops to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.

F. Countertops: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.

1. Install countertops with no more than 1/8 inch in 96-inch (3 mm in 2400-mm) sag, bow, or other variation from a straight line.

2. Secure backsplashes to tops with concealed metal brackets at 16 inches (400 mm) o.c. and to walls with adhesive.

3. Seal junctures of tops, splashes, and walls with mildew-resistant silicone sealant or another permanently elastic sealing compound recommended by countertop material manufacturer.

3.3 ADJUSTING AND CLEANING

A. Repair damaged and defective countertops, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.

B. Clean countertops on exposed and semiexposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION
DIVISION 22 - PLUMBING

SECTION 22 0100 - PLUMBING ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES
A. Coordination drawings.
B. Submittals for review, information, and project closeout.
C. Number of copies of submittals.
D. Submittal procedures.

1.2 PROJECT COORDINATION
A. Make the following types of submittals to the Architect/Engineer through the Project Coordinator:
   1. Requests for substitution.
   2. Shop drawings, product data, and samples.
   3. Test and inspection reports.
   4. Manufacturer's instructions and field reports.
   5. Applications for payment and change order requests.
   6. Progress schedules.
   7. Coordination drawings.
   8. Closeout submittals.
   9. As-built Record Drawings.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 COORDINATION DRAWINGS
A. Provide information required by Project Coordinator for preparation of coordination drawings.
B. Review drawings prior to submission to Architect/Engineer.
C. The Contractor and all sub-contractors shall coordinate the construction by all trades prior to installation of the equipment. This shall include the preparation of coordination drawings showing all architectural, structural, mechanical, and electrical components above the ceilings, in mechanical rooms, and other places containing a significant number of utilities or limited space for utilities.

3.2 SUBMITTALS FOR REVIEW
A. When the following are specified in individual sections, submit them for review:
   1. Product data.
   2. Shop drawings.
B. Submit to Architect/Engineer for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.
C. Contractor is responsible for dimensions and compliance with construction documents. Engineer's review is to assist the Contractor only.
D. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below.

3.3 SUBMITTALS FOR INFORMATION
A. When the following are specified in individual sections, submit them for information:
   1. Design data.
   2. Certificates.
   3. Test reports.
   4. Inspection reports.
   5. Manufacturer's instructions.
   6. Other types indicated.
B. Submit for the Architect/Engineer's knowledge as contract administrator or for the Owner.
3.4 SUBMITTALS FOR PROJECT CLOSEOUT
   A. When the following are specified in individual sections, submit them at project closeout:
      1. Project record documents.
      2. Operation and maintenance data.
      3. Warranties.
      4. Test and balance reports.
      5. System certification as required.
      6. Other types as indicated.

3.5 NUMBER OF COPIES OF SUBMITTALS
   A. Documents for Review:
      1. Small size sheets, not larger than 8-1/2 x 11 inches (215 x 280 mm): Submit the number of copies which the Contractor requires, plus 3 copies which will be retained by the Architect. A minimum of eight submittals shall be submitted.
      2. Larger sheets, not larger than 36 x 48 inches (910 x 1220 mm): Submit the number of opaque reproductions which Contractor requires, plus 3 copies which will be retained by Architect. A minimum of eight submittals shall be submitted.
   B. Documents for Information: Submit 3 copies.
   C. Documents for Project Closeout: Make 3 reproductions of submittal originally reviewed. Submit one extra of submittals for information.
   D. Refer to front-end specifications for acceptance of electronic submittals.

3.6 SUBMITTAL PROCEDURES
   A. Identify Project, Contractor, Subcontractor or supplier; pertinent drawing and detail number, and specification section number, as appropriate on each copy.
   B. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of Products required, field dimensions, adjacent construction Work, and coordination of information is in accordance with the requirements of the Work and Contract Documents.
   C. Deliver submittals to Architect/Engineer at business address.
   D. Schedule submittals to expedite the Project, and coordinate submission of related items.
   E. Identify variations from Contract Documents and Product or system limitations which may be detrimental to successful performance of the completed Work.
   F. Provide space for Architect/Engineer's review stamp.
   G. When revised for resubmission, identify all changes made since previous submission and identify it as a RESUBMITTAL.
   H. Distribute copies of reviewed submittals as appropriate. Instruct parties to promptly report any inability to comply with requirements.
   I. Submittals not requested will not be recognized or processed if they have not been checked and stamped by the General Contractor and Mechanical Contractor.
   J. The Contractor shall be responsible for timely submittal of shop drawings to avoid delays in material delivery. The Contractor shall coordinate with all sub-contractors and/or suppliers to expedite the generation of shop drawings. The Contractor shall advise the Engineer on a reasonable timeframe for the review of shop drawings by the Engineer for each set of shop drawings. The Contractor shall be responsible for a periodic checking on the status of all shop drawings and material delivery.

END OF SECTION
PART 1 GENERAL

1.1 SECTION INCLUDES
A. General product requirements.
B. Transportation, handling, storage and protection.
C. Product option requirements.
D. Substitution limitations and procedures.
E. Spare parts and maintenance materials.

1.2 SUBMITTALS
A. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.
B. Shop Drawing Submittals: Prepared specifically for this Project.

PART 2 PRODUCTS

2.1 PRODUCTS
A. Do not use materials and equipment removed from existing premises, except as specifically permitted by the Contract Documents.
B. Provide interchangeable components of the same manufacture for components being replaced.
C. Wiring Terminations: Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Size terminal lugs to NFPA 70, include lugs for terminal box.
D. Cord and Plug: Provide minimum 6 foot (2 m) cord and plug including grounding connector for connection to electric wiring system. Cord of longer length is specified in individual specification sections.

2.2 PRODUCT OPTIONS
A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.
B. Products Specified by Naming One or More Manufacturers: Use a product of one of the manufacturers named and meeting specifications, no options or substitutions allowed.
C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.
D. Manufacturers listed as "equivalent" to the specified manufacturer are encouraged to submit information on their product prior to bid.
E. Manufacturers interested in bidding their materials shall review the drawings, specifications, and construction codes during the bidding period to assure that their products meet the application requirements for the project. Manufacturers shall include all accessories and components for their material/equipment to be installed per the project requirements, applicable building codes, and their own written installation instructions and/or recommendations.
F. Manufacturers shall advise the engineer in writing of any potential issues or additional material requirements at least eight (8) days prior to bid date so any corrections can be addressed in an addendum. Requests for additional compensation after the bid to install materials per the project requirements, building codes, or manufacturer's instructions and/or recommendations shall be denied.

2.3 SPARE PARTS AND MAINTENANCE PRODUCTS
A. Provide spare parts, maintenance, and extra products of types and in quantities specified in individual specification sections.
B. Deliver to Project site; obtain receipt prior to final payment.
3.1 SUBSTITUTION PROCEDURES
A. Instructions to Bidders specify time restrictions for submitting requests for substitutions during the bidding period. Comply with requirements specified in that section in addition to any in this section giving preference to the Instructions to Bidders.
B. Substitutions may be considered when a product becomes unavailable through no fault of the Contractor.
C. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents.
D. A request for substitution constitutes a representation that the submitter:
   1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
   2. Will provide the same warranty for the substitution as for the specified product.
   3. Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to Owner.
   4. Waives claims for additional costs or time extension which may subsequently become apparent.
E. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.
F. Substitution Submittal Procedure:
   1. Submit three copies of request for substitution for consideration. Limit each request to one proposed substitution.
   2. Submit shop drawings, product data, and certified test results attesting to the proposed product equivalence. Burden of proof is on proposer.
   3. The Architect/Engineer will notify Contractor in writing of decision to accept or reject request.

3.2 TRANSPORTATION AND HANDLING
A. Transport and handle products in accordance with manufacturer's instructions.
B. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.
C. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.

3.3 STORAGE AND PROTECTION
A. Store and protect products in accordance with manufacturers' instructions.
B. Store with seals and labels intact and legible.
C. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.
D. For exterior storage of fabricated products, place on sloped supports above ground.
E. Provide bonded off-site storage and protection when site does not permit on-site storage or protection. Certificate of insurance shall be presented prior to storing products or materials off-site.
F. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
G. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.
H. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
I. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

END OF SECTION
DIVISION 22 - PLUMBING

SECTION 22 0120 - PLUMBING EXECUTION REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES
A. Examination, preparation, and general installation procedures.
B. Cleaning and protection.
C. Starting and testing of systems and equipment.
D. Demonstration and instruction of Owner personnel.
E. Closeout procedures, except payment procedures.

1.2 DRAWINGS AND MEASUREMENTS
A. Contract drawings for mechanical work are in part diagrammatic, intended to convey the scope of work and indicate general arrangement of equipment, ducts, conduits, piping and approximate sizes and locations of equipment and outlets.
B. Mechanical trades shall follow these drawings in laying out their work, consult general construction drawings to familiarize themselves with all conditions affecting their work, and shall verify spaces in which their work will be installed.
C. Coordinate work with other trades as job conditions reasonably require.
D. Where job conditions require reasonable changes in indicated locations and arrangement, make such changes without extra cost to Owner.
E. The drawings are not intended to be scaled for roughing measurements nor to serve as shop drawings.
F. The installation details, instruction and recommendations of the manufacturer of the product used, shall form the basis of the installation of the products for usage on this project except where definite and specific instructions are set forth therein or details are shown on plans.

1.3 ORDINANCES, PERMITS AND CODES
A. All work shall be executed in accordance with the Local, State and other attending rules and regulations applicable to the trade affected and be subject to the inspection of these departments.
B. Obtain all permits and licenses required for work performed under Division 22 and pay all fees in connection with same.
C. Where work required by the drawings and specification is above the standard required by local regulations, it shall be done as shown and/or specified.

1.4 COORDINATION
A. Coordinate scheduling, submittals, and work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.
B. Verify utility requirements and characteristics of operating elements are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.
C. Coordinate space requirements, supports, and installation of mechanical and electrical work which are indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
D. Coordinate installation of equipment, piping, ductwork, etc. with electrical gear. Equipment shall not be located in front of panels. Ductwork and piping shall not be routed above panels. Coordinate location of electrical equipment with Division 26. Install per NEC requirements.
E. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.
F. Coordinate completion and clean-up of work of separate sections.
G. After Owner occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of Owner's activities.
H. The Contractor and all sub-contractors shall coordinate the construction by all trades prior to installation of the equipment. This shall include the preparation of coordination drawings showing all architectural, structural, mechanical, and electrical components above the ceilings, in mechanical rooms, and other places containing a significant number of utilities or limited space for utilities.

PART 2 PRODUCTS

2.1 NO REQUIREMENTS

PART 3 EXECUTION

3.1 CLARIFICATION OF CONSTRUCTION DOCUMENTS
   A. Prior to submitting written questions in the form of Requests for Information (RFI’s) or similar paperwork, the Contractor shall contact the Engineer by telephone to discuss the question and possible solutions. Written correspondence shall follow the verbal communications where paperwork is necessary to document significant changes to the construction documents or contract price.

3.2 EXAMINATION
   A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Beginning new work means acceptance of existing conditions.
   B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.
   C. Examine and verify specific conditions described in individual specification sections.
   D. Verify that utility services are available, of the correct characteristics, and in the correct locations.
   E. Protect the work of other trades.

3.3 PREPARATION
   A. Prepare surfaces and remove surface finishes to provide for proper installation of new work and finishes.
   B. Clean substrate surfaces prior to applying next material or substance.
   C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

3.4 GENERAL INSTALLATION REQUIREMENTS
   A. Install Products as specified in individual sections.
   B. Make neat transitions. Patch work to match adjacent work in texture and appearance.
   C. When existing finished surfaces are cut so that a smooth transition with new work is not possible, terminate existing surface along a straight line at a natural line of division and make recommendation to Architect.
   D. Where there are multiple similar rooms or equipment installations, the Contractor shall "mock-up" a completed room or installation prior to beginning construction of the remaining similar rooms or equipment. This will give the Engineer, Architect, and/or Owner the opportunity to view a typical installation.

3.5 PROGRESS CLEANING
   A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition as per OSHA standards.
   B. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.
   C. Collect and remove waste materials, debris, and rubbish from site periodically and dispose off-site.

3.6 PROTECTION OF INSTALLED WORK
   A. Protect installed work and provide special protection where specified in individual specification sections.
   B. Provide temporary and removable protection for installed Products. Control activity in immediate work area to prevent damage.

3.7 STARTING SYSTEMS
   A. Coordinate schedule for start-up of various equipment and systems.
   B. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions which may cause damage.
   C. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.
   D. Verify that wiring and support components for equipment are complete and tested.
E. Execute start-up under supervision of applicable Contractor personnel in accordance with manufacturers’ instructions.

F. When specified in individual specification Sections, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.

G. Submit a written report that equipment or system has been properly installed and is functioning correctly. Report shall include all test results and procedures.

H. Provide the services of a factory trained representative to instruct the Owner’s authorized personnel, where indicated, in the operation, control and maintenance of equipment.

I. Any irregularities, faulty equipment, etc. shall be repaired or replaced as required prior to acceptance.

J. Run operating test for three (3) eight (8) hour periods.

K. All equipment shall be freshly oiled, filters charged with clean media and installation completely finished prior to acceptance.

3.8 DEMONSTRATION AND INSTRUCTION

A. Demonstrate operation and maintenance of Products to Owner’s personnel two weeks prior to date of final inspection. Date shall be coordinated with owner.

B. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at agreed time, at equipment location.

C. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.

D. Provide a qualified person who is knowledgeable about the Project to perform demonstration and instruction of owner personnel.

3.9 ADJUSTING

A. Adjust operating Products and equipment to ensure smooth and unhindered operation.

B. Testing, adjusting, and balancing HVAC systems.

3.10 FINAL CLEANING

A. Execute final cleaning prior to final project assessment.

B. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.

C. Replace filters of operating equipment.

D. Remove waste and surplus materials, rubbish, and construction facilities from the site.

3.11 CLOSEOUT PROCEDURES

A. Make submittals that are required by governing or other authorities.

1. Provide copies to Architect.

B. Notify Architect when work is considered ready for Substantial Completion.

C. Submit written certification that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Architect’s review.

D. Correct items of work listed in executed Certificates of Substantial Completion and comply with requirements for access to Owner-occupied areas.

E. Notify Architect when work is considered finally complete. The Contractor shall review the project for completion and prepare a punchlist prior to notifying the architect.

F. Prior to a formal onsite visit by the Engineer to verify project completion, the Contractor shall furnish to the Engineer the final punchlist for review. If the Engineer travels to the site to find the construction not ready for the observation visit, the Contractor shall pay for the Engineer’s time and travel expenses.

G. Complete items of work determined by Architect/Engineer’s Final Review.

END OF SECTION
PART 1 GENERAL

1.1 SECTION INCLUDES
A. Project Record Documents.
B. Operation and Maintenance Data.
C. Warranties and bonds.

1.2 RELATED SECTIONS
A. Section 22 0100- Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.
B. Section 22 0120 - Execution Requirements: Contract closeout procedures.

1.3 SUBMITTALS
A. Project Record Documents: Submit documents to Architect/Engineer 2 weeks prior to substantial completion review.
B. Operation and Maintenance Data:
   1. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit completed documents within ten days after acceptance.
   2. Submit 1 copy of completed documents 15 days prior to final inspection. This copy will be reviewed and returned after final inspection, with Architect/Engineer comments. Revise content of all document sets as required prior to final submission.
   3. Submit two sets of revised final documents in final form within 10 days after final inspection.
C. Warranties and Bonds:
   1. For equipment or component parts of equipment put into service during construction with Owner’s permission, submit documents within ten days after acceptance.
   2. Make other submittals within ten days after Date of Substantial Completion, prior to final Application for Payment.
   3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within ten days after acceptance, listing the date of acceptance as the beginning of the warranty period.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 PROJECT RECORD DOCUMENTS
A. Maintain on-site one set of the following record documents; record actual revisions to the Work:
   1. Drawings.
   2. Specifications.
   3. Addenda.
   4. Change Orders and other modifications to the Contract.
   5. Reviewed shop drawings, product data, and samples.
   6. Manufacturer's instruction for assembly, installation, and adjusting.
B. Ensure entries are complete and accurate, enabling future reference by Owner.
C. Record information concurrent with construction progress.
D. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
   1. Manufacturer’s name and product model and number.
   2. Changes made by Addenda and modifications.
E. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
   1. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
   2. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
   3. Field changes of dimension and detail.
   4. Details not on original Contract drawings.
3.2 OPERATION AND MAINTENANCE DATA
   A. For Each Product or System: List names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.
   B. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.
   C. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.

3.3 OPERATION AND MAINTENANCE DATA FOR EQUIPMENT AND SYSTEMS
   A. For Each Item of Equipment and Each System:
      1. Description of unit or system, and component parts.
      2. Identify function, normal operating characteristics, and limiting conditions.
      3. Include performance curves, with engineering data and tests.
      4. Complete nomenclature and model number of replaceable parts.
   B. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.
   C. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and trouble shooting; disassembly, repair, and reassembly instructions.
   D. Include manufacturer's printed operation and maintenance instructions for each component.
   E. Sequence of operation by controls manufacturer.
   F. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
   G. Provide control diagrams by controls manufacturer as installed. (Record Drawings)
   H. Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
   I. Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
   J. Include test and balancing reports.
   K. Additional Requirements: As specified in individual product specification sections.

3.4 OPERATION AND MAINTENANCE MANUALS
   A. Prepare instructions and data by personnel experienced in maintenance and operation of described products.
   B. Prepare data in the form of an instructional manual.
   C. Binders: Commercial quality, 8-1/2 x 11 inch three D side ring binders with durable plastic covers; 3 inch maximum ring size. When multiple binders are used, correlate data into related consistent groupings.
   D. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify Contractor Name; identify Architect and Engineer Firms names; identify subject matter of contents.
   E. Provide tabbed dividers for each separate product and system, with typed description of product and major component parts of equipment.
   F. Text: Manufacturer's printed data, or typewritten data on 24 pound paper.
   G. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.
   H. Arrange content by systems under section numbers and sequence of Table of Contents of this Project Manual.
   I. Table of Contents: Provide title of Project; names, addresses, and telephone numbers of Architect/Engineer, Consultants, and Contractor with name of responsible parties; schedule of products and systems, indexed to content of the volume.

END OF SECTION
DIVISION 22 - PLUMBING

SECTION 22 0519 - METERS AND GAUGES FOR PLUMBING PIPING

PART 1 GENERAL

1.1 SECTION INCLUDES
A. Pressure gauges and pressure gauge taps.
B. Thermometers and thermometer wells.

1.2 REFERENCE STANDARDS
A. ASME B40.100 - Pressure Gauges and Gauge Attachments.
D. UL 393 - Indicating Pressure Gauges for Fire-Protection Service.

1.3 SUBMITTALS
A. See Section 22 0100 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide list that indicates use, operating range, total range and location for manufactured components.
C. Project Record Documents: Record actual locations of components and instrumentation.

PART 2 PRODUCTS

2.1 PRESSURE GAUGES
A. Manufacturers:
B. Pressure Gauges: ASME B40.100, UL 393 drawn steel case, phosphor bronze bourdon tube, rotary brass movement, brass socket, with front recalibration adjustment, black scale on white background.
   1. Case: Steel with brass bourdon tube.
   2. Size: 4-1/2 inch (115 mm) diameter.
   3. Mid-Scale Accuracy: One percent.

2.2 PRESSURE GAUGE TAPPINGS
A. Gauge Cock: Tee or lever handle, brass for maximum 150 psi (1034 kPa).

2.3 STEM TYPE THERMOMETERS
A. Manufacturers:
B. Thermometers - Adjustable Angle: Red- or blue-appearing non-toxic liquid in glass; ASTM E1; lens front tube, cast aluminum case with enamel finish, cast aluminum adjustable joint with positive locking device; adjustable 360 degrees in horizontal plane, 180 degrees in vertical plane.
   1. Size: 9 inch (225 mm) scale.
   2. Window: Clear Lexan.
   3. Accuracy: 2 percent, per ASTM E77.
   4. Calibration: Degrees F.

2.4 THERMOMETER SUPPORTS
A. Socket: Brass separable sockets for thermometer stems with or without extensions as required, and with cap and chain.
PART 3 EXECUTION

3.1 INSTALLATION
   A. Install in accordance with manufacturer's instructions.
   B. Install thermometers in piping systems in sockets in short couplings. Enlarge pipes smaller than 2-1/2 inch (60 mm) for installation of thermometer sockets. Ensure sockets allow clearance from insulation.
   C. Provide instruments with scale ranges selected according to service with largest appropriate scale.
   D. Install gauges and thermometers in locations where they are easily read from normal operating level. Install vertical to 45 degrees off vertical.
   E. Adjust gauges and thermometers to final angle, clean windows and lenses, and calibrate to zero.

3.2 SCHEDULES
   A. Pressure Gauges, Location and Scale Range:
      1. Pressure reducing valves, 0 to 100 psi.
   B. Stem Type Thermometers, Location and Scale Range:
      1. Domestic hot water supply and recirculation, 0 to 200 degrees F.

END OF SECTION
SPECIFICATIONS: Farley Municipal Building
206 1st Street N., Farley, Iowa 52046
ARCHITECT PROJECT #1728.01

DIVISION 22 - PLUMBING

SECTION 22 0553 - IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 GENERAL

1.1 SECTION INCLUDES
A. Nameplates.
B. Tags.
C. Pipe markers.
D. Ceiling tacks.

1.2 REFERENCE STANDARDS

1.3 SUBMITTALS
A. See Section 22 0100 - Plumbing Administrative Requirements, for submittal procedures.
B. List: Submit list of wording, symbols, letter size, and color coding for mechanical identification.
C. Chart and Schedule: Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.
D. Product Data: Provide manufacturers catalog literature for each product required.

PART 2 PRODUCTS

2.1 IDENTIFICATION APPLICATIONS
A. Piping: Pipe markers.
B. Small-sized Equipment: Tags.
C. Valves: Tags and ceiling tacks where located above lay-in ceiling.

2.2 NAMEPLATES
A. Manufacturers:
B. Description: Laminated three-layer plastic with engraved letters.
   2. Letter Height: 1/4 inch (6 mm).

2.3 TAGS
A. Manufacturers:
B. Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inch (40 mm) diameter.
C. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inch (40 mm) diameter with smooth edges.

2.4 PIPE MARKERS
A. Manufacturers:
SPECIFICATIONS: Farley Municipal Building
206 1st Street N., Farley, Iowa 52046
ARCHITECT PROJECT #1728.01


B. Comply with ASME A13.1.
C. Plastic Pipe Markers: Factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.
D. Underground Plastic Pipe Markers: Bright colored continuously printed plastic ribbon tape, minimum 6 inches (150 mm) wide by 4 mil (0.10 mm) thick, manufactured for direct burial service.

2.5 CEILING TACKS
A. Description: Steel with 3/4 inch (20 mm) diameter color coded head.

PART 3 EXECUTION

3.1 PREPARATION
A. Degrease and clean surfaces to receive adhesive for identification materials.

3.2 INSTALLATION
A. Install plastic nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.
B. Install tags with corrosion resistant chain.
C. Install plastic pipe markers in accordance with manufacturer's instructions.
D. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.
E. Install underground plastic pipe markers 6 to 8 inches (150 to 200 mm) below finished grade, directly above buried pipe.
F. Use tags on piping 3/4 inch (20 mm) diameter and smaller.
   1. Identify service, flow direction, and pressure.
   2. Install in clear view and align with axis of piping.
   3. Locate identification not to exceed 20 feet (6 m) on straight runs including risers and drops, adjacent to each valve and Tee, at each side of penetration of structure or enclosure, and at each obstruction.
G. Locate ceiling tacks to locate valves or dampers above lay-in panel ceilings. Locate in corner of panel closest to equipment.

END OF SECTION
SPECIFICATIONS: Farley Municipal Building  
206 1st Street N., Farley, Iowa 52046  
ARCHITECT PROJECT #I1728.01

DIVISION 22 - PLUMBING

SECTION 22 0719 - PLUMBING PIPING INSULATION

PART 1 GENERAL

1.1 SECTION INCLUDES
A. Piping insulation.
B. Jackets and accessories.

1.2 RELATED REQUIREMENTS
A. Section 07 8400 - Firestopping.
B. Section 09 9123 - Interior Painting: Painting insulation jacket.
C. Section 22 1005 - Plumbing Piping: Placement of hangers and hanger inserts.

1.3 REFERENCE STANDARDS

1.4 SUBMITTALS
A. See Section 22 0100 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.
C. Manufacturer's Instructions: Indicate installation procedures that ensure acceptable workmanship and installation standards will be achieved.

1.5 QUALITY ASSURANCE
A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than three years of documented experience.
B. Applicator Qualifications: Company specializing in performing the type of work specified in this section with minimum three years of experience.

1.6 DELIVERY, STORAGE, AND HANDLING
A. Accept materials on site, labeled with manufacturer's identification, product density, and thickness.

1.7 FIELD CONDITIONS
A. Maintain ambient conditions required by manufacturers of each product.
B. Maintain temperature before, during, and after installation for minimum of 24 hours.

PART 2 PRODUCTS

2.1 REGULATORY REQUIREMENTS
A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.
2.2 GLASS FIBER
   A. Manufacturers:
      5. Substitutions: See Section 22 0110 - Plumbing Product Requirements.
   B. Insulation: ASTM C547 and ASTM C795; rigid molded, noncombustible.
      1. K (Ksi) Value: ASTM C177, 0.24 at 75 degrees F (0.035 at 24 degrees C).
      3. Maximum Moisture Absorption: 0.2 percent by volume.
   C. Insulation: ASTM C547 and ASTM C795; semi-rigid, noncombustible, end grain adhered to jacket.
      1. K (Ksi) Value: ASTM C177, 0.24 at 75 degrees F (0.035 at 24 degrees C).
      3. Maximum Moisture Absorption: 0.2 percent by volume.
   D. Vapor Barrier Jacket: White Kraft paper with glass fiber yarn, bonded to aluminized film; moisture vapor transmission when tested in accordance with ASTM E96/E96M of 0.02 perm-inches (0.029 ng/Pa s m).

2.3 FLEXIBLE ELASTOMERIC CELLULAR INSULATION
   A. Manufacturer:
      1. Aeroflex USA, Inc: www.aeroflexusa.com/#sle.
   B. Insulation: Preformed flexible elastomeric cellular rubber insulation complying with ASTM C534/C534M Grade 1; use molded tubular material wherever possible.
      1. Minimum Service Temperature: Minus 40 degrees F (Minus 40 degrees C).
   C. Elastomeric Foam Adhesive: Air dried, contact adhesive, compatible with insulation.

2.4 JACKETS
   A. PVC Plastic.
      1. Manufacturers:
      2. Jacket: One piece molded type fitting covers and sheet material, off-white color.
         a. Minimum Service Temperature: 0 degrees F (Minus 18 degrees C).
         b. Maximum Service Temperature: 150 degrees F (66 degrees C).
         c. Moisture Vapor Permeability: 0.002 perm inch (0.0029 ng/Pa s m), maximum, when tested in accordance with ASTM E96/E96M.
         d. Thickness: 10 mil (0.25 mm).
         e. Connections: Brush on welding adhesive.
      B. Canvas Jacket: UL listed 6 oz./sq. yd. (220 g/sq. m) plain weave cotton fabric treated with dilute fire retardant lagging adhesive.
         1. Lagging Adhesive: Compatible with insulation.
         1. Thickness: 0.016 inch (0.40 mm) sheet.
         2. Finish: Smooth.
         3. Joining: Longitudinal slip joints and 2 inch (50 mm) laps.
         4. Fittings: 0.016 inch (0.4 mm) thick die shaped fitting covers with factory attached protective liner.

PART 3 EXECUTION

3.1 EXAMINATION
   A. Verify that piping has been tested before applying insulation materials.
   B. Verify that surfaces are clean and dry, with foreign material removed.

3.2 INSTALLATION
   A. Install in accordance with manufacturer's instructions.
B. Install in accordance with North American Insulation Manufacturers Association (NAIMA) National Insulation Standards.

C. Exposed Piping: Locate insulation and cover seams in least visible locations.

D. Insulated pipes conveying fluids below ambient temperature: Insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.

E. Glass fiber insulated pipes conveying fluids below ambient temperature:
   1. Provide vapor barrier jackets, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples and vapor barrier mastic.
   2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with glass cloth and vapor barrier adhesive or PVC fitting covers.

F. For hot piping conveying fluids 140 degrees F (60 degrees C) or less, do not insulate flanges and unions at equipment, but bevel and seal ends of insulation.

G. For hot piping conveying fluids over 140 degrees F (60 degrees C), insulate flanges and unions at equipment.

H. Glass fiber insulated pipes conveying fluids above ambient temperature:
   1. Provide standard jackets, with or without vapor barrier, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples.
   2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe. Finish with glass cloth and adhesive or PVC fitting covers.

I. Inserts and Shields:
   1. Application: Piping 1-1/2 inches (40 mm) diameter or larger.
   2. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.
   3. Insert Location: Between support shield and piping and under the finish jacket.
   4. Insert Configuration: Minimum 6 inches (150 mm) long, of same thickness and contour as adjoining insulation; may be factory fabricated.

J. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions. At fire separations, refer to Section 07 8400.

K. Pipe Exposed in Mechanical Equipment Rooms or Finished Spaces (less than 10 feet (3 meters) above finished floor): Finish with canvas jacket sized for finish painting.

### 3.3 SCHEDULES

#### A. Plumbing Systems:

1. Domestic Hot Water Supply:
   a. Glass Fiber Insulation:
      1) Pipe Size Range: 0 - 1-1/2" inch.
      2) Thickness: 1 inch.

2. Domestic Hot Water Recirculation:
   a. Glass Fiber Insulation:
      1) Pipe Size Range: All sizes.
      2) Thickness: 1 inch (25 mm).

3. Domestic Cold Water:
   a. Glass Fiber Insulation:
      2) Thickness: 1/2 inch
      3) Pipe Size Range: 1-1/4 - 2".
      4) Thickness: 1 inch

4. Plumbing Vents Within 10 Feet (3 Meters) of the Exterior:

#### B. Cooling Systems:

1. Refrigerant Suction.
2. Refrigerant Hot Gas.

END OF SECTION
PART 1  GENERAL

1.1  SECTION INCLUDES
A.  Piping Safety Covers.

1.2  RELATED SECTIONS
A.  Section 22 0719 - Plumbing Piping Insulation.
B.  Section 22 1005 - Plumbing Piping.

1.3  REFERENCES

1.4  SUBMITTALS
A.  Product Data: Manufacturer's descriptive literature for products specified in this section.
B.  Shop Drawings: Indicate locations and configurations of piping insulation for indicated plumbing configurations.

1.5  DELIVERY, STORAGE, AND HANDLING
A.  Store products of this section in manufacturer's unopened packaging until installation; maintain storage conditions for products in accordance with manufacturer's recommendations.

PART 2  PRODUCTS

2.1  MANUFACTURERS
A.  Acceptable Manufacturer: Truebro, Inc; 7 Main Street, P.O. Box 440, Ellington, CT 06029. ASD. Tel: (800) 340-5969 (outside CT), (860) 875-2868 (inside CT). Fax: (860) 872-0300. Email: info@truebro.com. www.truebro.com.

2.2  PIPING INSULATION ACCESSORIES
A.  Provide products that comply with the following:
1.  Americans with Disabilities Act (ADA), Article 4.19.4.
2.  Requirements of applicable building code.
B.  Piping Safety Covers: Truebro Lav-Guard.
   1.  Characteristics: Three-piece molded assembly, minimum 1/8 inch (3 mm) wall thickness, with internal ribs to provide air space between piping and piping insulation jacket, molded to receive manufacturer's snap-clip fasteners.
   2.  Vinyl Material: Impact-resistant and stain-resistant molded closed-cell anti-microbial vinyl compound, UV-stable, non-fading, non-yellowing; having the following performance characteristics:
      a.  Burning Characteristics: 0 seconds Average Time of Burning (ATB), 0 mm Area of Burning (AEB), when tested in accordance with ASTM D 635.
      b.  Thermal Conductivity: K-value 1.17 (2.02), when tested in accordance with ASTM C 177.
      c.  Indentation Hardness: 60, minimum, when tested in accordance with ASTM D 2240, using Type A durometer.
   3.  Trap Assembly Cover: Three-piece assembly, with removable clean-out nut enclosure.
   4.  Angle Stop Covers: Formed with hinged cap for access to valve without requiring cover removal.
   5.  Configurations: In accordance with manufacturer's product data for project piping configurations indicated on drawings.
   6.  Color: China White, gloss finish; paintable.
   7.  Fasteners: Manufacturer's standard re-usable snap-clip fasteners; wire-tie fasteners not permitted.

PART 3  EXECUTION

3.1  EXAMINATION
A.  Verify that piping configurations are correct type for piping cover component configurations specified.
3.2 INSTALLATION
   A. Install products of this section in accordance with manufacturer’s printed installation instructions.

3.3 PROTECTION OF INSTALLED PRODUCTS
   A. Do not allow damage to installed products by subsequent construction activities; protect products until Substantial Completion.

END OF SECTION
PART 1 GENERAL

1.1 SECTION INCLUDES
   A. Pipe, pipe fittings, specialties, and connections for piping systems.
      1. Sanitary sewer.
      2. Domestic water.
      4. Flanges, unions, and couplings.
      5. Pipe hangers and supports.
      6. Valves.
      7. Check.
      8. Water pressure reducing valves.
      9. Relief valves.

1.2 RELATED REQUIREMENTS
   A. Section 22 0553 - Identification for Plumbing Piping and Equipment.
   B. Section 22 0719 - Plumbing Piping Insulation.
   C. Section 33 0110.58 - Disinfection of Water Utility Piping Systems.

1.3 REFERENCE STANDARDS
   C. ASME B16.3 - Malleable Iron Threaded Fittings: Classes 150 and 300.
   D. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings.
   E. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings.
   F. ASME B31.1 - Power Piping.
   G. ASME B31.9 - Building Services Piping.
   I. ASME BPVC-IX - Boiler and Pressure Vessel Code, Section IX - Welding, Brazing, and Fusing Procedures; Welders; Brazers; and Welding, Brazing and Fusing Operators.
   J. ASSE 1003 - Performance Requirements for Water Pressure Reducing Valves for Domestic Water Distribution Systems.
   Y. ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
AF. ASTM D2855 - Standard Practice for the Two-Step (Primer & Solvent Cement) Method of Joining Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Piping Components with Tapered Sockets.
AL. AWWA C151/A21.51 - Ductile-Iron Pipe, Centrifugally Cast.
AM. AWWA C606 - Grooved and Shouldered Joints.
AN. AWWA C651 - Disinfecting Water Mains.
AQ. ICC-ES AC01 - Acceptance Criteria for Expansion Anchors in Masonry Elements.
AT. MSS SP-67 - Butterfly Valves.
AU. MSS SP-70 - Cast Iron Gate Valves, Flanged and Threaded Ends.
AV. MSS SP-78 - Cast Iron Plug Valves, Flanged and Threaded Ends.
AW. MSS SP-80 - Bronze Gate, Globe, Angle and Check Valves.
AY. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.
AZ. NSF 61 - Drinking Water System Components - Health Effects.
BA. NSF 372 - Drinking Water System Components - Lead Content.

1.4 SUBMITTALS
A. See Section 22 0100 - Administrative Requirements for submittal procedures.
B. Product Data: Provide data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.
C. Shop Drawings: For non-penetrating rooftop supports, submit detailed layout developed for this project, with design calculations for loadings and spacings.
D. Project Record Documents: Record actual locations of valves.

1.5 QUALITY ASSURANCE
A. Perform work in accordance with applicable codes.
B. Valves: Manufacturer's name and pressure rating marked on valve body.
C. Welding Materials and Procedures: Comply with ASME BPVC-IX and applicable state labor regulations.
D. Welder Qualifications: Certified in accordance with ASME BPVC-IX.
E. Identify pipe with marking including size, ASTM material classification, ASTM specification, potable water certification, water pressure rating.

1.6 DELIVERY, STORAGE, AND HANDLING
A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
B. Provide temporary protective coating on cast iron and steel valves.
C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
D. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.
1.7 FIELD CONDITIONS
   A. Do not install underground piping when bedding is wet or frozen.

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS
   A. Potable Water Supply Systems: Provide piping, pipe fittings, and solder and flux (if used), that comply with NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.

2.2 SANITARY SEWER PIPING, BURIED WITHIN 5 FEET (1500 MM) OF BUILDING
   A. Cast Iron Pipe: ASTM A74 service weight.
      1. Fittings: Cast iron.
      2. Joints: Hub-and-spigot, CISPI HSN compression type with ASTM C564 neoprene gaskets or lead and oakum.
   B. Cast Iron Pipe: CISPI 301, hubless.
      1. Fittings: Cast iron.
      2. Joints: CISPI 310, neoprene gasket and stainless steel clamp and shield assemblies.
   C. PVC Pipe: ASTM D2665 or ASTM D3034.
      1. Fittings: PVC.

2.3 SANITARY SEWER PIPING, ABOVE GRADE
   A. Cast Iron Pipe: ASTM A74, service weight.
      1. Fittings: Cast iron.
      2. Joint Seals: ASTM C564 neoprene gaskets, or lead and oakum.
   B. Cast Iron Pipe: CISPI 310, hubless, service weight.
      1. Fittings: Cast iron.
   C. PVC Pipe: ASTM D2665.
      1. Fittings: PVC.

2.4 DOMESTIC WATER PIPING, BURIED WITHIN 5 FEET (1500 MM) OF BUILDING
   A. Copper Pipe: ASTM B42, annealed.
      1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22 wrought copper and bronze.

2.5 DOMESTIC WATER PIPING, ABOVE GRADE
   A. Copper Tube: ASTM B88 (ASTM B88M), Type L (B), Drawn (H).
      1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze.

2.6 NATURAL GAS PIPING, ABOVE GRADE
   A. Steel Pipe: ASTM A53/A53M Schedule 40 black.
      2. Joints: Threaded or welded to ASME B31.1.

2.7 FLANGES, UNIONS, AND COUPLINGS
   A. Unions for Pipe Sizes 3 Inches (80 mm) and Under:
      1. Ferrous pipe: Class 150 malleable iron threaded unions.
      2. Copper tube and pipe: Class 150 bronze unions with soldered joints.
   B. Mechanical Couplings for Grooved and Shouldered Joints: Two or more curved housing segments with continuous key to engage pipe groove, circular C-profile gasket, and bolts to secure and compress gasket.
      1. Dimensions and Testing: In accordance with AWWA C606.
      2. Housing Material: Provide ASTM A47/A47M malleable iron, ductile iron, or galvanized.
      4. When pipe is field grooved, provide coupling manufacturer’s grooving tools.
2.8 PIPE HANGERS AND SUPPORTS

A. Provide hangers and supports that comply with MSS SP-58.
   1. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 recommendations.
   2. Overhead Supports: Individual steel rod hangers attached to structure or to trapeze hangers.
   3. Trapeze Hangers: Welded steel channel frames attached to structure.

B. Plumbing Piping - Drain, Waste, and Vent:
   1. Hangers for Pipe Sizes 1/2 Inch (15 mm) to 1-1/2 Inches (40 mm): Malleable iron, adjustable swivel, split ring.
   2. Hangers for Pipe Sizes 2 Inches (50 mm) and Over: Carbon steel, adjustable, clevis.
   3. Wall Support for Pipe Sizes to 3 Inches (80 mm): Cast iron hook.
   4. Wall Support for Pipe Sizes 4 Inches (100 mm) and Over: Welded steel bracket and wrought steel clamp.

C. Plumbing Piping - Water:
   1. Hangers for Pipe Sizes 1/2 Inch (15 mm) to 1-1/2 Inches (40 mm): Malleable iron, adjustable swivel, split ring.
   2. Hangers for Cold Pipe Sizes 2 Inches (50 mm) and Over: Carbon steel, adjustable, clevis.

D. Hanger Fasteners: Attach hangers to structure using appropriate fasteners, as follows:
   3. Other Types: As required.
   4. Manufacturers:

2.9 BALL VALVES

A. Construction, 4 Inches (100 mm) and Smaller: MSS SP-110, Class 150, 400 psi (2760 kPa) CWP, bronze or ductile iron body, 304 stainless steel or chrome plated brass ball, regular port, teflon seats and stuffing box ring, blow-out proof stem, lever handle with balancing stops, threaded or grooved ends with union.

2.10 BUTTERFLY VALVES

A. Construction 1-1/2 Inches (40 mm) and Larger: MSS SP-67, 200 psi (1380 kPa) CWP, cast or ductile iron body, nickel-plated ductile iron disc, resilient replaceable EPDM seat, wafer ends, extended neck, 10 position lever handle.

B. Provide gear operators for valves 8 inches (150 mm) and larger, and chain-wheel operators for valves mounted over 8 feet (2400 mm) above floor.

2.11 WATER PRESSURE REDUCING VALVES

A. Manufacturers:

B. Up to 2 Inches (50 mm):
   1. ASSE 1003, bronze body, stainless steel, and thermoplastic internal parts, fabric reinforced diaphragm, strainer, threaded single union ends.

2.12 RELIEF VALVES

A. Temperature and Pressure:
   1. ANSI Z21.22, AGA certified, bronze body, teflon seat, stainless steel stem and springs, automatic, direct pressure actuated, temperature relief maximum 210 degrees F (98.9 degrees C), capacity ASME BPVC-IV certified and labelled.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that excavations are to required grade, dry, and not over-excavated.

3.2 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
B. Remove scale and dirt, on inside and outside, before assembly.
3.3 INSTALLATION
   A. Install in accordance with manufacturer's instructions.
   B. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.
   C. Copper Pipe and Tube: Make soldered joints in accordance with ASTM B828, using specified solder, and flux meeting ASTM B813; in potable water systems use flux also complying with NSF 61 and NSF 372.
   D. PVC Pipe: Make solvent-welded joints in accordance with ASTM D2855.
   E. Sleeve pipes passing through partitions, walls and floors.
   F. Inserts:
      1. Provide inserts for placement in concrete formwork.
      2. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
      3. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
      4. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut above slab.
   G. Pipe Hangers and Supports:
      1. Install in accordance with ASME B31.9.
      2. Support horizontal piping as indicated.
      3. Install hangers to provide minimum 1/2 inch (15 mm) space between finished covering and adjacent work.
      4. Place hangers within 12 inches (300 mm) of each horizontal elbow.
      5. Use hangers with 1-1/2 inch (40 mm) minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
      7. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
      8. Provide copper plated hangers and supports for copper piping.
      9. Support cast iron drainage piping at every joint.

3.4 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM
   A. Disinfect water distribution system in accordance with Section 33 0110.58.
   B. Prior to starting work, verify system is complete, flushed and clean.
   C. Ensure acidity (pH) of water to be treated is between 7.4 and 7.6 by adding alkali (caustic soda or soda ash) or acid (hydrochloric).
   D. Inject disinfectant, free chlorine in liquid, powder, tablet or gas form, throughout system to obtain 50 to 80 mg/L residual.
   E. Bleed water from outlets to ensure distribution and test for disinfectant residual at minimum 15 percent of outlets.
   F. Maintain disinfectant in system for 24 hours.
   G. If final disinfectant residual tests less than 25 mg/L, repeat treatment.
   H. Flush disinfectant from system until residual equal to that of incoming water or 1.0 mg/L.
   I. Take samples no sooner than 24 hours after flushing, from 10 percent of outlets and from water entry, and analyze in accordance with AWWA C651.

3.5 SERVICE CONNECTIONS
   A. Provide new sanitary sewer services. Before commencing work check invert elevations required for sewer connections, confirm inverts and ensure that these can be properly connected with slope for drainage and cover to avoid freezing.
   B. Provide new water service complete with approved reduced pressure backflow preventer and water meter with bypass valves, pressure reducing valve, and sand strainer.

3.6 SCHEDULES
   A. Pipe Hanger Spacing:
      1. Metal Piping:
         a. Pipe Size: 1/2 inches (15 mm) to 1-1/4 inches (32 mm):
            1) Maximum Hanger Spacing: 6.5 ft. (2 m).
            2) Hanger Rod Diameter: 3/8 inches (9 mm).
         b. Pipe Size: 1-1/2 inches (40 mm) to 2 inches (50 mm):
1) Maximum Hanger Spacing: 10 ft. (3 m).
2) Hanger Rod Diameter: 3/8 inch (9 mm).

c. Pipe Size: 2-1/2 inches (65 mm) to 3 inches (75 mm):
   1) Maximum Hanger Spacing: 10 ft. (3 m).
   2) Hanger Rod Diameter: 1/2 inch (13 mm).

d. Pipe Size: 4 inches (100 mm) to 6 inches (150 mm):
   1) Maximum Hanger Spacing: 10 ft. (3 m).
   2) Hanger Rod Diameter: 5/8 inch (15 mm).

2. Plastic Piping:
   a. All Sizes:
      1) Maximum Hanger Spacing: 6 ft. (1.8 m).
      2) Hanger Rod Diameter: 3/8 inch (9 mm).

END OF SECTION
PART 1 GENERAL

1.1 SECTION INCLUDES
   A. Drains.
   B. Cleanouts.
   C. Hydrants.
   D. Refrigerator valve and recessed box.
   E. Backflow preventers.
   F. Water hammer arrestors.
   G. Mixing valves.
   H. Catch basins and manholes.

1.2 RELATED REQUIREMENTS
   A. Section 22 1005 - Plumbing Piping.
   B. Section 22 4000 - Plumbing Fixtures.

1.3 REFERENCE STANDARDS
   A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design.
   B. ASME A112.6.3 - Floor and Trench Drains.
   C. ASSE 1011 - Performance Requirements for Hose Connection Vacuum Breakers.
   D. ASSE 1012 - Performance Requirements for Backflow Preventers with an Intermediate Atmospheric Vent.
   E. ASSE 1013 - Performance Requirements for Reduced Pressure Principle Backflow Preventers and Reduced Pressure Principle Fire Protection Backflow Preventers.
   F. ASSE 1019 - Performance Requirements for Wall Hydrant with Backflow Protection and Freeze Resistance.
   G. NSF 61 - Drinking Water System Components - Health Effects.
   H. NSF 372 - Drinking Water System Components - Lead Content.
   I. PDI-WH 201 - Water Hammer Arresters.

1.4 SUBMITTALS
   A. See Section 22 0100 - Administrative Requirements for submittal procedures.
   B. Product Data: Provide component sizes, rough-in requirements, service sizes, and finishes.
   C. Shop Drawings: Indicate dimensions, weights, and placement of openings and holes.
   D. Manufacturer's Instructions: Indicate Manufacturer's Installation Instructions: Indicate assembly and support requirements.
   E. Maintenance Data: Include installation instructions, spare parts lists, exploded assembly views.

1.5 DELIVERY, STORAGE, AND HANDLING
   A. Accept specialties on site in original factory packaging. Inspect for damage.

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS
   A. Specialties in Potable Water Supply Systems: Provide products that comply with NSF 61 and NSF 372 for maximum lead content.

2.2 DRAINS
   A. Manufacturers:
B. Floor Drain:
   1. ASME A112.6.3; lacquered cast iron or stainless steel, two piece body with double drainage flange, weep holes, reversible clamping collar, and round, adjustable nickel-bronze strainer.

2.3 CLEANOUTS
A. Manufacturers:
B. Cleanouts at Exterior Surfaced Areas:
   1. Round cast nickel bronze access frame and non-skid cover.
C. Cleanouts at Exterior Unsurfaced Areas:
   1. Line type with lacquered cast iron body and round epoxy coated gasketed cover.
D. Cleanouts at Interior Finished Floor Areas:
   1. Lacquered cast iron body with anchor flange, reversible clamping collar, threaded top assembly, and round gasketed scored cover in service areas and round gasketed depressed cover to accept floor finish in finished floor areas.
E. Cleanouts at Interior Finished Wall Areas:
   1. Line type with lacquered cast iron body and round epoxy coated gasketed cover, and round stainless steel access cover secured with machine screw.

2.4 HYDRANTS
A. Manufacturers:
B. Wall Hydrants:
   1. ASSE 1019; freeze resistant, self-draining type with chrome plated wall plate hose thread spout, handwheel, and integral vacuum breaker.

2.5 REFRIGERATOR VALVE AND Recessed Box
A. Box Manufacturers:
B. Valve Manufacturers:
C. Description: Plastic preformed rough-in box with brass valves with wheel handle, slip in finishing cover.

2.6 BACKFLOW PREVENTERS
A. Manufacturers:
B. Reduced Pressure Backflow Preventers:
   1. ASSE 1013; bronze body with bronze internal parts and stainless steel springs; two independently operating, spring loaded check valves; diaphragm type differential pressure relief valve located between check valves; third check valve that opens under back pressure in case of diaphragm failure; non-threaded vent outlet; assembled with two gate valves, strainer, and four test cocks.

2.7 WATER HAMMER ARRESTORS
A. Manufacturers:

B. Water Hammer Arrestors:
   1. Stainless steel construction, bellows type sized in accordance with PDI-WH 201, precharged suitable for operation in temperature range minus 100 to 300 degrees F (minus 73 to 149 degrees C) and maximum 250 psi (1700 kPa) working pressure.

2.8 MIXING VALVES
   A. Thermostatic Mixing Valves:
      1. Manufacturers:
         d. Substitutions: See Section 22 0110 - Product Requirements.
      2. Valve: Chrome plated cast brass body, stainless steel or copper alloy bellows, integral temperature adjustment.

2.9 CATCH BASINS AND MANHOLES
   A. Manufacturers:
   B. Catch Basins:

PART 3 EXECUTION

3.1 INSTALLATION
   A. Install in accordance with manufacturer’s instructions.
   B. Extend cleanouts to finished floor or wall surface. Lubricate threaded cleanout plugs with mixture of graphite and linseed oil. Ensure clearance at cleanout for rodding of drainage system.
   C. Encase exterior cleanouts in concrete flush with grade.
   D. Install floor cleanouts at elevation to accommodate finished floor.
   E. Install approved potable water protection devices on plumbing lines where contamination of domestic water may occur; on boiler feed water lines, janitor rooms, fire sprinkler systems, premise isolation, irrigation systems, flush valves, interior and exterior hose bibbs.
   F. Pipe relief from backflow preventer to nearest drain.
   G. Install water hammer arrestors complete with accessible isolation valve on hot and cold water supply piping to each fixture or group of fixtures.

END OF SECTION
DIVISION 22 - PLUMBING

SECTION 22 3000 - PLUMBING EQUIPMENT

PART 1 GENERAL

1.1 SECTION INCLUDES
A. Water Heaters:
B. Diaphragm-type compression tanks.
C. In-line circulator pumps.

1.2 REFERENCE STANDARDS
A. ASME BPVC-VIII-1 - Boiler and Pressure Vessel Code, Section VIII, Division 1 - Rules for Construction of Pressure Vessels.
B. NFPA 70 - National Electrical Code.

1.3 SUBMITTALS
A. See Section 22 0100 - Administrative Requirements, for submittals procedures.
B. Product Data:
   1. Provide dimension drawings of water heaters indicating components and connections to other equipment and piping.
   2. Indicate pump type, capacity and power requirements.
   3. Provide certified pump curves showing pump performance characteristics with pump and system operating point plotted. Include NPSH curve when applicable.
   4. Provide electrical characteristics and connection requirements.
C. Shop Drawings:
   1. Indicate dimensions of tanks, tank lining methods, anchors, attachments, lifting points, tappings, and drains.
D. Operation and Maintenance Data: Include operation, maintenance, and inspection data, replacement part numbers and availability, and service depot location and telephone number.
E. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.4 QUALITY ASSURANCE
A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.
B. Identification: Provide pumps with manufacturer's name, model number, and rating/capacity identified by permanently attached label.
C. Performance: Ensure pumps operate at specified system fluid temperatures without vapor binding and cavitation, are non-overloading in parallel or individual operation, operate within 25 percent of midpoint of published maximum efficiency curve.

1.5 WARRANTY
A. See Section 22 0130 - Closeout Submittals for additional warranty requirements.
B. Provide five year manufacturer warranty for domestic water heaters.

PART 2 PRODUCTS

2.1 WATER HEATERS
A. Manufacturers:
B. Residential Gas Fired:
   1. Type: Automatic, natural gas-fired, instantaneous.
2. Performance.
3. Tank: Glass lined welded steel with single flue passage, flue baffle and draft hood; thermally insulated and encased in corrosion-resistant steel jacket; baked-on enamel finish; floor shield and legs.
4. Controls: Automatic water thermostat and built-in gas pressure regulator; temperature range adjustable from 120 to 170 degrees F (49 to 77 degrees C), cast iron or sheet metal burner, safety pilot and thermocouple.
5. Accessories:
   b. Dip Tube: Brass.
   c. Drain valve.
   d. Anode: Magnesium.

2.2 DIAPHRAGM-TYPE COMPRESSION TANKS
A. Manufacturers:
B. Construction: Welded steel, tested and stamped in accordance with ASME BPVC-VIII-1; supplied with National Board Form U-1, rated for working pressure of 125 psig (860 kPa), with flexible EPDM diaphragm sealed into tank, and steel legs or saddles.
C. Accessories: Pressure gauge and air-charging fitting, tank drain; precharge to 12 psig (80 kPa).

2.3 IN-LINE CIRCULATOR PUMPS
A. Manufacturers:
B. Casing: Bronze, rated for 125 psig (860 kPa) working pressure, with stainless steel rotor assembly.
C. Impeller: Bronze.
D. Shaft: Alloy steel with integral thrust collar and two oil lubricated bronze sleeve bearings.
E. Seal: Carbon rotating against a stationary ceramic seat.
F. Drive: Flexible coupling.

PART 3 EXECUTION
3.1 INSTALLATION
A. Install plumbing equipment in accordance with manufacturer's instructions, as required by code, and complying with conditions of certification, if any.
B. Coordinate with plumbing piping and related fuel piping work to achieve operating system.
C. Pumps:
   1. Provide line sized isolating valve and strainer on suction and line sized soft seated check valve and balancing valve on discharge.
   2. Ensure pumps operate at specified system fluid temperatures without vapor binding and cavitation, are non-overloading in parallel or individual operation, and operate within 25 percent of midpoint of published maximum efficiency curve.

END OF SECTION
SPECIFICATIONS: Farley Municipal Building
206 1st Street N., Farley, Iowa 52046
ARCHITECT PROJECT #I1728.01

DIVISION 22 - PLUMBING

SECTION 22 4000 - PLUMBING FIXTURES

PART 1 GENERAL

1.1 SECTION INCLUDES
A. Water closets.
B. Urinals.
C. Lavatories.
D. Sinks.
E. Service sinks.
F. Electric water coolers.
G. Showers.

1.2 RELATED REQUIREMENTS
A. Section 22 1005 - Plumbing Piping.
B. Section 22 1006 - Plumbing Piping Specialties.
C. Section 22 3000 - Plumbing Equipment.

1.3 REFERENCE STANDARDS
A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design.
B. IAPMO Z124 - Plastic Plumbing Fixtures.
D. ASME A112.6.1M - Supports for Off-the-Floor Plumbing Fixtures for Public Use.
E. ASME A112.18.1 - Plumbing Supply Fittings.
G. ASME A112.19.2 - Ceramic Plumbing Fixtures.
H. ASME A112.19.3 - Stainless Steel Plumbing Fixtures.
I. ASME A112.19.4M - Porcelain Enameled Formed Steel Plumbing Fixtures.
J. ASSE 1014 - Performance Requirements for Backflow Prevention Devices for Hand-Held Showers.
L. NSF 372 - Drinking Water System Components - Lead Content.

1.4 SUBMITTALS
A. See Section 22 0100 - Plumbing Administrative Requirements, for submittal procedures.
B. Product Data: Provide catalog illustrations of fixtures, sizes, rough-in dimensions, utility sizes, trim, and finishes.
C. Manufacturer's Instructions: Indicate installation methods and procedures.
D. Maintenance Data: Include fixture trim exploded view and replacement parts lists.

1.5 DELIVERY, STORAGE, AND HANDLING
A. Accept fixtures on site in factory packaging. Inspect for damage.
B. Protect installed fixtures from damage by securing areas and by leaving factory packaging in place to protect fixtures and prevent use.

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS
A. Potable Water Systems: Provide plumbing fittings and faucets that comply with NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.

2.2 TANK TYPE WATER CLOSETS
A. Tank Type Water Closet Manufacturers:
SPECIFICATIONS: Farley Municipal Building
206 1st Street N., Farley, Iowa 52046
ARCHITECT PROJECT #1728.01


B. Bowl: ASME A112.19.2; floor mounted, vitreous china reverse trap, close-coupled closet combination with regular rim, insulated vitreous china closet tank with fittings and lever flushing valve, bolt caps.
1. Water Consumption: Maximum 1.6 gallons (6 liters) per flush.

C. Seat Manufacturers:
5. Substitutions: See Section 22 0110 - Plumbing Product Requirements.

D. Seat: Solid white plastic, open front, extended back, less cover, complete with self-sustaining hinge.

2.3 WALL HUNG URINALS
A. Wall Hung Urinal Manufacturers:

1. Flush Volume: 1.0 gallons (3.7 liters), maximum.
2. Flush Valve: Exposed (top spud).
4. Trap: Integral.

C. Flush Valves: ASME A112.18.1, diaphragm type, complete with vacuum breaker stops and accessories.
1. Sensor-Operated Type: Solenoid or motor-driven operator, battery powered, infrared sensor with mechanical over-ride or over-ride push button.
2. Exposed Type: Chrome plated, escutcheon, integral screwdriver stop.
3. Manufacturers:
d. Substitutions: See Section 22 0110 - Plumbing Product Requirements.

D. Carriers:
1. Manufacturers:
   c. Substitutions: See Section 22 0110 - Plumbing Product Requirements.
2. ASME A112.6.1M; cast iron and steel frame with tubular legs, lugs for floor and wall attachment, threaded fixture studs for fixture hanger, bearing studs.

2.4 LAVATORIES
A. Lavatory Manufacturers:

B. Vitreous China Counter Top Basin: ASME A112.19.2; vitreous china self-rimming counter top lavatory, with drillings on 4 inch (100 mm) centers, front overflow, soap depression, seal of putty, calking, or concealed vinyl gasket.

C. Supply Faucet Manufacturers:
4. Delta.
5. Substitutions: See Section 22 0110 - Plumbing Product Requirements.
D. Supply Faucet: ASME A112.18.1; chrome plated combination supply fitting with pop-up waste, water economy aerator with maximum flow of 0.5 gallon per minute (low-flow) (1.9 liters per minute (low-flow)), indexed handles.

E. Accessories:
   1. Chrome plated 17 gage, 0.0538 inch (1.37 mm) brass P-trap with clean-out plug and arm with escutcheon.

2.5 SINKS
A. Sink Manufacturers:

B. Single Compartment Bowl: ASME A112.19.3; Outside dimensions 20 gage, 0.0359 inch (0.91 mm) thick, Type 302 stainless steel, self-rimming and undercoated, with ledge back drilled for trim.

C. Trim Manufacturers:
   1. Chicago.
   2. Delta.
   5. Sloan Valve Company: www.sloanvalve.com
   7. Substitutions: See Section 22 0110 - Plumbing Product Requirements.

D. ASME A112.18.1M; chrome plated brass supply with swing spout, water economy aerator with maximum 1.5 GPM flow, single lever handle or indexed lever handles where indicated.

2.6 SHOWERS
A. Shower Manufacturers:

B. Cabinet: IAPMO Z124 reinforced glass fiber, 32 by 32 by 75 inches (800 by 800 by 1900 mm) with stone texture, integral receptor, soap dish, foldable seat as scheduled, removable chrome plated strainer, tail piece.

C. Shower Valve:
   1. Comply with ASME A112.18.1.
   2. Provide two handle in wall diverter valve body with integral thermostatic mixing valve to supply 1.5 gpm (0.094 L/s).

D. Hand-Held Shower Head:
   1. ASME A112.18.1, adjustable spray hand-held shower head with swivel fitting, with ASSE 1014 backflow preventer.

2.7 ELECTRIC WATER COOLERS
A. Electric Water Cooler Manufacturers:

B. Water Cooler: Electric, mechanically refrigerated; surface handicapped mounted; stainless steel top, vinyl on steel body, elevated anti-squirt bubbler with stream guard, automatic stream regulator, push button, mounting bracket; integral air cooled condenser and stainless steel grille.
   1. Capacity: 8 gallons per hour (30.3 liters per hour) of 50 degrees F (10 degrees C) water with inlet at 80 degrees F (27 degrees C) and room temperature of 90 degrees F (32 degrees C), when tested in accordance with ASHRAE Std 18.
   2. Electrical: 115 V, 60 Hertz compressor, 6 foot (2 m) cord and plug for connection to electric wiring system including grounding connector.

2.8 SERVICE SINKS
A. Service Sink Manufacturers:
SPECIFICATIONS: Farley Municipal Building
206 1st Street N., Farley, Iowa 52046
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5. Substitutions: See Section 22 0110 - Plumbing Product Requirements.

B. Bowl: 24 by 24 by 10 inch (600 by 600 by 250 mm) high white molded stone, floor mounted, with one inch (25 mm) wide shoulders, vinyl bumper guard, stainless steel strainer.
C. Trim: ASME A112.18.1 exposed wall type supply with cross handles, spout wall brace, vacuum breaker, hose end spout, strainers, eccentric adjustable inlets, integral screwdriver stops with covering caps and adjustable threaded wall flanges.
D. Accessories:
   1. 5 feet (1.5 m) of 1/2 inch (13 mm) diameter plain end reinforced plastic hose.
   2. Hose clamp hanger.
   3. Mop hanger.

PART 3 EXECUTION

3.1 EXAMINATION
A. Verify that walls and floor finishes are prepared and ready for installation of fixtures.
B. Verify that electric power is available and of the correct characteristics.
C. Confirm that millwork is constructed with adequate provision for the installation of counter top lavatories and sinks.

3.2 PREPARATION
A. Rough-in fixture piping connections in accordance with minimum sizes indicated in fixture rough-in schedule for particular fixtures.

3.3 INSTALLATION
A. Install each fixture with trap, easily removable for servicing and cleaning.
B. Provide chrome plated rigid or flexible supplies to fixtures with loose key stops, reducers, and escutcheons.
C. Install components level and plumb.
D. Install and secure fixtures in place with wall supports and bolts.
E. Solidly attach water closets to floor with lag screws. Lead flashing is not intended hold fixture in place.

3.4 INTERFACE WITH WORK OF OTHER SECTIONS
A. Review millwork shop drawings. Confirm location and size of fixtures and openings before rough-in and installation.

3.5 ADJUSTING
A. Adjust stops or valves for intended water flow rate to fixtures without splashing, noise, or overflow.

3.6 CLEANING
A. Clean plumbing fixtures and equipment.

3.7 PROTECTION
A. Protect installed products from damage due to subsequent construction operations.
B. Repair or replace damaged products before Date of Substantial Completion.

END OF SECTION
DIVISION 23 - HEATING, VENTILATING, AND AIR-CONDITIONING (HVAC)

SECTION 23 0100 - ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES
   A. Coordination drawings.
   B. Submittals for review, information, and project closeout.
   C. Number of copies of submittals.
   D. Submittal procedures.

1.2 RELATED SECTIONS
   A. Section 23 0120 - Execution Requirements: Additional coordination requirements.
   B. Section 23 0130 - Closeout Submittals: Project record documents.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 COORDINATION DRAWINGS
   A. Provide information required by Project Coordinator for preparation of coordination drawings.
   B. Review drawings prior to submission to Architect.

3.2 SUBMITTALS FOR REVIEW
   A. When the following are specified in individual sections, submit them for review:
      1. Product data.
      2. Shop drawings.
      3. Samples for selection.
      4. Samples for verification.
   B. After review, provide copies and distribute in accordance with Submittal Procedures article below.

3.3 SUBMITTALS FOR INFORMATION
   A. When the following are specified in individual sections, submit them for information:
      1. Design data.
      2. Certificates.
      3. Test reports.
      4. Inspection reports.
      5. Manufacturer's instructions.
      6. Other types indicated.

3.4 SUBMITTALS FOR PROJECT CLOSEOUT
   A. When the following are specified in individual sections, submit them at project closeout:
      1. Project record documents.
      2. Operation and maintenance data.
      3. Warranties.
      5. Test and balance reports.
      6. System certification as required.
      7. Other types as indicated.

3.5 NUMBER OF COPIES OF SUBMITTALS
   A. Documents for Review:
      1. Small size sheets, not larger than 8-1/2 x 11 inches (215 x 280 mm): Submit the number of copies which the Contractor requires, plus 3 copies which will be retained by the Architect. A minimum of eight submittals shall be submitted.
2. Larger sheets, not larger than 36 x 48 inches (910 x 1220 mm): Submit the number of opaque reproductions which Contractor requires, plus 3 copies which will be retained by Architect. A minimum of eight submittals shall be submitted.

B. Documents for Project Closeout: Make two reproductions of submittal originally reviewed. Submit one extra of submittals for information.

3.6 SUBMITTAL PROCEDURES

A. Identify Project, Contractor, Subcontractor or supplier; pertinent drawing and detail number, and specification section number, as appropriate on each copy.

B. Apply Contractor’s stamp, signed or initialed certifying that review, approval, verification of Products required, field dimensions, adjacent construction Work, and coordination of information is in accordance with the requirements of the Work and Contract Documents.

C. Deliver submittals to Architect at business address.

D. Schedule submittals to expedite the Project, and coordinate submission of related items.

E. For each submittal for review, allow 15 days excluding delivery time to and from the Contractor.

F. Provide space for Contractor and Architect review stamps.

G. When revised for resubmission, identify all changes made since previous submission.

H. Distribute copies of reviewed submittals as appropriate. Instruct parties to promptly report any inability to comply with requirements.

I. Shop Drawings not stamped as specified will be returned to the Contractor without action.

J. Submittals not requested will not be recognized or processed.

END OF SECTION
PART 1 GENERAL

1.1 SECTION INCLUDES
   A. General product requirements.
   B. Transportation, handling, storage and protection.
   C. Product option requirements.
   D. Substitution limitations and procedures.
   E. Spare parts and maintenance materials.

1.2 SUBMITTALS
   A. Product Data Submittals: Submit manufacturer’s standard published data. Mark each copy to identify applicable
      products, models, options, and other data. Supplement manufacturers’ standard data to provide information specific
      to this Project.
   B. Shop Drawing Submittals: Prepared specifically for this Project.

PART 2 PRODUCTS

2.1 PRODUCTS
   A. Wiring Terminations: Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials
      indicated. Size terminal lugs to NFPA 70, include lugs for terminal box.
   B. Cord and Plug: Provide minimum 6 foot (2 m) cord and plug including grounding connector for connection to electric
      wiring system. Cord of longer length is specified in individual specification sections.

2.2 PRODUCT OPTIONS
   A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or
      description.
   B. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for
      substitution for any manufacturer not named.

2.3 SPARE PARTS AND MAINTENANCE PRODUCTS
   A. Provide spare parts, maintenance, and extra products of types and in quantities specified in individual specification
      sections.

PART 3 EXECUTION

3.1 SUBSTITUTION PROCEDURES
   A. Instructions to Bidders specify time restrictions for submitting requests for substitutions during the bidding period.
      Comply with requirements specified in this section.
   B. Substitutions may be considered when a product becomes unavailable through no fault of the Contractor.
   C. A request for substitution constitutes a representation that the submitter:
      1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified
         product.
      2. Will provide the same warranty for the substitution as for the specified product.
      3. Will coordinate installation and make changes to other Work which may be required for the Work to be
         complete with no additional cost to Owner.
      4. Waives claims for additional costs or time extension which may subsequently become apparent.
   D. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals,
      without separate written request, or when acceptance will require revision to the Contract Documents.
   E. Substitution Submittal Procedure:
      1. Submit three copies of request for substitution for consideration. Limit each request to one proposed
         substitution.
      2. Submit shop drawings, product data, and certified test results attesting to the proposed product equivalence.
         Burden of proof is on proposer.
3. The Architect will notify Contractor in writing of decision to accept or reject request.
4. Request shall be made in writing and be delivered to A/E no later than seven days prior to receipt of bids.

3.2 TRANSPORTATION AND HANDLING
A. Transport and handle products in accordance with manufacturer’s instructions.
B. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.
C. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.

3.3 STORAGE AND PROTECTION
A. Store and protect products in accordance with manufacturers’ instructions.
B. Store with seals and labels intact and legible.
C. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.
D. For exterior storage of fabricated products, place on sloped supports above ground.
E. Provide bonded off-site storage and protection when site does not permit on-site storage or protection. Certificate of insurance shall be presented prior to storing products or materials off-site.
F. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
G. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
H. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

END OF SECTION
PART 1 GENERAL

1.1 SECTION INCLUDES
A. Examination, preparation, and general installation procedures.
B. Cutting and patching.
C. Surveying for laying out the work.
D. Cleaning and protection.
E. Starting and testing of systems and equipment.
F. Demonstration and instruction of Owner personnel.
G. Closeout procedures, except payment procedures.

1.2 RELATED SECTIONS
A. Section 23 0100- Administrative Requirements for submittals procedures.
B. Section 23 0130 - Closeout Submittals: Project record documents, operation and maintenance data, warranties and bonds.

1.3 SUBMITTALS
A. Cutting and Patching: Submit written request in advance of cutting or alteration which affects:
   1. Structural integrity of any element of Project.
   2. Integrity of weather exposed or moisture resistant element.
   3. Efficiency, maintenance, or safety of any operational element.
   5. Work of Owner or separate Contractor.

1.4 DRAWINGS AND MEASUREMENTS
A. Contract drawings for mechanical work are in part diagrammatic, intended to convey the scope of work and indicate general arrangement of equipment, ducts, conduits, piping and approximate sizes and locations of equipment and outlets.
B. Mechanical trades shall follow these drawings in laying out their work, consult general construction drawings to familiarize themselves with all conditions affecting their work, and shall verify spaces in which their work will be installed.
C. Coordinate work with other trades as job conditions reasonably require.
D. Where job conditions require reasonable changes in indicated locations and arrangement, make such changes without extra cost to Owner.
E. The drawings are not intended to be scaled for roughing measurements nor to serve as shop drawings.
F. The installation details, instruction and recommendations of the manufacturer of the product used, shall form the basis of the installation of the products for usage on this project except where definite and specific instructions are set forth therein or details are shown on plans.

1.5 ORDINANCES, PERMITS AND CODES
A. All work shall be executed in accordance with the Local, State and other attending rules and regulations applicable to the trade affected and be subject to the inspection of these departments.
B. Obtain all permits and licenses required for work performed under Division 23 and pay all fees in connection with same.
C. Where work required by the drawings and specification is above the standard required by local regulations, it shall be done as shown and/or specified.

1.6 PROJECT CONDITIONS
A. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.
B. Dust Control: Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere.
1.7 COORDINATION
A. Coordinate scheduling, submittals, and work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.
B. Verify utility requirements and characteristics of operating equipment are compatible with building utilities.
C. Coordinate space requirements, supports, and installation of mechanical and electrical work which are indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
D. Coordinate installation of equipment, piping, ductwork, etc. with electrical gear. Equipment shall not be located in front of panels. Ductwork and piping shall not be routed above panels. Coordinate location of electrical equipment with Division 16. Install per NEC requirements.
E. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.
F. Coordinate completion and clean-up of work of separate sections.
G. After Owner occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of Owner’s activities.

PART 2 PRODUCTS
2.1 PATCHING MATERIALS
A. New Materials: As specified in product sections; match existing products and work for patching and extending work.

PART 3 EXECUTION
3.1 EXAMINATION
A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Beginning new work means acceptance of existing conditions.
B. Examine and verify specific conditions described in individual specification sections.
C. Verify that utility services are available, of the correct characteristics, and in the correct locations.
D. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.
E. Protect the work of other trades.

3.2 GENERAL INSTALLATION REQUIREMENTS
A. Install Products as specified in individual sections.

3.3 CUTTING AND PATCHING
A. Execute cutting and patching including excavation and fill to complete the work, to uncover work to install improperly sequenced work, to remove and replace defective or non-conforming work, to remove samples of installed work for testing when requested, to provide openings in the work for penetration of mechanical and electrical work, to execute patching to complement adjacent work, and to fit Products together to integrate with other work.
B. Execute work by methods to avoid damage to other work, and which will provide appropriate surfaces to receive patching and finishing.
C. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.
D. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material in accordance with Section 15050, to full thickness of the penetrated element.
E. Coordinate all cutting and patching with General Contractor and other trades.

3.4 PROGRESS CLEANING
A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition as per OSHA standards.
B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.
C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.
D. Collect and remove waste materials, debris, and rubbish from site periodically and dispose off-site.

3.5 PROTECTION OF INSTALLED WORK
A. Protect installed work and provide special protection where specified in individual specification sections.
B. Provide temporary and removable protection for installed Products. Control activity in immediate work area to prevent damage.

3.6 STARTING SYSTEMS
A. Coordinate schedule for start-up of various equipment and systems.
B. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions which may cause damage.
C. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.
D. Verify that wiring and support components for equipment are complete and tested.
E. Execute start-up under supervision of applicable Contractor personnel in accordance with manufacturers’ instructions.
F. When specified in individual specification Sections, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.
G. Submit a written report that equipment or system has been properly installed and is functioning correctly. Report shall include all test results and procedures.
H. Provide the services of a factory trained representative to instruct the Owner’s authorized personnel, where indicated, in the operation, control and maintenance of equipment.
I. Any irregularities, faulty equipment, etc. shall be repaired or replaced as required prior to acceptance.
J. Run operating test for three (3) eight (8) hour periods.
K. All equipment shall be freshly oiled, filters charged with clean media and installation completely finished prior to acceptance.

3.7 DEMONSTRATION AND INSTRUCTION
A. Demonstrate operation and maintenance of Products to Owner’s personnel two weeks prior to date of final inspection. Date shall be coordinated with owner.
B. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at agreed time, at equipment location.
C. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.
D. Provide a qualified person who is knowledgeable about the Project to perform demonstration and instruction of owner personnel.
E. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.

3.8 ADJUSTING
A. Adjust operating Products and equipment to ensure smooth and unhindered operation.

3.9 FINAL CLEANING
A. Execute final cleaning prior to final project assessment.
B. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.
C. Replace filters of operating equipment.
D. Remove waste and surplus materials, rubbish, and construction facilities from the site.

3.10 CLOSEOUT PROCEDURES
A. Make submittals that are required by governing or other authorities.
   1. Provide copies to Architect.
B. Notify Architect when work is considered finally complete.
C. Complete items of work determined by Architect's final inspection.

END OF SECTION
PART 1 GENERAL

1.1 SECTION INCLUDES
A. Testing, adjustment, and balancing of air systems.

1.2 REFERENCE STANDARDS
C. NEBB (TAB) - Procedural Standards for Testing Adjusting and Balancing of Environmental Systems.

1.3 SUBMITTALS
A. See Section 23 0100 - Administrative Requirements, for submittal procedures.
B. Final Report: Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.
   1. Revise TAB plan to reflect actual procedures and submit as part of final report.
   2. Submit draft copies of report for review prior to final acceptance of Project. Provide final copies for Architect and for inclusion in operating and maintenance manuals.
   3. Include actual instrument list, with manufacturer name, serial number, and date of calibration.
   4. Form of Test Reports: Where the TAB standard being followed recommends a report format use that; otherwise, follow ASHRAE Std 111.
   5. Units of Measure: Report data in both I-P (inch-pound) and SI (metric) units.
   6. Include the following on the title page of each report:
      a. Name of Testing, Adjusting, and Balancing Agency.
      b. Address of Testing, Adjusting, and Balancing Agency.
      c. Telephone number of Testing, Adjusting, and Balancing Agency.
      d. Project name.
      e. Project location.
      f. Project Architect.
      g. Project Engineer.
      h. Project Contractor.
      i. Project altitude.
      j. Report date.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS
A. Perform total system balance in accordance with one of the following:
   1. AABC (NSTSB), AABC National Standards for Total System Balance.
B. Begin work after completion of systems to be tested, adjusted, or balanced and complete work prior to Substantial Completion of the project.
C. TAB Agency Qualifications:
   1. Company specializing in the testing, adjusting, and balancing of systems specified in this section.
   2. Certified by one of the following:
D. TAB Supervisor and Technician Qualifications: Certified by same organization as TAB agency.

3.2 EXAMINATION
A. Verify that systems are complete and operable before commencing work. Ensure the following conditions:
   1. Systems are started and operating in a safe and normal condition.
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2. Temperature control systems are installed complete and operable.  
3. Proper thermal overload protection is in place for electrical equipment.  
4. Final filters are clean and in place. If required, install temporary media in addition to final filters.  
5. Duct systems are clean of debris.  
6. Fans are rotating correctly.  
7. Access doors are closed and duct end caps are in place.  
8. Air outlets are installed and connected.  
9. Duct system leakage is minimized.  

B. Submit field reports. Report defects and deficiencies that will or could prevent proper system balance.

3.3 PREPARATION  
A. Hold a pre-balancing meeting at least one week prior to starting TAB work.

3.4 ADJUSTMENT TOLERANCES  
A. Air Handling Systems: Adjust to within plus or minus 5 percent of design for supply systems and plus or minus 10 percent of design for return and exhaust systems.  
B. Air Outlets and Inlets: Adjust total to within plus 10 percent and minus 5 percent of design to space. Adjust outlets and inlets in space to within plus or minus 10 percent of design.

3.5 RECORDING AND ADJUSTING  
A. Field Logs: Maintain written logs including:  
1. Running log of events and issues.  
2. Discrepancies, deficient or uncompleted work by others.  
4. Lists of completed tests.  
B. Ensure recorded data represents actual measured or observed conditions.  
C. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.  
D. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.  
E. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.

3.6 AIR SYSTEM PROCEDURE  
A. Adjust air handling and distribution systems to provide required or design supply, return, and exhaust air quantities at site altitude.  
B. Make air quantity measurements in ducts by Pitot tube traverse of entire cross sectional area of duct.  
C. Measure air quantities at air inlets and outlets.  
D. Adjust distribution system to obtain uniform space temperatures free from objectionable drafts and noise.  
E. Use volume control devices to regulate air quantities only to extend that adjustments do not create objectionable air motion or sound levels. Effect volume control by duct internal devices such as dampers and splitters.  
F. Vary total system air quantities by adjustment of fan speeds. Provide drive changes required. Vary branch air quantities by damper regulation.

3.7 SCOPE  
A. Test, adjust, and balance the following:  
1. Forced Air Furnaces.  
2. Air Cooled Refrigerant Condensers.  
3. Air Coils.  
4. Fans.  
5. Energy Recovery Ventilators  
6. Air Inlets and Outlets.

3.8 MINIMUM DATA TO BE REPORTED  
A. Electric Motors:  
1. Manufacturer.  
2. Model/Frame.
3. HP/BHP.
4. Phase, voltage, amperage; nameplate, actual, no load.
5. RPM.

B. Cooling Coils:
1. Identification/number.
2. Location.
4. Manufacturer.
5. Air flow, design and actual.
6. Entering air DB temperature, design and actual.
7. Entering air WB temperature, design and actual.
8. Leaving air DB temperature, design and actual.
9. Leaving air WB temperature, design and actual.
10. Saturated suction temperature, design and actual.
11. Air pressure drop, design and actual.

C. Air Moving Equipment:
1. Location.
2. Manufacturer.
3. Model number.
4. Serial number.
5. Arrangement/Class/Discharge.
6. Air flow, specified and actual.
7. Return air flow, specified and actual.
8. Outside air flow, specified and actual.
9. Total static pressure (total external), specified and actual.
10. Inlet pressure.
11. Discharge pressure.

D. Return Air/Outside Air:
1. Identification/location.
2. Design air flow.
3. Actual air flow.
4. Design return air flow.
5. Actual return air flow.
6. Design outside air flow.
7. Actual outside air flow.

E. Exhaust Fans:
1. Location.
2. Manufacturer.
3. Model number.
4. Serial number.
5. Air flow, specified and actual.

F. Air Distribution Tests:
1. Air terminal number.
2. Room number/location.
3. Terminal type.
4. Terminal size.
5. Area factor.
6. Design air flow.
7. Test (final) velocity.

END OF SECTION
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DIVISION 23 - HEATING, VENTILATING, AND AIR-CONDITIONING (HVAC)

SECTION 23 0713 - DUCT INSULATION

PART 1 GENERAL

1.1 SECTION INCLUDES
A. Duct insulation.
B. Duct liner.

1.2 REFERENCE STANDARDS
H. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible.

1.3 SUBMITTALS
A. See Section 23 0100 - Administrative Requirements for submittal procedures.
B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.
C. Manufacturer's Instructions: Indicate installation procedures necessary to ensure acceptable workmanship and that installation standards will be achieved.

1.4 DELIVERY, STORAGE, AND HANDLING
A. Accept materials on site in original factory packaging, labelled with manufacturer's identification, including product density and thickness.
B. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.

PART 2 PRODUCTS

2.1 REGULATORY REQUIREMENTS
A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

2.2 GLASS FIBER, FLEXIBLE
A. Manufacturer:
B. Insulation: ASTM C553; flexible, noncombustible blanket.
   1. 'K' ('Ksi') value: 0.36 at 75 degrees F (0.052 at 24 degrees C), when tested in accordance with ASTM C518.
   3. Maximum Water Vapor Absorption: 5.0 percent by weight.
C. Vapor Barrier Jacket:
   1. Kraft paper with glass fiber yarn and bonded to aluminized film.
2. Moisture Vapor Permeability: 0.02 perm inch (0.029 ng/Pa s m), when tested in accordance with ASTM E96/E96M.
3. Secure with pressure sensitive tape.

2.3 DUCT LINER

A. Manufacturers:

B. Glass Fiber Insulation: Non-corrosive, incombustible glass fiber complying with ASTM C1071; flexible blanket, rigid board, and preformed round liner board; impregnated surface and edges coated with poly vinyl acetate polymer, acrylic polymer, or black composite.
1. Fungal Resistance: No growth when tested according to ASTM G21.
2. Apparent Thermal Conductivity: Maximum of 0.31 at 75 degrees F (0.045 at 24 degrees C).
3. Service Temperature: Up to 250 degrees F (121 degrees C).
4. Rated Velocity on Coated Air Side for Air Erosion: 5,000 fpm (25.4 m/s), minimum.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install in accordance with manufacturer’s instructions.
B. Insulated ducts conveying air below ambient temperature:
1. Provide insulation with vapor barrier jackets.
2. Finish with tape and vapor barrier jacket.
3. Continue insulation through walls, sleeves, hangers, and other duct penetrations.
4. Insulate entire system including fittings, joints, flanges, fire dampers, flexible connections, and expansion joints.

C. Duct and Plenum Liner Application:
1. Adhere insulation with adhesive for 90 percent coverage.
2. Secure insulation with mechanical liner fasteners. Refer to SMACNA (DCS) for spacing.

3.2 SCHEDULES

A. Exhaust Ducts Exposed to Outdoor Air.
B. Outside Air Intake Ducts.
C. Supply Ducts.

END OF SECTION
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DIVISION 23 - HEATING, VENTILATING, AND AIR-CONDITIONING (HVAC)

SECTION 23 0719 - HVAC PIPING INSULATION

PART 1 GENERAL

1.1 SECTION INCLUDES
A. Piping insulation.

1.2 SUBMITTALS
A. See Section 23 0100 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

1.3 DELIVERY, STORAGE, AND HANDLING
A. Accept materials on site, labeled with manufacturer's identification, product density, and thickness.

PART 2 PRODUCTS

2.1 REGULATORY REQUIREMENTS
A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

2.2 FLEXIBLE ELASTOMERIC CELLULAR INSULATION
A. Manufacturer:
B. Insulation: Preformed flexible elastomeric cellular rubber insulation complying with ASTM C534/C534M Grade 1; use molded tubular material wherever possible.
   1. Minimum Service Temperature: Minus 40 degrees F (Minus 40 degrees C).
C. Elastomeric Foam Adhesive: Air dried, contact adhesive, compatible with insulation.

PART 3 EXECUTION

3.1 EXAMINATION
A. Verify that piping has been tested before applying insulation materials.
B. Verify that surfaces are clean and dry, with foreign material removed.

3.2 INSTALLATION
A. Install in accordance with manufacturer's instructions.
B. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions. At fire separations.
C. Exterior Applications: Provide vapor barrier jacket. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe, and finish with glass mesh reinforced vapor barrier cement. Cover with aluminum jacket with seams located on bottom side of horizontal piping. Provide two coats of UV resistant finish for flexible elastomeric cellular insulation without jacketing.

3.3 SCHEDULE
A. Cooling Systems:
   1. Refrigerant Suction: 1" Thickness

END OF SECTION
PART 1  GENERAL

1.1  SECTION INCLUDES
A. Piping.
B. Refrigerant.
C. Moisture and liquid indicators.
D. Valves.
E. Strainers.
F. Filter-driers.
G. Expansion valves.

1.2  REFERENCE STANDARDS
A. AHRI 495 - Performance Rating of Refrigerant Liquid Receivers.
B. AHRI 710 - Performance Rating of Liquid-Line Driers.
C. AHRI 730 (I-P) - Flow Capacity Rating of Suction-Line Filters and Suction-Line Filter-Driers.
D. AHRI 750 - Thermostatic Refrigerant Expansion Valves.
F. ASHRAE Std 34 - Designation and Safety Classification of Refrigerants.
G. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings.
H. ASME B16.26 - Cast Copper Alloy Fittings for Flared Copper Tubes.
I. ASME B31.5 - Refrigeration Piping and Heat Transfer Components.
M. AWS A5.8M/A5.8 - Specification for Filler Metals for Brazing and Braze Welding.

1.3  SYSTEM DESCRIPTION
A. Where more than one piping system material is specified ensure system components are compatible and joined to ensure the integrity of the system is not jeopardized. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.
B. Provide pipe hangers and supports in accordance with ASME B31.5 unless indicated otherwise.
C. Liquid Indicators:
   1. Use line size liquid indicators in main liquid line leaving condenser.
   2. If receiver is provided, install in liquid line leaving receiver.
   3. Use line size on leaving side of liquid solenoid valves.
D. Valves:
   1. Use service valves on suction and discharge of compressors.
   2. Use gauge taps at compressor inlet and outlet.
   3. Use gauge taps at hot gas bypass regulators, inlet and outlet.
   4. Use check valves on compressor discharge.
   5. Use check valves on condenser liquid lines on multiple condenser systems.
E. Filter-Driers:
   1. Use a filter-drier immediately ahead of liquid-line controls, such as thermostatic expansion valves, solenoid valves, and moisture indicators.

1.4  SUBMITTALS
A. See Section 23 0100 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide general assembly of specialties, including manufacturer’s catalogue information. Provide manufacturers catalog data including load capacity.
C. Shop Drawings: Indicate schematic layout of system, including equipment, critical dimensions, and sizes.
D. Design Data: Submit design data indicating pipe sizing. Indicate load carrying capacity of trapeze, multiple pipe, and riser support hangers.
E. Manufacturer's Installation Instructions: Indicate support, connection requirements, and isolation for servicing.

1.5 QUALITY ASSURANCE
A. Installer Qualifications: Company specializing in performing the type of work specified in this section, with minimum 5 years of documented experience.

1.6 DELIVERY, STORAGE, AND HANDLING
A. Deliver and store piping and specialties in shipping containers with labeling in place.
B. Protect piping and specialties from entry of contaminating material by leaving end caps and plugs in place until installation.
C. Dehydrate and charge components such as piping and receivers, seal prior to shipment, until connected into system.

PART 2 PRODUCTS

2.1 PIPING
A. Copper Tube: ASTM B280, H58 hard drawn or O60 soft annealed.
   2. Joints: Braze, AWS A5.8M/A5.8 BCuP silver/phosphorus/copper alloy.
B. Copper Tube to 7/8 inch (22 mm) OD: ASTM B88 (ASTM B88M), Type K (A), annealed.
C. Pipe Supports and Anchors:
   1. Provide hangers and supports that comply with MSS SP-58.
      a. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 recommendations.
   2. Hangers for Pipe Sizes 1/2 to 1-1/2 Inch (13 to 38 mm): Malleable iron adjustable swivel, split ring.
   3. Hangers for Pipe Sizes 2 Inches (50 mm) and Over: Carbon steel, adjustable, clevis.
   4. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
   5. Wall Support for Pipe Sizes to 3 Inches (75 mm): Cast iron hook.
   7. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.
   8. Hanger Rods: Mild steel threaded both ends, threaded one end, or continuous threaded.
   9. Inserts: Malleable iron case of galvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods.

2.2 REFRIGERANT
A. Refrigerant: R-134a, tetrafluoroethane as defined in ASHRAE Std 34.

2.3 MOISTURE AND LIQUID INDICATORS
A. Manufacturers:
   2. Parker Hannifin/Refrigeration and Air Conditioning: www.parker.com
   3. Sporlan, a Division of Parker Hannifin: www.parker.com
B. Indicators: Single port type, UL listed, with copper or brass body, flared or solder ends, sight glass, color coded paper moisture indicator with removable element cartridge and plastic cap; for maximum temperature of 200 degrees F (93 degrees C) and maximum working pressure of 500 psi (3450 kPa).

2.4 VALVES
A. Manufacturers:
B. Diaphragm Packless Valves:
   1. UL listed, globe or angle pattern, forged brass body and bonnet, phosphor bronze and stainless steel dia-
      phragms, rising stem and handwheel, stainless steel spring, nylon seat disc, solder or flared ends, with
      positive backseating; for maximum working pressure of 500 psi (3450 kPa) and maximum temperature
      of 275 degrees F (135 degrees C).

C. Packed Angle Valves:
   1. Forged brass or nickel plated forged steel, forged brass seal caps with copper gasket, rising stem and
      seat with backseating, molded stem packing, solder or flared ends; for maximum working pressure
      of 500 psi (3450 kPa) and maximum temperature of 275 degrees F (135 degrees C).

D. Ball Valves:
   1. Two piece bolted forged brass body with teflon ball seals and copper tube extensions, brass bonnet and
      seal cap, chrome plated ball, stem with neoprene ring stem seals; for maximum working pressure
      of 500 psi (3450 kPa) and maximum temperature of 300 degrees F (149 degrees C).

E. Service Valves:
   1. Forged brass body with copper stubs, brass caps, removable valve core, integral ball check valve, flared
      or solder ends, for maximum pressure of 500 psi (3450 kPa).

2.5 STRAINERS
A. Straight Line or Angle Line Type:
   1. Brass or steel shell, steel cap and flange, and replaceable cartridge, with screen of stainless steel wire or
      monel reinforced with brass; for maximum working pressure of 430 psi (2960 kPa).

2.6 FILTER-DRIERS
A. Manufacturers:

B. Performance:
   1. Flow Capacity - Liquid Line, minimum, rated in accordance with AHRI 710.
   2. Pressure Drop: 2 psi (14 kPa), maximum, when operating at full connected evaporator capacity.

C. Cores: Molded or loose-fill molecular sieve desiccant compatible with refrigerant, activated alumina, activated
   charcoal, and filtration to 40 microns, with secondary filtration to 20 microns; of construction that will not pass
   into refrigerant lines.

D. Construction: UL listed.
   1. Connections: As specified for applicable pipe type.

2.7 EXPANSION VALVES
A. Manufacturers:

B. Angle or Straight Through Type: AHRI 750; design suitable for refrigerant, brass body, internal or external
   equalizer, bleed hole, adjustable superheat setting, replaceable inlet strainer, with non-replaceable capillary tube
   and remote sensing bulb and remote bulb well.

C. Selection: Evaluate refrigerant pressure drop through system to determine available pressure drop across valve.
   Select valve for maximum load at design operating pressure and minimum 10 degrees F (6 degrees C) superheat.
   Select to avoid being undersized at full load and excessively oversized at part load.

PART 3 EXECUTION

3.1 PREPARATION
A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
B. Remove scale and dirt on inside and outside before assembly.
C. Prepare piping connections to equipment with flanges or unions.
3.2 INSTALLATION
A. Install refrigeration specialties in accordance with manufacturer's instructions.
B. Route piping in orderly manner, with plumbing parallel to building structure, and maintain gradient.
C. Install piping to conserve building space and avoid interference with use of space.
D. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
E. Provide clearance for installation of insulation and access to valves and fittings.
F. Flood piping system with nitrogen when brazing.
G. Insulate piping and equipment; refer to Section 22 0716.
H. Follow ASHRAE Std 15 procedures for charging and purging of systems and for disposal of refrigerant.
I. Fully charge completed system with refrigerant after testing.

3.3 FIELD QUALITY CONTROL
A. See Section 01 4000 - Quality Requirements, for additional requirements.
B. Test refrigeration system in accordance with ASME B31.5.
C. Pressure test system with dry nitrogen to 200 psi (1380 kPa). Perform final tests at 27 inches (92 kPa) vacuum and 200 psi (1380 kPa) using halide torch. Test to no leakage.

END OF SECTION
DIVISION 23 - HEATING, VENTILATING, AND AIR-CONDITIONING (HVAC)

SECTION 23 3100 - HVAC DUCTS AND CASINGS

PART 1  GENERAL

1.1 SECTION INCLUDES
A. Metal ductwork.
B. Casing and plenums.

1.2 RELATED REQUIREMENTS
A. Section 23 0593 - Testing, Adjusting, and Balancing for HVAC.
B. Section 23 0713 - Duct Insulation: External insulation and duct liner.
C. Section 23 3300 - Air Duct Accessories.
D. Section 23 3700 - Air Outlets and Inlets.

1.3 REFERENCE STANDARDS
C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
F. ICC-ES AC106 - Acceptance Criteria for Predrilled Fasteners (Screw Anchors) in Masonry Elements.
I. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible.
J. SMACNA (LEAK) - HVAC Air Duct Leakage Test Manual.
K. UL 181 - Standard for Factory-Made Air Ducts and Air Connectors.

1.4 SUBMITTALS
A. See Section 23 0100 - Administrative Requirements for submittal procedures.
B. Product Data: Provide data for duct materials.
C. Shop Drawings: Indicate duct fittings, particulars such as gages, sizes, welds, and configuration prior to start of work for specific pressure class and higher systems.
D. Project Record Documents: Record actual locations of ducts and duct fittings. Record changes in fitting location and type. Show additional fittings used.

1.5 QUALITY ASSURANCE
A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience, and approved by manufacturer.

1.6 FIELD CONDITIONS
A. Do not install duct sealants when temperatures are less than those recommended by sealant manufacturers.
B. Maintain temperatures within acceptable range during and after installation of duct sealants.

PART 2  PRODUCTS

2.1 DUCT ASSEMBLIES
A. Regulatory Requirements: Construct ductwork to comply with NFPA 90A standards.

2.2 MATERIALS
A. Galvanized Steel for Ducts: Hot-dipped galvanized steel sheet, ASTM A653/A653M FS Type B, with G60/Z180 coating.
B. Joint Sealers and Sealants: Non-hardening, water resistant, mildew and mold resistant.
   1. Type: Heavy mastic or liquid used alone or with tape, suitable for joint configuration and compatible with substrates, and recommended by manufacturer for pressure class of ducts.
   2. VOC Content: Not more than 250 g/L, excluding water.
3. Surface Burning Characteristics: Flame spread index of zero and smoke developed index of zero, when tested in accordance with ASTM E84.

4. Manufacturers:
   c. Substitutions: See Section 23 0110 - Product Requirements.

C. Hanger Rod: ASTM A36/A36M; steel, galvanized; threaded both ends, threaded one end, or continuously threaded.

D. Hanger Fasteners: Attach hangers to structure using appropriate fasteners, as follows:
   3. Concrete Screw Type Anchors: Complying with ICC-ES AC193.
   5. Manufacturers:
      b. Substitutions: See Section 23 0110 - Product Requirements.

2.3 DUCTWORK FABRICATION
   A. Fabricate and support in accordance with SMACNA (DCS) and as indicated.
   B. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.
   C. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.
   D. Fabricate continuously welded round and oval duct fittings in accordance with SMACNA (DCS).
   E. Where ducts are connected to exterior wall louvers and duct outlet is smaller than louver frame, provide blank-out panels sealing louver area around duct. Use same material as duct, painted black on exterior side; seal to louver frame and duct.

2.4 MANUFACTURED DUCTWORK AND FITTINGS
   A. Round Ducts: Round lockseam duct with galvanized steel outer wall.
      1. Manufacture in accordance with SMACNA (DCS).
   B. Flexible Ducts: Two ply vinyl film supported by helically wound spring steel wire.
      1. Pressure Rating: 10 inches WG (2.50 kPa) positive and 1.0 inches WG (250 Pa) negative.
      2. Maximum Velocity: 4000 fpm (20.3 m/sec).
      3. Temperature Range: Minus 10 degrees F to 160 degrees F (Minus 23 degrees C to 71 degrees C).

2.5 CASINGS
   A. Fabricate casings in accordance with SMACNA (DCS) and construct for operating pressures indicated.
   B. Mount floor mounted casings on 4 inch (100 mm) high concrete curbs. At floor, rivet panels on 8 inch (200 mm) centers to angles. Where floors are acoustically insulated, provide liner of galvanized 18 gage, 0.0478 inch (1.21 mm) expanded metal mesh supported at 12 inch (300 mm) centers, turned up 12 inches (300 mm) at sides with sheet metal shields.
   C. Reinforce door frames with steel angles tied to horizontal and vertical plenum supporting angles. Install hinged access doors where indicated or required for access to equipment for cleaning and inspection.

PART 3 EXECUTION

3.1 INSTALLATION
   A. Install, support, and seal ducts in accordance with SMACNA (DCS).
   B. Install in accordance with manufacturer's instructions.
   C. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.
   D. Duct sizes indicated are inside clear dimensions. For lined ducts, maintain sizes inside lining.
   E. Provide openings in ductwork where required to accommodate thermometers and controllers. Provide pilot tube openings where required for testing of systems, complete with metal can with spring device or screw to ensure against air leakage. Where openings are provided in insulated ductwork, install insulation material inside a metal ring.
   F. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.
G. Use crimp joints with or without bead for joining round duct sizes 8 inch (200 mm) and smaller with crimp in direction of air flow.

H. Use double nuts and lock washers on threaded rod supports.

I. Connect diffusers or light troffer boots to low pressure ducts directly or with 5 feet (1.5 m) maximum length of flexible duct held in place with strap or clamp.

J. At exterior wall louvers, seal duct to louver frame and install blank-out panels.

END OF SECTION
PART 1  GENERAL

1.1  SECTION INCLUDES
A. Air turning devices/extractors.
B. Backdraft dampers - metal.
C. Backdraft dampers - fabric.
D. Combination fire and smoke dampers.
E. Duct access doors.
F. Duct test holes.
G. Fire dampers.
H. Flexible duct connections.
I. Smoke dampers.
J. Volume control dampers.

1.2  RELATED REQUIREMENTS
A. Section 23 3100 - HVAC Ducts and Casings.

1.3  REFERENCE STANDARDS
D. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible.
E. UL 555 - Standard for Fire Dampers.
F. UL 555C - Standard for Safety Ceiling Dampers.
G. UL 555S - Standard for Smoke Dampers.

1.4  SUBMITTALS
A. See Section 23 0100 - Administrative Requirements, for submittal procedures.
B. Shop Drawings: Indicate for shop fabricated assemblies including volume control dampers.

1.5  DELIVERY, STORAGE, AND HANDLING
A. Protect dampers from damage to operating linkages and blades.

PART 2  PRODUCTS

2.1  AIR TURNING DEVICES/EXTRACTORS
A. Multi-blade device with blades aligned in short dimension; steel construction; with individually adjustable blades, mounting straps.

2.2  BACKDRAFT DAMPERS - METAL
A. Manufacturers:
   5. Substitutions: See Section 23 0110 - Product Requirements.

2.3  BACKDRAFT DAMPERS - FABRIC
A. Fabric Backdraft Dampers: Factory-fabricated.
   2. Birdscreen: 1/2 inch (12 mm) nominal mesh of galvanized steel or aluminum.
   3. Maximum Velocity: 1000 fpm (5 mps) face velocity.
2.4 COMBINATION FIRE AND SMOKE DAMPERS
   A. Manufacturers:
   B. Fabricate in accordance with NFPA 90A, UL 555, UL 555S, and as indicated.
   C. Provide factory sleeve and collar for each damper.
   D. Multiple Blade Dampers: Fabricate with 16 ga, 0.0598 inch (1.52 mm) galvanized steel frame and blades, oil-impregnated bronze or stainless steel sleeve bearings and plated steel axles, stainless steel jamb seals, 1/8 by 1/2 inch (3.2 by 12.7 mm) plated steel concealed linkage, stainless steel closure spring, blade stops, and lock, and 1/2 inch (12.7 mm) actuator shaft.
   E. Operators: UL listed and labelled spring return pneumatic type suitable for operation on 0-20 psig (0-140 kPa) instrument air. Provide end switches to indicate damper position. Locate damper operator on interior of duct and link to damper operating shaft.
   F. Normally Open Smoke Responsive Fire Dampers: Curtain type, closing upon actuation of electro thermal link, flexible stainless steel blade edge seals to provide constant sealing pressure, stainless steel springs with locking devices to ensure positive closure for units mounted horizontally.
   G. Electro Thermal Link: Fusible link melting at 165 degrees F (74 degrees C); 120 volts, single phase, 60 Hz; UL listed and labeled.

2.5 DUCT ACCESS DOORS
   A. Manufacturers:
   B. Fabricate in accordance with SMACNA (DCS) and as indicated.
   C. Access doors with sheet metal screw fasteners are not acceptable.

2.6 DUCT TEST HOLES
   A. Temporary Test Holes: Cut or drill in ducts as required. Cap with neat patches, neoprene plugs, threaded plugs, or threaded or twist-on metal caps.

2.7 FIRE DAMPERS
   A. Manufacturers:
   B. Fabricate in accordance with NFPA 90A and UL 555, and as indicated.
   C. Ceiling (Radiation) Dampers: Galvanized steel, 22 ga, 0.0299 inch (0.76 mm) frame and 16 ga, 0.0598 inch (1.52 mm) flap, two layers 0.125 inch (3.2 mm) ceramic fiber on top side and one layer on bottom side for round flaps, with locking clip.
      1. Rated for three hour service in compliance with UL 555C.
   D. Horizontal Dampers: Galvanized steel, 22 ga, 0.0299 inch (0.76 mm) frame, stainless steel closure spring, and lightweight, heat retardant non-asbestos fabric blanket.

2.8 FLEXIBLE DUCT CONNECTIONS
   A. Fabricate in accordance with SMACNA (DCS) and as indicated.
   B. Flexible Duct Connections: Fabric crimped into metal edging strip.
      1. Fabric: UL listed fire-retardant neoprene coated woven glass fiber fabric to NFPA 90A, minimum density 30 oz. per sq. yd. (1.0 kg/sq. m).
2.9 SMOKE DAMPERS

2.10 VOLUME CONTROL DAMPERS
A. Manufacturers:
B. Fabricate in accordance with SMACNA (DCS) and as indicated.
C. Splitter Dampers:
D. Single Blade Dampers:
E. Multi-Blade Damper: Fabricate of opposed blade pattern with maximum blade sizes 8 by 72 inch (200 by 1825 mm). Assemble center and edge crimped blades in prime coated or galvanized channel frame with suitable hardware.
F. Quadrants:
   1. Provide locking, indicating quadrant regulators on single and multi-blade dampers.
   2. On insulated ducts mount quadrant regulators on stand-off mounting brackets, bases, or adapters.

PART 3 EXECUTION

3.1 INSTALLATION
A. Install accessories in accordance with manufacturer's instructions, NFPA 90A, and follow SMACNA (DCS). Refer to Section 23 3100 for duct construction and pressure class.
B. Provide backdraft dampers on exhaust fans or exhaust ducts nearest to outside and where indicated.
C. Provide duct access doors for inspection and cleaning before and after filters, coils, fans, automatic dampers, at fire dampers, combination fire and smoke dampers, and elsewhere as indicated. Provide for cleaning kitchen exhaust ducts in accordance with NFPA 96. Provide minimum 8 by 8 inch (200 by 200 mm) size for hand access, size for shoulder access, and as indicated. Provide 4 by 4 inch (100 by 100 mm) for balancing dampers only. Review locations prior to fabrication.
D. Provide duct test holes where indicated and required for testing and balancing purposes.
E. Provide fire dampers, combination fire and smoke dampers, and smoke dampers at locations indicated, where ducts and outlets pass through fire rated components, and where required by Authorities Having Jurisdiction. Install with required perimeter mounting angles, sleeves, breakaway duct connections, corrosion resistant springs, bearings, bushings and hinges.
F. Install smoke dampers and combination smoke and fire dampers in accordance with NFPA 92.
G. Demonstrate re-setting of fire dampers to Owner's representative.
H. At fans and motorized equipment associated with ducts, provide flexible duct connections immediately adjacent to the equipment.
I. Provide balancing dampers at points on supply, return, and exhaust systems where branches are taken from larger ducts as required for air balancing. Install minimum 2 duct widths from duct take-off.
J. Use splitter dampers only where indicated.
K. Provide balancing dampers on duct take-off to diffusers, grilles, and registers, regardless of whether dampers are specified as part of the diffuser, grille, or register assembly.

END OF SECTION
SPECIFICATIONS: Farley Municipal Building
206 1st Street N., Farley, Iowa 52046
ARCHITECT PROJECT #I1728.01

DIVISION 23 - HEATING, VENTILATING, AND AIR-CONDITIONING (HVAC)

SECTION 23 3423 - HVAC POWER VENTILATORS

PART 1 GENERAL

1.1 SECTION INCLUDES
A. Roof exhausters.
B. Cabinet exhaust fans.
C. Upblast roof exhausters.

1.2 REFERENCE STANDARDS
A. AMCA (DIR) - (Directory of) Products Licensed Under AMCA International Certified Ratings Program.
C. AMCA 204 - Balance Quality and Vibration Levels for Fans.
E. AMCA 300 - Reverberant Room Method for Sound Testing of Fans.
F. AMCA 301 - Methods for Calculating Fan Sound Ratings from Laboratory Test Data.
G. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
H. UL 705 - Power Ventilators.

1.3 SUBMITTALS
A. See Section 23 0100 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide data on fans and accessories including fan curves with specified operating point clearly plotted, power, RPM, sound power levels at rated capacity, and electrical characteristics and connection requirements.
C. Manufacturer's Instructions: Indicate installation instructions.
D. Maintenance Data: Include instructions for lubrication, motor and drive replacement, spare parts list, and wiring diagrams.

1.4 FIELD CONDITIONS
A. Permanent ventilators may be used for ventilation during construction only after ductwork is clean, filters are in place, bearings have been lubricated, and fan has been test run under observation.

PART 2 PRODUCTS

2.1 MANUFACTURERS
F. Substitutions: See Section 23 0110 - Product Requirements.

2.2 POWER VENTILATORS - GENERAL
A. Static and Dynamically Balanced: AMCA 204 - Balance Quality and Vibration Levels for Fans.
B. Performance Ratings: Determined in accordance with AMCA 210 and bearing the AMCA Certified Rating Seal.
C. Sound Ratings: AMCA 301, tested to AMCA 300 and bearing AMCA Certified Sound Rating Seal.
D. Fabrication: Comply with AMCA 99.
E. UL Compliance: UL listed and labeled, designed, manufactured, and tested in accordance with UL 705.
F. Electrical Components: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

2.3 ROOF EXHAUSTERS
A. Fan Unit: V-belt or direct driven as indicated, with spun aluminum housing; resilient mounted motor; 1/2 inch (13 mm) mesh, 0.62 inch (1.6 mm) thick aluminum wire birdscreen; square base to suit roof curb with continuous curb gaskets.
B. Backdraft Damper: Gravity actuated, aluminum multiple blade construction, felt edged with offset hinge pin, nylon bearings, blades linked, and line voltage motor drive, power open, spring return.

C. Sheaves: Cast iron or steel, dynamically balanced, bored to fit shafts and keyed; variable and adjustable pitch motor sheave selected so required rpm is obtained with sheaves set at mid-position; fan shaft with self-aligning pre-lubricated ball bearings.

2.4 CABINET EXHAUST FANS
A. Centrifugal Fan Unit: V-belt or direct driven with galvanized steel housing lined with acoustic insulation, resilient mounted motor, gravity backdraft damper in discharge.
B. Disconnect Switch: Cord and plug in housing for thermal overload protected motor and wall mounted switch.
C. Grille: Molded white plastic.
D. Sheaves: Cast iron or steel, dynamically balanced, bored to fit shafts and keyed; variable and adjustable pitch motor sheaves selected so required rpm is obtained with sheaves set at mid-position; fan shaft with self-aligning pre-lubricated ball bearings.

2.5 UPBLAST ROOF EXHAUSTERS
A. Manufacturers:
B. Direct Drive Fan:
   1. Fan Wheel:
      a. Type: Non-overloading, backward inclined centrifugal.
      b. Material: Aluminum.
   2. Statically and dynamically balanced.
   3. Motors:
      a. Open drip-proof (ODP).
      b. Heavy duty ball bearing type.
      c. Mount on vibration isolators or resilient cradle mounts, out of air stream.
      d. Fully accessible for maintenance.
   4. Housing:
      a. Construct of heavy gage aluminum including curb cap, windband, and motor compartment.
      b. Rigid internal support structure.
      c. One-piece fabricated or fully welded curb-cap base to windband for leak proof construction.
      d. Construct drive frame assembly of heavy gage steel, mounted on vibration isolators.
      e. Provide breather tube for fresh air motor cooling and wiring.
C. Shafts and Bearings:
   1. Fan Shaft:
      a. Ground and polished steel with anti-corrosive coating.
      b. First critical speed at least 25 percent over maximum cataloged operating speed.
   2. Bearings:
      a. Permanently sealed or pillow block type.
      b. Minimum L10 life in excess of 100,000 hours (equivalent to L50 average life of 500,000 hours), at maximum cataloged operating speed.
      c. 100 percent factory tested.
D. Drive Assembly:
   1. Belts, pulleys, and keys oversized for a minimum of 150 percent of driven horsepower.
   2. Belts: Static free and oil resistant.
   3. Fully machined cast iron type, keyed and securely attached to the wheel and motor shafts.
   4. Motor pulley adjustable for final system balancing.
   5. Readily accessible for maintenance.
E. Disconnect Switches:
   1. Factory mounted and wired.
   2. Environment Type per NEMA 250: As indicated on the drawings.
3. Finish for Painted Steel Enclosures: Provide manufacturer's standard, factory applied gray, unless otherwise indicated.
4. Positive electrical shutoff.
5. Wired from fan motor to junction box installed within motor compartment.
F. Drain Trough: Allows for single-point drainage of water, grease, and other residues.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install in accordance with manufacturer’s instructions.
B. Secure roof exhausters with cadmium plated steel lag screws to roof curb.
C. Extend ducts to roof exhausters into roof curb. Counterflash duct to roof opening.
D. Install backdraft dampers on inlet to roof and wall exhausters.

END OF SECTION
SPECIFICATIONS: Farley Municipal Building
206 1st Street N., Farley, Iowa 52046
ARCHITECT PROJECT #1728.01

DIVISION 23 - HEATING, VENTILATING, AND AIR-CONDITIONING (HVAC)

SECTION 23 3700 - AIR OUTLETS AND INLETS

PART 1 GENERAL

1.1 SECTION INCLUDES
A. Diffusers.
B. Registers/grilles.
C. Louvers.
D. Gravity ventilators.

1.2 REFERENCE STANDARDS
A. AHRI 880 (I-P) - Performance Rating of Air Terminals.
B. AMCA 500-L - Laboratory Methods of Testing Louvers for Rating.
C. AMCA 511 - Certified Ratings Program for Air Control Devices.
D. AMCA 550 - Test Method for High Velocity Wind Driven Rain Resistant Louvers.
E. ASHRAE Std 70 - Method of Testing the Performance of Air Outlets and Inlets.
I. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible.

1.3 SUBMITTALS
A. See Section 23 0100 - Administrative Requirements for submittal procedures.
B. Product Data: Provide data for equipment required for this project. Review outlets and inlets as to size, finish, and type of mounting prior to submission. Submit schedule of outlets and inlets showing type, size, location, application, and noise level.
C. Project Record Documents: Record actual locations of air outlets and inlets.

PART 2 PRODUCTS

2.1 MANUFACTURERS
H. Substitutions: See Section 23 0110 - Product Requirements.

2.2 RECTANGULAR CEILING DIFFUSERS
A. Type: Provide square, stamped, multi-core, square, adjustable pattern, stamped, multi-core, square and rectangular, multi-louvered, square and rectangular, adjustable pattern, multi-louvered, and diffuser to discharge air in 360 degree, one way, two way, three way, and four way pattern with sectorizing baffles where indicated.
B. Connections: Round.
C. Frame: Provide surface mount, snap-in, inverted T-bar, and spline type. In plaster ceilings, provide plaster frame and ceiling frame.
D. Accessories: Provide radial opposed blade, butterfly, and combination splitter volume control damper; removable core, sectorizing baffle, safety chain, wire guard, equalizing grid, operating rod extension, anti-smudging device, and gaskets for surface mounted diffusers with damper adjustable from diffuser face.
2.3 **CEILING SLOT DIFFUSERS**
   A. Type: Continuous 3/4 inch (19 mm) wide slot, two slots wide, with adjustable vanes for left, right, or vertical discharge.

2.4 **CEILING SUPPLY REGISTERS/GRILLES**
   A. Type: Streamlined and individually adjustable curved blades to discharge air along face of grille, two-way deflection.
   B. Frame: 1-1/4 inch (32 mm) margin with countersunk screw mounting and gasket.

2.5 **CEILING EXHAUST AND RETURN REGISTERS/GRILLES**
   A. Type: Streamlined blades, 3/4 inch (19 mm) minimum depth, 3/4 inch (19 mm) maximum spacing, with blades set at 45 degrees, vertical face.
   B. Frame: 1-1/4 inch (32 mm) margin with countersunk screw mounting.
   C. Fabrication: Steel with 20 gage, 0.0359 inch (0.91 mm) minimum frames and 22 gage, 0.0299 inch (0.76 mm) minimum blades, steel and aluminum with 20 gage, 0.0359 inch (0.91 mm) minimum frame, or aluminum extrusions, with factory baked enamel finish.
   D. Damper: Integral, gang-operated, opposed blade type with removable key operator, operable from face where not individually connected to exhaust fans.

2.6 **CEILING EGG CRATE EXHAUST AND RETURN GRILLES**
   A. Type: Egg crate style face consisting of 1/2 by 1/2 by 1/2 inch (13 by 13 by 13 mm), 1/2 by 1/2 by 1 inch (13 by 13 by 25 mm), and 1 by 1 by 1 inch (25 by 25 by 25 mm) grid core.
   B. Fabrication: Grid core consists of aluminum with mill aluminum finish.
   C. Color: To be selected by Architect from manufacturer's standard range.
   D. Frame: 1-1/4 inch (32 mm) margin with countersunk screw mounting.

2.7 **WALL SUPPLY REGISTERS/GRILLES**

2.8 **LOUVERS**
   A. Manufacturers:
      2. Greenheck.
   B. Type: 6 inch (150 mm) deep with blades on 45 degree slope with center baffle and return bend, heavy channel frame, 1/2 inch (13 mm) square mesh screen over exhaust and 1/2 inch (13 mm) square mesh screen over intake.
   C. Color: To be selected by Architect from manufacturer's standard range.

2.9 **GRAVITY VENTILATORS**
   A. Spun Aluminum Intake and Relief Gravity Ventilator:
      1. Manufacturers:
      2. Substitutions: See Section 23 0110 - Product Requirements.
      3. General:
         a. Provide low silhouette configuration for intake applications with natural gravity or negative pressure system.
         b. Performance ratings and factory testing to be in accordance with AMCA 511 and AMCA 550.
      3. Hood:
      4. Birdscreen:
         a. Fabricate in accordance with ASTM B221 (ASTM B221M).
      5. Options/Accessories:
         a. Roof Curb:
            1) Flat Roofs: Welded, straight side curb with flashing flange and wood nailer.
            2) Pitched Roofs: Welded, straight side curb with flashing flange and wood nailer.
            3) Material: Aluminum.
         b. Curb Seal: Rubber seal between fan and roof curb.
c. Dampers:
   1) Type: Gravity.
   2) Factory designed to prevent outside air from entering back into building when fan is off.

PART 3 EXECUTION

3.1 INSTALLATION
   A. Install in accordance with manufacturer's instructions.
   B. Check location of outlets and inlets and make necessary adjustments in position to conform with architectural features, symmetry, and lighting arrangement.
   C. Install diffusers to ductwork with air tight connection.
   D. Provide balancing dampers on duct take-off to diffusers, and grilles and registers, despite whether dampers are specified as part of the diffuser, or grille and register assembly.
   E. Paint ductwork visible behind air outlets and inlets matte black. Refer to Section 09 9123.

END OF SECTION
PART 1 GENERAL

1.1 SECTION INCLUDES
A. Disposable panel filters.

1.2 REFERENCE STANDARDS
A. ASHRAE Std 52.2 - Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size.
B. UL 900 - Standard for Air Filter Units.

1.3 SUBMITTALS
A. See Section 23 0100 - Administrative Requirements for submittal procedures.
B. Shop Drawings: Indicate filter assembly and filter frames, dimensions, motor locations, and electrical characteristics and connection requirements.
C. Manufacturer's Installation Instructions: Indicate assembly and change-out procedures.
D. Operation and Maintenance Data: Include instructions for operation, changing, and periodic cleaning.
E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 23 0110 - Product Requirements, for additional provisions.
   2. Extra Filters: One set of each type and size.

PART 2 PRODUCTS

2.1 FILTER MANUFACTURERS
D. Substitutions: See Section 23 0110 - Product Requirements.

2.2 DISPOSABLE PANEL FILTERS
A. Media: UL 900 Class 2, fiber blanket, factory sprayed with flameproof, non-drip, non-volatile adhesive.
   1. Thickness: 1 inch (25 mm).
B. Performance Rating:
   1. Face Velocity: 500 FPM (2.54 m/sec).
   2. Initial Resistance: 0.15 inch WG (37 Pa).
   3. Recommended Final Resistance: 0.50 inches WG (125 Pa).
C. Casing: Cardboard frame.

PART 3 EXECUTION

3.1 INSTALLATION
A. Install air cleaning devices in accordance with manufacturer's instructions.
B. Prevent passage of unfiltered air around filters with felt, rubber, or neoprene gaskets.
C. Do not operate fan system until filters (temporary or permanent) are in place. Replace temporary filters used during construction and testing, with clean set.
D. Provide filter gauges on filter banks, installed with separate static pressure tips upstream and downstream of filters.

END OF SECTION
PART 1 GENERAL

1.1 SECTION INCLUDES
   A. Forced air furnaces.
   B. Controls.

1.2 REFERENCE STANDARDS
   C. NEMA MG 1 - Motors and Generators.

1.3 SUBMITTALS
   A. See Section 23 0100 - Administrative Requirements, for submittal procedures.
   B. Product Data:  Provide rated capacities, weights, accessories, electrical nameplate data, and wiring diagrams.
   C. Shop Drawings:  Indicate assembly, required clearances, and location and size of field connections.
   D. Manufacturer's Instructions:  Indicate rigging, assembly, and installation instructions.
   E. Operation and Maintenance Data:  Include manufacturer's descriptive literature, operating instructions, installation instructions, maintenance and repair data, and parts listing.
   F. Warranty:  Submit manufacturer's warranty and ensure forms have been filled out in Owner's name and registered with manufacturer.

1.4 WARRANTY
   A. Provide three year manufacturer’s warranty for solid state ignition modules.

PART 2 PRODUCTS

2.1 MANUFACTURERS
   C. Ruud.

2.2 GAS FIRED FURNACES
   A. Annual Fuel Utilization Efficiency (AFUE):  0.95 (“condensing”).
   B. Units:  Self-contained, packaged, factory assembled, pre-wired unit consisting of cabinet, modulating supply fan, ECM motor, variable gas heat, heating element, controls, air filter, humidifier, and accessories; wired for single power connection with control transformer.
      1. Safety certified by CSA in accordance with ANSI Z21.47.
      6. Accessories:
         a. Roof termination kit.
   C. Cabinet:  Steel with baked enamel finish, easily removed and secured access doors with safety interlock switches, glass fiber insulation with reflective liner.  If not certified for combustible flooring, please provide additional steel base.
   D. Primary Heat Exchanger:
      2. Shape:  Clamshell type.
E. Secondary Heat Exchanger:
   2. Shape.
F. Gas Burner:
   1. Atmospheric type with adjustable combustion air supply.
   2. Gas valve, two stage provides 100 percent safety gas shut-off; 24 volt combining pressure regulation, safety pilot, manual set (On-Off), pilot filtration, automatic electric valve.
   3. Electronic pilot ignition, with electric spark igniter.
   4. Combustion air damper with synchronous spring return damper motor.
   5. Non-corrosive combustion air blower with permanently lubricated motor.
G. Gas Burner Safety Controls:
   1. Thermocouple sensor: Prevents opening of gas valve until pilot flame is proven and stops gas flow on ignition failure.
   2. Flame rollout switch: Installed on burner box and prevents operation.
   3. Vent safety shutoff sensor: Temperature sensor installed on draft hood and prevents operation, manual reset.
   4. Limit Control: Fixed stop at maximum permissible setting, de-energizes burner on excessive bonnet temperature, automatic resets.
H. Supply Fan: Centrifugal type rubber mounted with direct drive with adjustable variable pitch motor pulley.
I. Motor:
   1. 300-1300 rpm ECM, permanently lubricated, hinge mounted.
J. Air Filters: 1 inch (25 mm) thick glass fiber, disposable type arranged for easy replacement.
K. Operating Controls:
   1. Room Thermostat: Cycles burner to maintain room temperature setting.
   2. Supply Fan Control: Energize from bonnet temperature independent of burner controls, with adjustable timed off delay and fixed timed on delay, with manual switch for continuous fan operation. Provide continuous low speed fan operation.

2.3 THERMOSTATS

A. Room Thermostat: Low voltage, electric solid state microcomputer based room thermostat with remote sensor:
   1. Preferential rate control to minimize overshoot and deviation from setpoint.
   2. Programming based on weekdays, Saturday and Sunday.
   3. Selection features including degree F or degree C display, 12 or 24 hour clock, keyboard disable, remote sensor, fan on-auto.
   4. Thermostat Display:
      a. Time of day.
      b. Actual room temperature.
      c. Programmed temperature.
      d. Day of week.
      e. System Mode Indication: heating, cooling, fan auto, off, and on, auto or on, off.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that substrates are ready for installation of units and openings are as indicated on shop drawings.
B. Verify that proper power supply is available and located correctly.
C. Verify that proper fuel supply is available for connection.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions and requirements of authorities having jurisdiction.
B. Install in accordance with NFPA 90A.
C. Install gas fired furnaces in accordance with NFPA 54.
D. Provide vent connections in accordance with NFPA 211.

END OF SECTION
DIVISION 23 - HEATING, VENTILATING, AND AIR-CONDITIONING (HVAC)

SECTION 23 6213 - PACKAGED AIR-COOLED REFRIGERANT COMPRESSOR AND CONDENSER UNITS

PART 1 GENERAL

1.1 SECTION INCLUDES
A. Condensing unit package.
B. Charge of refrigerant and oil.
C. Controls and control connections.
D. Refrigerant piping connections.
E. Motor starters.
F. Electrical power connections.

1.2 RELATED REQUIREMENTS
A. Section 23 2300 - Refrigerant Piping.
B. Section 23 5400 - Furnaces.

1.3 REFERENCE STANDARDS
B. ASHRAE Std 23.1 - Methods of Testing for Rating the Performance of Positive Displacement Refrigerant Compressors and Condensing Units that Operate at Subcritical Temperatures of the Refrigerant.
D. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
E. UL 207 - Standard for Refrigerant-Containing Components and Accessories, Nonelectrical.

1.4 SUBMITTALS
A. See Section 23 0100 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide rated capacities, weights specialties and accessories, electrical nameplate data, and wiring diagrams. Include equipment served by condensing units in submittal, or submit at same time, to ensure capacities are complementary.
C. Shop Drawings: Indicate components, assembly, dimensions, weights and loadings, required clearances, and location and size of field connections. Include schematic layouts showing condensing units, cooling coils, refrigerant piping, and accessories required for complete system.
D. Manufacturer's Instructions: Submit manufacturer's complete installation instructions.
E. Operation and Maintenance Data: Include start-up instructions, maintenance instructions, parts lists, controls, and accessories.
F. Warranty: Submit manufacturer's warranty and ensure forms have been filled out in Owner's name and registered with manufacturer.

1.5 WARRANTY
A. Provide a five year warranty to include coverage for refrigerant compressors.

PART 2 PRODUCTS

2.1 MANUFACTURERS
A. Carrier, a part of UTC Building and Industrial Systems, a unit of United Technologies Corp: www.carrier.com.
C. Ruud.
D. Substitutions: See Section 23 0110 - Product Requirements.

2.2 MANUFACTURED UNITS
A. Units: Self-contained, packaged, factory assembled and pre-wired units suitable for outdoor use consisting of cabinet, compressors, condensing coil and fans, integral sub-cooling coil, controls, liquid receiver, wind deflector, and screens.
B. Construction and Ratings: In accordance with AHRI 210/240. Test in accordance with ASHRAE Std 23.1.
C. Performance Ratings: Energy Efficiency Rating (EER) and Coefficient of Performance (COP) not less than prescribed by ASHRAE Std 90.1 I-P.

2.3 CASING
A. House components in welded steel frame with galvanized steel panels with weather resistant, baked enamel finish.
B. Mount starters, disconnects, and controls in weatherproof panel provided with full opening access doors. Provide mechanical interlock to disconnect power when door is opened.
C. Provide removable access doors or panels with quick fasteners and piano hinges.

2.4 CONDENSER COILS
A. Coils: Aluminum fins mechanically bonded to seamless copper tubing. Provide sub-cooling circuits. Air test under water to 425 psig (2900 kPa), and vacuum dehydrate. Seal with holding charge of nitrogen.

2.5 FANS AND MOTORS
A. Vertical discharge direct driven propeller type condenser fans with fan guard on discharge. Equip with roller or ball bearings with grease fittings extended to outside of casing.

2.6 COMPRESSORS
A. Compressor: Hermetic scroll type.
B. Mounting: Statically and dynamically balance rotating parts and mount on spring vibration isolators.
C. Lubrication System: Reversible, positive displacement oil pump with oil charging valve, oil level sight glass, and magnetic plug or strainer.
D. Motor: Constant speed 1800 rpm suction gas cooled with electronic sensor and winding over temperature protection, designed for across-the-line starting. Furnish with starter.
E. Capacity Reduction Equipment: Suction valve unloaders, with lifting mechanism operated by electrically actuated solenoid valve, with unloaded compressor start; controlled from suction pressure.
F. Sump Oil Heater: Evaporates refrigerant returning to sump during shut down. Energize heater continuously when compressor is not operating.

2.7 REFRIGERANT CIRCUIT
A. Provide each unit with one refrigerant circuit, factory supplied and piped. Refer to Section 23 2300.
B. For each refrigerant circuit, provide:
   1. Liquid line sight glass and moisture indicator.
   2. Insulated suction line.

2.8 CONTROLS
A. On unit, mount weatherproof steel control panel, NEMA 250, containing power and control wiring, molded case disconnect switch, factory wired with single point power connection.
B. For each compressor, provide across-the-line starter, non-recycling compressor overload, starter relay, and control power transformer or terminal for controls power. Provide manual reset current overload protection. For each condenser fan, provide across-the-line starter with starter relay.
C. Provide safety controls arranged so any one will shut down machine:
   1. High discharge pressure switch (manual reset) for each compressor.
   2. Low suction pressure switch (automatic reset) for each compressor.
   3. Oil Pressure switch (manual reset).
D. Provide the following operating controls:
   1. Thermostat located in room cycles compressors activates cylinder unloaders.
   2. One minute off timer prevents compressor from short cycling.
   3. Low ambient temperature controls.
E. Provide controls to permit operation down to 40 degrees F ambient temperature.
F. Gauges: Prepiped for suction and discharge refrigerant pressures and oil pressure for each compressor.
G. Provide low voltage, adjustable thermostat to control heating stages in sequence with delay between stages, compressor stages, and supply fan to maintain temperature setting:

PART 3 EXECUTION

3.1 INSTALLATION
A. Install in accordance with manufacturer's installation instructions.
B. Complete structural, mechanical, and electrical connections in accordance with manufacturer's installation instructions.

3.2 SYSTEM STARTUP

A. Supply initial charge of refrigerant and oil for each refrigeration system. Replace losses of oil or refrigerant prior to end of correction period.

B. Charge system with refrigerant and test entire system for leaks after completion of installation. Repair leaks, put system into operation, and test equipment performance.

C. Shut-down system if initial start-up and testing takes place in winter and machines are to remain inoperative. Repeat start-up and testing operation at beginning of first cooling season.

END OF SECTION
PART 1  GENERAL

1.1  SECTION INCLUDES
A. Energy recovery units.
B. Casing.
C. Fans.
D. Filters.
E. Dampers.
F. Power and controls.

1.2  SUBMITTALS
A. See Section 23 0100 - Administrative Requirements, for submittal procedures.
B. Product Data: Manufacturer’s installation instruction, product data, and engineering calculations.
C. Shop Drawings: Show design and assembly of energy recovery unit and installation and connection details.

PART 2  PRODUCTS

2.1  MANUFACTURERS
A. Energy Recovery Ventilators:
   2. Nu-Air.

2.2  ENERGY RECOVERY UNITS
A. Energy Recovery Units: Provide stationary core air-to-air exchanger; prefabricated packaged system designed by manufacturer.
   1. Provide unit with a AHRI 1060 I-P compliant air-to-air exchanger.
   2. Access: Hinged and/or screwed access panels on front.

2.3  CASING
A. Wall, Floor, and Roof Panels:
   1. Construction: 1.5 inch thick, double wall box construction, with formed edges of exterior wall overlapping formed edges of interior wall.
   2. Insulation:
      a. 1.5 inch insulated fiberglass.
      b. Panel Cores: Mineral wool board.
      c. Flame Spread Index (FSI): 25 or less, when tested in accordance with ASTM E84 or UL 723.
      d. Smoke Developed Index (SDI): 50, maximum, when tested in accordance with ASTM E84 or UL 723.
B. Access Panels: Provide access to components through a large, tightly sealed and easily removable panel.
C. Doors:
   1. Construct doors of same construction and thickness as wall panels.

2.4  FANS
A. Provide separate fans for exhaust and supply blowers.
B. Fans:
C. Housings: 12 gage, 0.1046 inch (2.66 mm) aluminized steel with plenums integral to general housing and constructed to Class 1 fan standards.
D. Motors:
   1. Motors: Open drip proof.
   2. Efficiency: High.
4. Control: Constant Speed.
5. Fan Motor: UL listed and labeled.

E. Drives:
   1. Fans: Belt driven.
   2. Horsepower: 7.5 HP (5.2 kW).

2.5 FILTERS
   A. Thickness: 2 inch
   B. Exhaust and Fresh Air Streams: MERV 7 filters constructed to meet ASHRAE Std 52.2.

2.6 DAMPERS
   A. Motorized Dampers: Provide motorized dampers at outside air inlet, exhaust air outlet, and supply air outlet.
      1. Type: Motorized two position parallel blade damper with blade seals.
      2. Motorized Damper: Roll-formed structural hat channels, reinforced at the corners,
      3. Blades: Single skin, 16 gage, 0.0598 inch (1.52 mm).
   B. Motorized Louvers:
      1. Type: Motorized two position parallel blade louver with drainable blades, blade seals, and jamb seals
      2. Adjustable louver:
         a. Fabrication: Mullion style.
            1) Frame:
               (a) Material: Extruded aluminum, Alloy 6063-T5.
            2) Blades:
               (a) Style: Horizontal, adjustable, drainable.
               (b) Material: Formed aluminum, Alloy 6063-T5.

2.7 POWER AND CONTROLS
   A. Motor Control Panels: UL listed.
   B. Include necessary motor starters, fuses, transformers and overload protection according to NFPA 70.
   C. Install wiring in accordance with NFPA 70.

PART 3 EXECUTION

3.1 INSTALLATION
   A. Provide openings for suitable ductwork connection.

3.2 CLEANING
   A. Clean filters, air plenums, interior and exposed-to-view surfaces prior to Substantial Completion.

END OF SECTION
DIVISION 23 - HEATING, VENTILATING, AND AIR-CONDITIONING (HVAC)

SECTION 23 8200 - CONVECTION HEATING AND COOLING UNITS

PART 1 GENERAL

1.1 SECTION INCLUDES
   A. Unit heaters.
   B. Electric unit heaters.
   C. Electric cabinet unit heaters.

1.2 SUBMITTALS
   A. See Section 23 0100 - Administrative Requirements, for submittal procedures.
   B. Product Data: Provide typical catalog of information including arrangements.
   C. Shop Drawings:
   D. Manufacturer’s Instructions: Indicate installation instructions and recommendations.
   E. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, installation
      instructions, maintenance and repair data, and parts listings.

PART 2 PRODUCTS

2.1 ELECTRIC UNIT HEATERS
   A. Manufacturers:
      3. Redd-i.
      4. Qmark.
      5. Marley Engineered Products.
   B. Provide products listed, classified, and labeled by Underwriters Laboratories Inc. (UL), Intertek (ETL), or testing firm
      acceptable to Authority Having Jurisdiction as suitable for the purpose indicated.
   C. Assembly: Suitable for mounting from ceiling or structure above with built-in controls, thermal safety cut-out, and
electric terminal box.
   D. Acceptable Heating Element Assemblies:
      1. Horizontal Projection Units:
   E. Housing:
      1. Horizontal Projection Units:
         a. Construction materials to consist of heavy gage steel with galvanized, polyester powder coat, or high
gloss baked enamel finish.
         b. Provide with threaded holes for threaded rod suspension.
         c. Provisions for access to internal components for maintenance, adjustments, and repair.
   F. Air Inlets and Outlets:
      1. Inlets: Provide stamped louvers or protective grilles with fan blade guard.
      2. Outlets: Provide diffuser cones, directional louvers, or radial diffusers.
   G. Fan: Factory balanced, direct drive, axial type with fan guard.
   H. Motor: Totally enclosed, thermally protected, and provided with permanently lubricated bearings.
   I. Controls:

2.2 ELECTRIC CABINET UNIT HEATERS
   A. Manufacturers:
      4. QMark.
      5. Redd-i.
B. Provide products listed, classified, and labeled by Underwriters Laboratories Inc. (UL), Intertek (ETL), or testing firm acceptable to Authority Having Jurisdiction as suitable for the purpose indicated.
C. Heating Elements: Provide open-wire, finned tubular, resistance wire enclosed in steel sheath.
D. Cabinet: Minimum 18 gage, 0.0478 inch (1.21 mm) thick steel front panel with exposed corners and edges rounded, easily removed panels, glass fiber insulation and integral air outlet, and inlet grilles.
E. Finish:
   1. Factory applied, painted finish.
   2. Color: As selected from color chart.
F. Fans: Centrifugal forward-curved double-width wheels, statically and dynamically balanced, direct driven.
G. Motor: Tap wound multiple speed permanent split capacitor with sleeve bearings, resiliently mounted.
H. Controls:
   1. Thermal cutout with automatic reset to de-energize electric heating elements in the event of overheating.
   2. Thermostat.

PART 3 EXECUTION

3.1 INSTALLATION
A. Install in accordance with manufacturer's recommendations.
B. Install equipment exposed to finished areas after walls and ceilings are finished and painted.
C. Do not damage equipment or finishes.
D. Unit Heaters:
   1. Hang from building structure, with pipe hangers anchored to building, not from piping or electrical conduit.
   2. Mount as high as possible to maintain greatest headroom unless otherwise indicated.
E. Cabinet Unit Heaters:
   1. Install as indicated.
   2. Coordinate to ensure correct recess size for recessed units.

3.2 CLEANING
A. After construction and painting is completed, clean exposed surfaces of units.
B. Vacuum clean coils and inside of units.
C. Touch-up marred or scratched surfaces of factory-finished cabinets using finish materials furnished by the manufacturer.
D. Install new filters.

3.3 PROTECTION
A. Provide finished cabinet units with protective covers during the balance of construction.

END OF SECTION
PART 1  GENERAL

1.1  SECTION INCLUDES
A. Coordination drawings.
B. Submittals for review, information, and project closeout.
C. Number of copies of submittals.
D. Submittal procedures.

PART 2  PRODUCTS - NOT USED

PART 3  EXECUTION

3.1  COORDINATION DRAWINGS
A. Provide information for preparation of coordination drawings.
B. Review drawings prior to submission to the Owner.
C. The Contractor and all sub-contractors shall coordinate the construction by all trades prior to installation of the equipment. This shall include the preparation of coordination drawings showing all architectural, structural, mechanical, and electrical components above the ceilings, in mechanical rooms, and other places containing a significant number of utilities or limited space for utilities.

3.2  SUBMITTALS FOR REVIEW
A. When the following are specified in individual sections, submit them for review:
   1. Product data.
   2. Shop drawings.
B. Submit to the Architect for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.
C. Contractor is responsible for dimensions and compliance with construction documents. Engineer's review is to assist the Contractor only.
D. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES.

3.3  SUBMITTALS FOR INFORMATION
A. When the following are specified in individual sections, submit them for information:
   1. Design data.
   2. Certificates.
   3. Test reports.
   4. Inspection reports.
   5. Manufacturer's instructions.
   6. Other types indicated.

3.4  SUBMITTALS FOR PROJECT CLOSEOUT
A. When the following are specified in individual sections, submit them at project closeout:
   1. Project record documents.
   2. Operation and maintenance data.
   3. Warranties.
   5. Other types as indicated.

3.5  NUMBER OF COPIES OF SUBMITTALS
A. Documents for Review:
   1. Submit electronically in the form of pdf files. Engineer shall return comments and/or one marked-up copy.
B. Documents for Project Closeout: Make two reproductions of submittal originally reviewed. Submit one extra of submittals for information.
3.6 SUBMITTAL PROCEDURES

A. Identify Project, Owner, Subcontractor or supplier; pertinent drawing and detail number, and specification section number, as appropriate on each copy.

B. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of Products required, field dimensions, adjacent construction Work, and coordination of information is in accordance with the requirements of the Work and Contract Documents.

C. Deliver submittals electronically via email or ftp site.

D. Schedule submittals to expedite the Project, and coordinate submission of related items.

E. Identify variations from Contract Documents and Product or system limitations which may be detrimental to successful performance of the completed Work.

F. Provide space for Engineer's review stamp.

G. When revised for resubmission, identify all changes made since previous submission.

H. Distribute copies of reviewed submittals as appropriate. Instruct parties to promptly report any inability to comply with requirements.

I. Submittals not requested will not be recognized or processed if they have not been checked and stamped by the General Contractor and Electrical Contractor.

J. The Contractor shall be responsible for timely submittal of shop drawings to avoid delays in material delivery. The Contractor shall coordinate with all sub-contractors and/or suppliers to expedite the generation of shop drawings. The Contractor shall advise the Engineer on a reasonable timeframe for the review of shop drawings by the Engineer for each set of shop drawings. The Contractor shall be responsible for a periodic checking on the status of all shop drawings and material delivery.
PART 1 GENERAL

1.1 SECTION INCLUDES
A. General product requirements.
B. Transportation, handling, storage and protection.
C. Product option requirements.
D. Substitution limitations and procedures.
E. Spare parts and maintenance materials.

1.2 SUBMITTALS
A. Product Data Submittals: Submit manufacturer’s standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers’ standard data to provide information specific to this Project.
B. Shop Drawing Submittals: Prepared specifically for this Project.

PART 2 PRODUCTS

2.1 PRODUCTS
A. Wiring Terminations: Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Size terminal lugs to NFPA 70, include lugs for terminal box.

2.2 PRODUCT OPTIONS
A. Products Specified by Naming One or More Manufacturers: Use a product of one of the manufacturers named and meeting specifications, no options or substitutions allowed.
B. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.
C. Manufacturers listed as “equal” to the specified manufacturer and model are encouraged to submit information on their product prior to bid.
D. Manufacturers interested in bidding their materials shall review the drawings, specifications, and construction codes during the bidding period to assure that their products meet the applications for the project. Manufacturers shall include all accessories and components for their material/equipment to be installed per the project requirements, applicable building codes, and their own instructions and recommendations. Manufacturers shall advise the Engineer of any potential issues or additional material requirements before 8 days prior to bid so any corrections can be addressed in an addendum. Requests for additional compensation after the bid to install materials per the project requirements, construction codes, or manufacturer’s instructions/recommendations shall be denied.

2.3 SPARE PARTS AND MAINTENANCE PRODUCTS
A. Provide spare parts, maintenance, and extra products of types and in quantities specified in individual specification sections.

PART 3 EXECUTION

3.1 SUBSTITUTION PROCEDURES
A. The Instructions to Bidders specify time restrictions for submitting requests for substitutions during the bidding period. Comply with requirements specified in this section.
B. Substitutions may be considered when a product becomes unavailable through no fault of the Contractor.
C. A request for substitution constitutes a representation that the submitter:
   1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
   2. Will provide the same warranty for the substitution as for the specified product.
   3. Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to Owner.
   4. Waives claims for additional costs or time extension which may subsequently become apparent.
D. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.

E. Substitution Submittal Procedure:
   1. Submit three copies of request for substitution for consideration. Limit each request to one proposed substitution.
   2. Submit shop drawings, product data, and certified test results attesting to the proposed product equivalence. Burden of proof is on proposer.

3.2 TRANSPORTATION AND HANDLING
   A. Transport and handle products in accordance with manufacturer's instructions. All transportation costs shall be by this Contractor.
   B. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.
   C. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.

3.3 STORAGE AND PROTECTION
   A. Store and protect products in accordance with manufacturers' instructions.
   B. Store with seals and labels intact and legible.
   C. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.
   D. For exterior storage of fabricated products, place on sloped supports above ground.
   E. Provide bonded off-site storage and protection when site does not permit on-site storage or protection. Certificate of Insurance is required for off-site storage.
   F. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
   G. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
   H. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

END OF SECTION
PART 1  GENERAL

1.1  SECTION INCLUDES
   A. Examination, preparation, and general installation procedures.
   B. Cutting and patching.
   C. Cleaning and protection.
   D. Starting and testing of systems and equipment.
   E. Demonstration and instruction of Owner personnel.
   F. Closeout procedures, except payment procedures.

1.2  PROJECT CONDITIONS
   A. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.
   B. Dust Control: Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere.

1.3  COORDINATION
   A. Coordinate scheduling, submittals, and work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.
   B. Verify utility requirements and characteristics of operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.
   C. Coordinate space requirements, supports, and installation of mechanical and electrical work which are indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
   D. In finished areas, conceal conduits and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.
   E. After occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of Owner’s activities.
   F. The Contractor and all sub-contractors shall coordinate the construction by all trades prior to installation of the equipment.

PART 2  PRODUCTS

2.1  NOT USED.

PART 3  EXECUTION

3.1  CLARIFICATION OF CONSTRUCTION DOCUMENTS
   A. Prior to submitting written questions in the form of Requests for Information (RFI's) or similar paperwork, the Contractor shall contact the Engineer by telephone to discuss the question and possible solutions. Written correspondence shall follow the verbal communications where paperwork is necessary to document significant changes to the construction documents or contract price.

3.2  EXAMINATION
   A. Verify that existing site conditions are acceptable for subsequent work. Beginning new work means acceptance of existing conditions.
   B. Examine and verify specific conditions described in individual specification sections.
   C. Verify that utility services are available, of the correct characteristics, and in the correct locations.

3.3  GENERAL INSTALLATION REQUIREMENTS
   A. Install Products as specified in individual sections.
3.4 CUTTING AND PATCHING
   A. Execute cutting and patching to complete the work, to uncover work to install improperly sequenced work, to remove and replace defective or non-conforming work, to remove samples of installed work for testing when requested, to provide openings in the work for penetration of mechanical and electrical work, to execute patching to complement adjacent work, and to fit Products together to integrate with other work.
   B. Execute work by methods to avoid damage to other work, and which will provide appropriate surfaces to receive patching and finishing.
   C. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.
   D. Fit work air tight to sleeves, conduit, and other penetrations through surfaces.
   E. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with material, to full thickness of the penetrated element.

3.5 PROGRESS CLEANING
   A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition per OSHA standards.
   B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.
   C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.
   D. Collect and remove waste materials, debris, and rubbish from site periodically and dispose off-site.

3.6 PROTECTION OF INSTALLED WORK
   A. Protect installed work and provide special protection where specified in individual specification sections.
   B. Provide temporary and removable protection for installed Products. Control activity in immediate work area to prevent damage.
   C. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
   D. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.

3.7 STARTING SYSTEMS
   A. Coordinate schedule for start-up of various equipment and systems.
   B. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.
   C. Verify that wiring and support components for equipment are complete and tested.
   D. Execute start-up under supervision of applicable Contractor personnel in accordance with manufacturers’ instructions.
   E. When specified in individual specification Sections, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.
   F. Provide written test results to owner with all data.
   G. Submit a written report that equipment or system has been properly installed and is functioning correctly.

3.8 DEMONSTRATION AND INSTRUCTION
   A. Demonstrate operation and maintenance of Products to the Owner’s personnel two weeks prior to date of final inspection.
   B. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at agreed time, at equipment location.
   C. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.
   D. Provide a qualified person who is knowledgeable about the Project to perform demonstration and instruction of owner personnel.
   E. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.

3.9 ADJUSTING
   A. Adjust operating Products and equipment to ensure smooth and unhindered operation.

3.10 FINAL CLEANING
   A. Execute final cleaning prior to final project assessment.
B. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.
C. Remove waste and surplus materials, rubbish, and construction facilities from the site.

3.11 CLOSEOUT PROCEDURES
A. Make submittals that are required by governing or other authorities.
B. Notify Architect when work is considered ready for Substantial Completion.
C. Complete items of work determined by final inspections.
D. Prior to a formal onsite observation visit by the Engineer to generate a punchlist, the Contractor shall perform an onsite observation to verify that the work is ready for the Engineer to visit the site. This shall include the generation and completion of a punchlist by the Contractor prior to the Engineer visiting the site. If the Engineer travels to the site to find the construction not ready for the observation visit, the Contractor shall pay for the Engineer's time and travel expenses.

END OF SECTION
DIVISION 26 - ELECTRICAL

SECTION 26 0519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1  GENERAL

1.1  SECTION INCLUDES
A. Wire and cable for 600 volts and less.
B. Wiring connectors and connections.

1.2  RELATED REQUIREMENTS
A. Section 26 0553 - Identification for Electrical Systems.

1.3  REFERENCE STANDARDS
A. NECA 1 - Standard for Good Workmanship in Electrical Construction.
C. NFPA 70 - National Electrical Code.

1.4  QUALITY ASSURANCE
A. Conform to requirements of NFPA 70.
B. Products: Furnish products listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

PART 2  PRODUCTS

2.1  WIRING REQUIREMENTS
A. Concealed Dry Interior Locations: Use only building wire in raceway.
B. Exposed Dry Interior Locations: Use only building wire in raceway.
C. Above Accessible Ceilings: Use only building wire in raceway or metal clad cable. Use metal clad cable for lighting fixture whips only.
D. Exterior Locations: Use only building wire with Type THHN/THWN insulation in raceway.
E. Underground Installations: Use only building wire with Type XHHW insulation in raceway.
F. Use solid conductor for feeders and branch circuits 12 AWG and smaller.
G. Use conductor not smaller than 12 AWG for power and lighting circuits.
H. Use 10 AWG conductors for 20 ampere, 120 volt branch circuits longer than 100 feet.
I. Conductor sizes and corresponding conduit sizes (where shown) are based on copper conductors. Under Bid Alternate provide aluminum conductors for 100 amp feeders and above (See note on Schematic Electrical Riser Diagram).
J. Provide a separate neutral for each phase wire - NO SHARED NEUTRALS.

2.2  BUILDING WIRE
A. Description: Single conductor insulated wire.
B. Conductor: Copper.
C. Insulation Voltage Rating: 600 volts.
D. Insulation: NFPA 70, Type THHN/THWN.

2.3  METAL CLAD CABLE
A. Description: NFPA 70, Type MC.
B. Conductor: Copper.
C. Insulation Voltage Rating: 600 volts.
D. Insulation Temperature Rating: 90 degrees C.
E. Insulation Material: Thermoplastic.
F. Armor Material: Aluminum.
G. Armor Design: Interlocked metal tape.

2.4  WIRING CONNECTORS
A. Split Bolt Connectors
   1. Product: Burndy or T&B.
SPECIFICATIONS - Farley Municipal Building
206 1st Street N., Farley, Iowa  52046
ARCHITECT PROJECT #1728.01

B. Solderless Pressure Connectors:
   1. Product: 3M #312 and #512 or equivalent Ideal.
C. Where tapping of conductors is required, use minimum of two layers wrapped half lapped. Tape shall be a minimum of 150% of thickness of insulation. Tape shall be U.L. Listed 3M Scotch Brand 33+.

PART 3  EXECUTION

3.1 EXAMINATION
A. Verify that interior of building has been protected from weather.
B. Verify that mechanical work likely to damage wire and cable has been completed.
C. Verify that raceway installation is complete and supported.
D. Protect conductors from paint.

3.2 PREPARATION
A. Completely and thoroughly swab raceway before installing wire.

3.3 INSTALLATION
A. Route wire and cable as required to meet project conditions.
   1. Wire and cable routing indicated is approximate unless dimensioned.
   2. Where wire and cable destination is indicated and routing is not shown, determine exact routing and lengths.
   3. Include wire/cable of lengths required to install connected devices within 10 ft. of location shown.
B. Pull all conductors into raceway at same time.
C. Use suitable wire pulling lubricant for all building wire.
D. Neatly train and lace wiring inside boxes, equipment, and panelboards.
E. Clean conductor surfaces before installing lugs and connectors.
F. Make splices, taps, and terminations to carry full ampacity with no perceptible temperature rise.
G. Use split bolt connectors for copper conductor splices and taps, 8 AWG and larger. Tape uninsulated conductors and connector with electrical tape to 150 percent of insulation rating of conductor.
H. Use solderless pressure connectors with insulating covers for conductor splices and taps, 10 AWG and smaller. Twist the wires together a minimum of four times (and trim) before installation of connector.
I. Identify and color code wire and cable under provisions of Section 26 0553. Identify each conductor with its circuit number or other designation indicated.
J. Wire shall not be installed until the building is enclosed and/or the masonry work is completed.
K. All cable for major feeder shall be continuous from origin to termination where possible.
L. Splices in branch circuit wiring shall be made in junction boxes only. Keep conductor splices to a minimum.
M. The continuity of circuit conductors shall not be dependent on service connections such as lamp holders, receptacles, etc. where the removal of such devices would interrupt the continuity.

END OF SECTION
DIVISION 26 - ELECTRICAL

SECTION 26 0526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES
A. Grounding and bonding components.
B. Provide all components necessary to complete the grounding system(s) consisting of:
   1. Metal underground water pipe.
   2. Concrete-encased electrode.
   3. Rod electrodes.

1.2 REFERENCE STANDARDS
B. NETA STD ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems;
C. NFPA 70 - National Electrical Code.

1.3 QUALITY ASSURANCE
A. Conform to requirements of NFPA 70.
B. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

2.1 ELECTRODES
A. Rod Electrodes: Copper.
   2. Length: 10 feet.
B. Foundation Electrodes: #4 AWG.

2.2 CONNECTORS AND ACCESSORIES
A. Wire: Stranded copper.
B. Grounding Electrode Conductor: Size to meet NFPA 70 requirements.

PART 3 EXECUTION

3.1 INSTALLATION
A. Install ground electrodes at locations indicated (See Grounding Detail). Install additional rod electrodes as required to achieve specified resistance to ground.
B. Provide grounding electrode conductor and connect to reinforcing steel in foundation footing. Bond steel together.
C. Provide bonding to meet requirements described in Quality Assurance.
D. Equipment Grounding Conductor: Provide separate, insulated conductor within each feeder and branch circuit raceway. Terminate each end on suitable lug, bus, or bushing.

3.2 FIELD QUALITY CONTROL
A. Inspect and test in accordance with NETA STD ATS except Section 4.
B. Perform inspections and tests listed in NETA STD ATS, Section 7.13.

END OF SECTION
DIVISION 26 - ELECTRICAL

SECTION 26 0529 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES
A. Conduit and equipment supports.
B. Anchors and fasteners.

1.2 REFERENCE STANDARDS
A. NECA 1 - Standard for Good Workmanship in Electrical Construction.
B. NFPA 70 - National Electrical Code.

1.3 QUALITY ASSURANCE
A. Conform to requirements of NFPA 70.
B. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

2.1 MATERIALS
A. Hangers, Supports, Anchors, and Fasteners - General: Corrosion-resistant materials of size and type adequate to carry the loads of equipment and conduit, including weight of wire in conduit.
B. Supports: Fabricated of structural steel or formed steel members; galvanized for metal conduit.
C. Wire ties are not an approved conduit support.
D. Anchors and Fasteners:
   1. Concrete Structural Elements: Use precast inserts, expansion anchors, powder-actuated anchors, or preset inserts.
   2. Steel Structural Elements: Use beam clamps, steel spring clips, steel ramset fasteners, or welded fasteners.
   3. Concrete Surfaces: Use self-drilling anchors or expansion anchors.
   4. Hollow Masonry, Plaster, and Gypsum Board Partitions: Use toggle bolts or hollow wall fasteners.
   5. Solid Masonry Walls: Use expansion anchors or preset inserts.

PART 3 EXECUTION

3.1 INSTALLATION
A. Install hangers and supports as required to adequately and securely support electrical system components, in a neat and workmanlike manner, as specified in NECA 1.
   1. Do not fasten supports to pipes, ducts, mechanical equipment, or conduit.
   2. Do not drill or cut structural members.
B. All supports shall be securely positioned to the structure, not equipment or ceiling tile supports. Coordinate structure load capabilities with General Contractor.
   C. Use sheet metal channel to bridge studs above and below cabinets and panelboards recessed in walls.

END OF SECTION
DIVISION 26 - ELECTRICAL

SECTION 26 0534 - CONDUIT

PART 1 GENERAL

1.1 SECTION INCLUDES
A. Conduit, fittings and conduit bodies.

1.2 RELATED REQUIREMENTS
A. Section 26 0526 - Grounding and Bonding for Electrical Systems.
B. Section 26 0529 - Hangers and Supports for Electrical Systems.
C. Section 26 0553 - Identification for Electrical Systems.
D. Section 26 0537 - Boxes.

1.3 REFERENCE STANDARDS
A. ANSI C80.3 - American National Standard for Steel Electrical Metallic Tubing (EMT).
B. NECA 1 - Standard for Good Workmanship in Electrical Construction.
C. NECA 101 - Standard for Installing Steel Conduits (Rigid, IMC, EMT).
D. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable.
E. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Conduit.
F. NEMA TC 3 - Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing.
G. NFPA 70 - National Electrical Code.

1.4 QUALITY ASSURANCE
A. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for purpose specified and shown.

1.5 DELIVERY, STORAGE, AND HANDLING
A. Accept conduit on site. Inspect for damage.
B. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.
C. Protect PVC conduit from sunlight.

PART 2 PRODUCTS

2.1 CONDUIT REQUIREMENTS
A. Conduit Size: Comply with NFPA 70.
   1. Minimum Size: Electrical conduits - 1/2 inch unless otherwise specified.
   2. Conduits shall be sized as noted or as required by NEC for number and size of conductors installed except that 3/4 inch shall be minimum size for branch circuit home runs and 1/2 inch shall be minimum size for all other conduit runs. Maximum size shall be as allowed by the NEC and within the limits of commonly manufactured sizes.
   3. Minimum Size: Data/Voice/CATV conduits - 3/4 inch unless otherwise specified
B. Underground Installations:
   1. More than 5 Feet from Foundation Wall: Use thinwall non-metallic conduit.
   2. Within 5 Feet from Foundation Wall: Use rigid steel conduit.
   3. In or Under Slab on Grade: Use thinwall non-metallic conduit.
   5. Other locations shall be Schedule 40 PVC.
C. Wet and Damp Locations: Use rigid steel conduit, intermediate metal conduit, or electrical metallic tubing.
D. Dry Locations:
   2. Exposed: Use electrical metallic tubing.

2.2 METAL CONDUIT
A. Manufacturers: Republic Steel Company, Triangle, Allied, or approved equivalent.
B. Fittings and Conduit Bodies: NEMA FB 1; material to match conduit.
2.3 FLEXIBLE METAL CONDUIT
   A. Description: Interlocked aluminum construction.
   B. Fittings: NEMA FB 1.

2.4 LIQUIDTIGHT FLEXIBLE METAL CONDUIT
   A. Description: Interlocked aluminum construction with PVC jacket.
   B. Fittings: NEMA FB 1.

2.5 ELECTRICAL METALLIC TUBING (EMT)
   A. Description: ANSI C80.3; galvanized tubing.
   B. Fittings and Conduit Bodies: NEMA FB 1; steel or malleable iron set screw type.

2.6 NONMETALLIC CONDUIT
   A. Description: NEMA TC 2; Schedule 40 PVC.
   B. Fittings and Conduit Bodies: NEMA TC 3.

PART 3 EXECUTION

3.1 EXAMINATION
   A. Verify that field measurements are as shown on drawings.
   B. Verify routing and termination locations of conduit prior to rough-in.
   C. Conduit routing is shown on drawings in approximate locations unless dimensioned. Route as required to complete wiring system.

3.2 INSTALLATION
   A. Conduit shall be run concealed where possible.
   B. Install conduit securely, in a neat and workmanlike manner, as specified in NECA 1.
   C. Install steel conduit as specified in NECA 101.
   D. Install nonmetallic conduit in accordance with manufacturer's instructions.
   E. Arrange supports to prevent misalignment during wiring installation.
   F. Support conduit using method approved for installation.
   G. Group related conduits; support using conduit rack. Construct rack using steel channel; provide space on each for 25 percent additional conduits.
   H. Fasten conduit supports to building structure and surfaces, not equipment.
   I. Do not support conduit with wire or perforated pipe straps. Remove temporary supports.
   J. Do not attach conduit to ceiling support wires.
   K. Arrange conduit to maintain headroom and present neat appearance.
   L. Route conduit parallel and perpendicular to walls.
   M. Route conduit in and under slab from point-to-point.
   N. Do not cross conduits in slab.
   O. Maintain adequate clearance between conduit and piping.
   P. Cut conduit square using saw or pipecutter; de-burr cut ends.
   Q. Bring conduit to shoulder of fittings; fasten securely.
   R. Join nonmetallic conduit using cement as recommended by manufacturer. Wipe nonmetallic conduit dry and clean before joining. Apply full even coat of cement to entire area inserted in fitting. Allow joint to cure for 20 minutes, minimum.
   S. Install no more than equivalent of three 90 degree bends between boxes. Use conduit bodies to make sharp changes in direction, as around beams. Use factory elbows for bends in metal conduit larger than 2 inch size.
   T. Provide suitable pull string in each empty conduit except sleeves and nipples.
   U. Provide grounding bushings on all conduits 2" and larger.
   V. Flexible metal conduit shall not be used in lengths longer than six feet.
   W. Ground and bond conduit under provisions of Section 26 0526.
   X. Identify conduit under provisions of Section 26 0553.
   Y. Install the conduit system mechanically and electrically continuous from outlet to outlet and to all cabinets, junction boxes, pull boxes, and equipment.
Z. All conduit runs above suspended acoustical ceilings shall be routed so as not to interfere with tile panel removal. All ceiling mounted equipment and fixtures in accessible ceilings shall be connected with flexible metal conduit or MC cable run from an accessible junction box on the structure above.

AA. In general, all horizontal runs of branch circuit conduit shall be installed in ceiling plenum. Conduit for convenience outlets, wall mounted fixtures, and other wall outlets shall be routed overhead and dropped through wall to the outlet. Do not use flexible metal conduit or MC cable inside new walls or for horizontal runs above ceilings. Short horizontal runs of flexible metal conduit in wood framing is acceptable.

AB. Use conduit fittings for sharp turns, tees, etc. in exposed locations.

AC. Conduit may be installed exposed in mechanical equipment rooms, and at connections to surface mounted panels and free standing equipment. Conduits exposed due to construction type in areas other than mechanical rooms shall be painted to match adjacent building surface.

3.3 INTERFACE WITH OTHER PRODUCTS

A. Install conduit to preserve fire resistance rating of partitions and other elements.

B. Route conduit through roof openings for piping and ductwork wherever possible. Where separate roofing penetration is required, coordinate location and installation method with roofing installation.

END OF SECTION
PART 1 GENERAL

1.1 SECTION INCLUDES
A. Wall and ceiling outlet boxes.
B. Pull and junction boxes.

1.2 RELATED REQUIREMENTS
A. Section 26 2726 - Wiring Devices:

1.3 REFERENCE STANDARDS
A. NECA 1 - Standard for Good Workmanship in Electrical Construction.
B. NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports.
C. NFPA 70 - National Electrical Code.

1.4 QUALITY ASSURANCE
A. Conform to requirements of NFPA 70.
B. Products: Provide products listed and classified by Underwriters Laboratories Inc.,

PART 2 PRODUCTS

2.1 MANUFACTURERS
A. Appleton, Steel City, National Electric, Legrand or approved equivalent.

2.2 OUTLET BOXES
A. Sheet Metal Outlet Boxes: NEMA OS 1, galvanized steel.
   1. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported; include 1/2 inch male fixture studs where required.

2.3 PULL AND JUNCTION BOXES
A. Sheet Metal Boxes: NEMA OS 1, galvanized steel.

PART 3 EXECUTION

3.1 EXAMINATION
A. Verify locations of outlets in prior to rough-in.

3.2 INSTALLATION
A. Install boxes securely, in a neat and workmanlike manner, as specified in NECA 1.
B. Install in locations as shown on Drawings and approved by owner, and as required for splices, taps, wire pulling, equipment connections, and as required by NFPA 70.
C. Provide multi-gang boxes for switches shown grouped on the drawings.
D. Set wall mounted boxes at elevations to accommodate mounting heights indicated.
E. Electrical boxes are shown on Drawings in approximate locations unless dimensioned.
   1. Adjust box locations up to 10 feet if required to accommodate intended purpose.
F. Orient boxes to accommodate wiring devices oriented as specified in Section 26 2726.
G. Maintain headroom and present neat mechanical appearance.
H. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only.
I. Coordinate mounting heights and locations of outlets mounted above counters and backsplashes.
J. Align adjacent wall mounted outlet boxes for switches, thermostats, and similar devices.
K. Use flush mounting outlet box in finished areas.
L. Do not install flush mounting box back-to-back in walls; provide minimum 6 inches separation. Provide minimum 24 inches separation in acoustic rated walls.
M. Secure flush mounting box to partition studs. Position to allow for surface finish thickness.
N. Use stamped steel bridges to fasten flush mounting outlet box between studs.
O. Install flush mounting box without damaging wall insulation or reducing its effectiveness.
P. Use properly supported, adjustable steel channel fasteners for hung ceiling outlet box.
Q. Do not fasten boxes to ceiling support wires.
R. Support boxes independently of conduit, except cast box that is connected to two rigid metal conduits both supported within 12 inches of box.
S. Use gang box where more than one device is mounted together. Do not use sectional box.
T. Use 4” square box with plaster ring for single device outlets.
U. Use cast outlet box, FS type, in exterior locations and wet locations.
V. Because of the scale of the drawings, certain basic items such as pull or junction boxes may not be shown. However, where these items are required by code, by other sections of the specifications, or for proper installation of the work, such items shall be furnished and installed.

3.3 ADJUSTING
A. Adjust flush-mounting outlets to make front flush with finished wall material.
B. Install knockout closures in unused box openings.
C. Outlet boxes shall be plumb and square with wall face.

3.4 CLEANING
A. Clean interior of boxes to remove dust, debris, and other material.

END OF SECTION
DIVISION 26 - ELECTRICAL

SECTION 26 0553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1  SECTION INCLUDES
   A. Nameplates and labels.
   B. Wire and cable markers.
   C. Underground warning tape.
   D. Field-painted identification of conduit.

1.2  REFERENCE STANDARDS
   A. NFPA 70 - National Electrical Code.

1.3  QUALITY ASSURANCE
   A. Conform to requirements of NFPA 70.
   B. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for purpose specified and shown.

PART 2 PRODUCTS

2.1  NAMEPLATES AND LABELS
   A. Nameplates: Engraved three-layer laminated plastic, black letters on white background.
   B. Locations:
      1. Each electrical distribution and control equipment enclosure.
      2. Switchboards and panels shall have a nameplate designating voltage, phase, and name of equipment of service origin (name of upstream panel).
      3. Disconnects and starters.
      5. Other equipment to be identified shall include, but not limited to, lighting controllers, pushbutton stations, special switches, special receptacles, and communication pull boxes.
   C. Letter Size:
      1. Use 1/4 inch letters for identifying grouped equipment.
   D. Circuit Numbers: Label panel and circuit numbers in a concealed location behind the cover plate of all receptacles and light switches. Label panel and circuit numbers on all equipment and junction boxes.

2.2  WIRE MARKERS
   A. Description: Tape type wire markers on feeder cables #4 and larger. Branch circuit wire and cable #6 and smaller shall be factory color coded by integral pigmentation.
   B. Locations: Each conductor at panelboard gutters and junction boxes each load connection.

2.3  UNDERGROUND WARNING TAPE
   A. Description: 4 inch wide plastic tape, detectable type colored red with suitable warning legend describing buried electrical lines.

PART 3 EXECUTION

3.1  INSTALLATION
   A. Equipment to be identified with nameplates shall include, but not limited to, panelboards, special system control panels, disconnects, pushbuttons stations, special lighting or control switches, special receptacles, communication pull boxes and j-boxes, and empty conduits provided for future use.
   B. Install nameplates and labels parallel to equipment lines.
   C. Secure nameplates to equipment front using screws.
   D. Secure nameplates to inside surface of door on panelboard that is recessed in finished locations.
   E. All j-boxes shall be legibly and permanently marked to indicate the circuit numbers associated with the conductors in the j-box.
   F. Each panelboard shall be provided with a neatly typed directory with plastic protector.
   G. Identify feeder cables using the following:
1. Colors:
a. 208/120 Volt System: Phase A - black, phase B - red, phase C - blue, neutral - white, equipment ground - green, isolated ground - green with yellow stripes/bands, switchleg - purple.

H. Identify conduit using field painting.
1. Paint colored band on each conduit longer than 6 feet.
2. Paint bands 10 feet on center. Do not paint where conduits are exposed in finished areas and are being painted to match the adjacent finishes.
3. Colors:
a. 208 Volt System: none.
b. Fire Alarm System: All j-boxes in the fire alarm system shall be painted Red.
c. Telephone/Data and CATV systems: blue.

I. Identify underground conduits using underground warning tape. Install one tape per trench at 3 inches below finished grade.

END OF SECTION
DIVISION 26 - ELECTRICAL

SECTION 26 2416 - PANELBOARDS

PART 1  GENERAL

1.1  SECTION INCLUDES
A. Main Distribution panelboards (Service Equipment).
B. Lighting and appliance panelboards.

1.2  RELATED REQUIREMENTS
A. Section 26 0526 - Grounding and Bonding for Electrical Systems.
B. Section 26 0553 - Identification for Electrical Systems.

1.3  REFERENCE STANDARDS
A. NECA 1 - Standard for Good Workmanship in Electrical Construction.
B. NEMA AB 1 - Molded Case Circuit Breakers.
C. NEMA KS 1 - Heavy Duty Enclosed and Dead-Front Switches (600 Volts Maximum).
D. NEMA PB 1 - Panelboards.
E. NEMA PB 1.1 - General Instructions for Proper Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less.
F. NFPA 70 - National Electrical Code.

1.4  SUBMITTALS
A. See Division 1 - for submittal procedures.
B. Shop Drawings: Indicate outline and support point dimensions, voltage, main bus ampacity, integrated short circuit ampere rating, circuit breaker and fusible switch arrangement and sizes.
C. Manufacturer’s Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

1.5  QUALITY ASSURANCE
A. Conform to requirements of NFPA 70.
B. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

PART 2  PRODUCTS

2.1  MANUFACTURERS

2.2  POWER DISTRIBUTION PANELBOARDS
A. Panels shall be similar to Square D I-Line.
B. Panel shall be UL listed and bear the UL label “Suitable for use as Service Equipment” if serving as main service entrance panel.
C. Description: NEMA PB 1, circuit breaker type.
D. Panelboard Bus: Aluminum, ratings as indicated. Provide copper ground bus in each panelboard.
E. Minimum integrated short circuit rating: As indicated. Series rating not allowed.
F. Molded Case Circuit Breakers: With integral thermal and instantaneous magnetic trip in each pole; UL listed. For air conditioning equipment branch circuits provide circuit breakers UL listed as Type HACR.
G. Enclosure: NEMA PB 1, Type 1 cabinet box.
H. Cabinet Front: Surface type, fastened with concealed trim clamps, hinged door with flush lock, metal directory frame, finished in manufacturer’s standard gray enamel.

2.3  LIGHTING AND APPLIANCE PANELBOARDS
A. Panels shall be similar to Square D Type NQ (120/240V) with Q series breakers.
B. Description: NEMA PB 1, circuit breaker type, lighting and appliance branch circuit panelboard.
C. Panelboard Bus: Aluminum, ratings as indicated. Provide copper ground bus in each panelboard.
D. Minimum integrated Short Circuit Rating: As indicated. Series rating not allowed.
E. Molded Case Circuit Breakers: NEMA AB 1, bolt-on type thermal magnetic trip circuit breakers, with common trip handle for all poles.
   1. Type SWD for lighting circuits.
   2. Type HACR for air conditioning equipment circuits.
   3. Do not use tandem circuit breakers.
F. Enclosure: NEMA PB 1, Type 1. Same height boxes for multi-tub panels.
G. Cabinet Box: 6 inches deep, 20 inches wide.
H. Cabinet Front: Flush or surface cabinet front with concealed trim clamps, concealed hinge, metal directory frame, and flush lock all keyed alike. Finish in manufacturer's standard gray enamel.

PART 3 EXECUTION

3.1 INSTALLATION
A. Install panelboards in accordance with NEMA PB 1.1 and NECA 1.
B. Install panelboards plumb. Install recessed panelboards flush with wall finishes.
C. Height: 6 feet to top of panelboard; install panelboards taller than 6 feet with bottom no more than 4 inches above floor.
D. Provide filler plates for unused spaces in panelboards.
E. Provide circuit breaker lock-on devices to prevent unauthorized personnel from de-energizing essential loads where indicated. Also provide for the following:
   1. Fire detection and alarm circuits.
   2. Communications equipment circuits.
   3. Intrusion detection and access control system circuits.
   4. Video surveillance system circuits.
F. Provide typed circuit directory for each branch circuit panelboard. Revise directory to reflect circuiting changes required to balance phase loads. Hand written directories are not acceptable.
G. Provide engraved plastic nameplates under the provisions of Section 26 0553.
H. Ground and bond panelboard enclosure according to Section 26 0526.

3.2 ADJUSTING
A. Measure steady state load currents at each panelboard feeder; rearrange circuits in the panelboard to balance the phase loads to within 20 percent of each other. Maintain proper phasing for multi-wire branch circuits.

END OF SECTION
DIVISION 26 - ELECTRICAL

SECTION 26 2717 - EQUIPMENT WIRING

PART 1 GENERAL

1.1 SECTION INCLUDES
A. Electrical connections to equipment.

1.2 RELATED REQUIREMENTS
A. Section 26 0534 - Conduit.
B. Section 26 0519 - Low-Voltage Electrical Power Conductors and Cables.
C. Section 26 0537 - Boxes.
D. Section 26 2726 - Wiring Devices.
E. Section 26 2818 - Enclosed Switches.
F. Section 26 2913 - Enclosed Controllers.

1.3 REFERENCE STANDARDS
A. NEMA WD 1 - General Color Requirements for Wiring Devices.
B. NEMA WD 6 - Wiring Devices - Dimensional Specifications.
C. NFPA 70 - National Electrical Code.

1.4 QUALITY ASSURANCE
A. Conform to requirements of NFPA 70.
B. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.5 COORDINATION
A. Obtain and review shop drawings, product data, manufacturer's wiring diagrams, and manufacturer's instructions for equipment furnished under other sections.
B. Coordinate breaker, wire, and conduit sizes for equipment furnished by other sections prior to ordering and prior to shop drawing release.
C. Determine connection locations and requirements.
D. Sequence rough-in of electrical connections to coordinate with installation of equipment.
E. Sequence electrical connections to coordinate with start-up of equipment.
F. Contractor is responsible for reviewing all related sections to provide all required connections (power & low voltage). Not all requirements may be shown on electrical drawings, but the contractor is still responsible for all electrical related items for the equipment. This includes neutral conductor if required per equipment manufacturer.

PART 2 PRODUCTS

2.1 MATERIALS
A. Cords and Caps: NEMA WD 6; match receptacle configuration at outlet provided for equipment.
   1. Colors: Conform to NEMA WD 1.
   2. Cord Construction: NFPA 70, Type SO, multiconductor flexible cord with identified equipment grounding conductor, suitable for use in damp locations.
   3. Size: Suitable for connected load of equipment, length of cord, and rating of branch circuit overcurrent protection.
B. Disconnect Switches: As specified in Section 26 2818.
C. Wiring Devices: As specified in Section 26 2726.
D. Enclosed Switches: As specified in Section 26 2818.
E. Wiring Devices: As specified in Section 26 2726.
F. Flexible Conduit: As specified in Section 26 0534.
G. Wire and Cable: As specified in Section 26 0519.
H. Boxes: As specified in Section 26 0537.
2.2 EQUIPMENT CONNECTIONS
    A. Motor connections:
       1. Electrical Connection: Flexible conduit.
       2. Contractor shall wire to motor controller or disconnect AND to motor unless otherwise indicated, for example, single point connection.
       3. Verify all connection parameters: ampacity, horsepower, voltage, phase, etc.. prior to ordering equipment. Coordinate with all trades providing equipment.
       4. Verify elevator connection parameters: ampacity, horsepower, voltage, phase, 3-Wire VS. 4-Wire, etc.. prior to ordering equipment (enclosed circuit breakers, circuit breakers, disconnects, etc.). Coordinate with supplier providing equipment. Provide shut trip breaker connected to fire alarm system. Provide an auxiliary contact for emergency return unit for elevator. Provide wiring to the elevator controller such that the contact is positively open when the main disconnecting means is open. Provide conduit and wiring as required by Elevator manufacturer. Coordinate exact requirements and location with Elevator manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION
    A. Verify that equipment is ready for electrical connection, wiring, and energization.

3.2 ELECTRICAL CONNECTIONS
    A. Make electrical connections in accordance with equipment manufacturer's instructions.
    B. Make conduit connections to equipment using flexible conduit. Use liquidtight flexible conduit with watertight connectors in damp or wet locations.
    C. Connect heat producing equipment using wire and cable with insulation suitable for temperatures encountered.
    D. Provide receptacle outlet to accommodate connection with attachment plug.
    E. Install cord & plug to equipment furnished by others, i.e. dishwashers, dryers, etc.
    F. Install suitable strain-relief clamps and fittings for cord connections at outlet boxes and equipment connection boxes.
    G. Install disconnect switches, controllers, control stations, and control devices to complete equipment wiring requirements.
PART 1 GENERAL

1.1 SECTION INCLUDES
A. Wall switches.
B. Receptacles.
C. Wall plates.
D. Poke-through assemblies.
E. Lighting Controls.
F. Occupancy sensors.

1.2 RELATED REQUIREMENTS
A. Section 26 0537 - Boxes.
B. Section 26 0553 - Identification for Electrical Systems: Labels for wiring devices.

1.3 REFERENCE STANDARDS
B. FS W-S-896 - Switches, Toggle (Toggle and Lock), Flush-mounted (General Specification); Federal Specification.
C. NECA 1 - Standard for Good Workmanship in Electrical Construction.
D. NFPA 70 - National Electrical Code.
E. UL 20 - General-Use Snap Switches.
F. UL 498 - Attachment Plugs and Receptacles.
G. UL 514D - Cover Plates for Flush-Mounted Wiring Devices.
H. UL 943 - Ground-Fault Circuit-Interrupters.

1.4 SUBMITTALS
A. See Section 26 0130 – Administrative Procedures for submittal procedures.
B. Product Data: Provide manufacturer's catalog information showing dimensions, colors, and configurations.

1.5 QUALITY ASSURANCE
A. Conform to requirements of NFPA 70.

PART 2 PRODUCTS

2.1 ALL WIRING DEVICES
A. Provide products listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

2.2 WALL SWITCHES
A. Manufacturers: Hubbell CS series, or equal Pass and Seymour, or Leviton.
B. Wall Switches: NEMA WD 1, Heavy Duty, AC only general-use snap switch.
   1. Body and Handle: plastic (color per architect) with rocker handle.
   2. Ratings:
      a. Voltage: 120 volts, AC.

2.3 RECEPTACLES
A. Manufacturers: Hubbell BR series or equal Pass and Seymour, or Leviton.
B. Receptacles: General duty, complying with NEMA WD 6 and WD 1.
   1. Device Body: Plastic (color per architect).
C. Convenience Receptacles: Type 5 - 20.
D. GFCI Receptacles: Convenience receptacle with integral ground fault circuit interrupter to meet regulatory requirements. Receptacles shall be "WR" weather resistant.
2.4 WALL PLATES
A. Decorative Cover Plates: color per architect, nylon.
   1. Product: Hubbell P Series or equal Pass and Seymour or Leviton.
B. In-Use Weatherproof Cover Plates: Self-closing, hinged, deep outlet cover with gasket between the hinged cover and mounting plate and between the enclosure and the mounting surface. Must be listed and labeled for wet location while in use.

2.5 POKE-THROUGH ASSEMBLIES
A. Description: Assembly comprising floor service fitting, poke-through component, fire stops and smoke barriers, and junction box for conduit termination; fire rating listed to match fire rating of floor and suitable for floor thickness where installed.
   1. See Floor Box Schedule shown on the drawings for description.

2.6 LIGHTING CONTROL
A. See Lighting Control Schedule for types.

2.7 OCCUPANCY SENSORS AND DAYLIGHT HARVESTING SENSORS
A. Sensors shall be of the ultrasonic, infrared, or multi-technology type per the schedule on the drawings.
B. Provide relay packs or room controllers and all accessories for sensors for control of the light fixtures. Relay packs shall be 120/277 volt, 20 amp minimum. Relay packs shall be capable of providing manual on control.
C. Sensor layout is based on the base manufacturer listed on the schedule. Manufacturers listed as equals shall adjust the quantity of layout of sensors to fit their product's specifications prior to bid, and shall advise the bidding contractors of these adjustments.
D. Cabling for digital system shall allow components to operate on a free-topology networking system, and shall accommodate both star and daisy-chain connection patterns.
E. See Lighting Control Schedule on the drawings.

PART 3 EXECUTION

3.1 EXAMINATION
A. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate devices and conductors in accordance with NFPA 70.
B. Verify that wall openings are neatly cut and will be completely covered by wall plates.
C. Verify that floor boxes are adjusted properly.
D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to devices.

3.2 PREPARATION
A. Provide extension rings to bring outlet boxes flush with finished surface.
B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.3 INSTALLATION
A. Perform work in a neat and workmanlike manner in accordance with NECA 1, including mounting heights specified in that standard unless otherwise indicated.
B. Coordinate locations of outlet boxes provided under Section 26 0537 as required for installation of wiring devices provided under this section.
C. Install wiring devices in accordance with manufacturer's instructions.
D. Where required, connect wiring devices using pigtails not less than 6 inches long. Do not connect more than one conductor to wiring device terminals.
E. Connect wiring devices by wrapping conductor clockwise 3/4 turn around screw terminal and tightening to proper torque specified by the manufacturer. Where present, do not use push-in pressure terminals that do not rely on screw-actuated binding.
F. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
G. Where split-wired duplex receptacles are indicated, remove tabs connecting top and bottom receptacles.
H. Install securely, in a neat and workmanlike manner, as specified in NECA 1.
I. Install wiring devices plumb and level with mounting yoke held rigidly in place.
J. Provide single coverplate for multi-gang boxes for switches shown grouped on the drawings.
K. Install wall switches with OFF position down.
L. Install blank wall plates on junction boxes and on outlet boxes with no wiring devices installed or designated for future use.
M. Install poke-through closure plugs in each unused core holes to maintain fire rating of floor.
N. Install receptacles with grounding pole on bottom.
O. Connect wiring devices by wrapping conductor around screw terminal.

3.4 INTERFACE WITH OTHER PRODUCTS
A. Coordinate locations of outlet boxes to obtain mounting heights specified.
B. Heights of devices shown on the drawings are to the center of the box.
C. Where light switches are located adjacent to doors, they shall be on the "knob" side.
D. Prior to roughing-in outlet boxes, Contractor shall verify from the general construction drawings, door swings, type of wall finishes, and locations for counters and work benches.

3.5 FIELD QUALITY CONTROL
A. Inspect each wiring device for damage and defects.
B. Operate each wall switch and wall dimmer with circuit energized to verify proper operation.
C. Operate each wall switch with circuit energized and verify proper operation.
D. Verify that each receptacle device is energized.
E. Test each receptacle to verify operation and proper polarity.
F. Test each GFCI receptacle for proper tripping operation according to manufacturer’s instructions.
G. Correct wiring deficiencies and replace damaged or defective wiring devices.

3.6 ADJUSTING
A. Adjust devices and wall plates to be flush and level.

3.7 CLEANING
A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

END OF SECTION
PART 1 GENERAL

1.1 SECTION INCLUDES
   A. Fuses.

1.2 REFERENCE STANDARDS
   A. NEMA FU 1 - Low Voltage Cartridge Fuses.
   B. NFPA 70 - National Electrical Code.

1.3 SUBMITTALS
   A. See Section 26 0132 - Product Requirements for submittal procedures.
   B. Product Data: Provide data sheets showing electrical characteristics, including time-current curves.

1.4 QUALITY ASSURANCE
   A. Conform to requirements of NFPA 70.
   B. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.5 MAINTENANCE MATERIALS
   A. Furnish three of each size and type fuse installed.

PART 2 PRODUCTS

2.1 MANUFACTURERS
   A. Bussman, Littelfuse or Mersen.

2.2 FUSES - GENERAL
   A. Dimensions and Performance: NEMA FU 1, Class as specified or indicated.
   B. Voltage: Rating suitable for circuit phase-to-phase voltage.
   C. Motor Load Feeder Switches: Class RK1 (time delay).

PART 3 EXECUTION

3.1 INSTALLATION
   A. Install fuses with label oriented such that manufacturer, type, and size are easily read.
DIVISION 26 - ELECTRICAL

SECTION 26 2818 - ENCLOSED SWITCHES

PART 1 GENERAL

1.1 SECTION INCLUDES
A. Fusible switches.

1.2 RELATED REQUIREMENTS
A. Section 26 2813 - Fuses.

1.3 REFERENCE STANDARDS
A. NECA (INST) - Standard of Installation; National Electrical Contractors Association.
B. NEMA KS 1 - Heavy Duty Enclosed and Dead-Front Switches (600 Volts Maximum).
D. NFPA 70 - National Electrical Code.

1.4 SUBMITTALS
A. See Section 26 0130 - Administrative Requirements for submittal procedures.
B. Product Data: Provide switch ratings and enclosure dimensions.
C. Shop Drawings: Provide product data and list of equipment to be served.

1.5 QUALITY ASSURANCE
A. Conform to requirements of NFPA 70.

PART 2 PRODUCTS

2.1 MANUFACTURERS
A. Same manufacturer as panelboards.

2.2 COMPONENTS
A. Fusible Switch Assemblies: NEMA KS 1, Type GD (general-duty) enclosed load interrupter knife switch.
   1. Externally operable handle interlocked to prevent opening front cover with switch in ON position.
   2. Handle lockable in OFF position.
   3. Fuse clips: Designed to accommodate NEMA FU1, Class R fuses.
B. Enclosures: NEMA KS 1.
   1. Interior Dry Locations: Type 1.
   2. Exterior Locations: Type 3R.

PART 3 EXECUTION

3.1 INSTALLATION
A. Install in accordance with manufacturer’s instructions.
B. Install fuses in fusible disconnect switches - size per nameplate & NEC.

3.2 FIELD QUALITY CONTROL
A. Inspect and test in accordance with NETA STD ATS, except Section 4.
B. Perform inspections and tests listed in NETA STD ATS, Section 7.5.1.1.

END OF SECTION
DIVISION 26 - ELECTRICAL

SECTION 26 5100 - INTERIOR LIGHTING

PART 1  GENERAL

1.1  SECTION INCLUDES
A. Interior lighting fixtures and accessories.
B. Emergency lighting units.
C. Exit signs.
D. LED drivers and controls.

1.2  REFERENCE STANDARDS
B. NECA/IESNA 500 - Standard for Installing Indoor Commercial Lighting Systems.
C. NFPA 70 - National Electrical Code.

1.3  SUBMITTALS
A. See Section 26 0130 - Administrative Requirements for submittal procedures.
B. Shop Drawings: Indicate dimensions and components for each fixture that is not a standard product of the manufacturer.
C. Product Data: Provide dimensions, ratings, and performance data.
D. Operation and Maintenance Data: Instructions for each product.

1.4  QUALITY ASSURANCE
A. Conform to requirements of NFPA 70 and NFPA 101.
B. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

PART 2  PRODUCTS

2.1  FIXTURE TYPES
A. Furnish products as indicated in the Light Fixture Schedule included on the Drawings.
B. Emergency Lighting Units: Self-contained incandescent emergency lighting unit.
   1. Battery: 6 volt, nickel-cadmium type, with 1.5 hour capacity.
   2. Battery Charger: Dual-rate type, with sufficient capacity to recharge discharged battery to full charge within twelve hours.
   3. Housing: plastic.
   4. Indicators: Lamps to indicate AC ON and RECHARGING.
   5. TEST switch: Transfers unit from external power supply to integral battery supply.
   6. Input Voltage: 120 volts.

2.2  EXIT SIGNS
A. Exit Signs: Exit sign fixture suitable for use as emergency lighting unit.
   1. Housing: plastic.
   2. Face: Plastic.
   3. Directional Arrows: As indicated.
   4. Mounting: Universal, for field selection.
   5. Battery: 6 volt, nickel-cadmium type, with 1.5 hour capacity.
   6. Battery Charger: Dual-rate type, with sufficient capacity to recharge discharged battery to full charge within twelve hours.
   7. Lamps: Manufacturer's standard.
   8. Input Voltage: 120 volts.

2.3  LED CONTROL UNITS - DIMMABLE
A. Solid state LED light engine with 85 CRI high efficiency LED array.
B. 0-10V dimming driver with dimming to 10%.
C. Rated system life of 50,000 hours at 70% output.
D. Light engine and drive are top and bottom accessible.
E. Provide lumen output, color temperature, voltage, and beam angle per plans.
F. 5 year fixture warranty.
G. Driver shall be similar to Philips Xitanium, Osram-Sylvania and Acuity shall be an approved equal manufacturer.

PART 3 EXECUTION

3.1 INSTALLATION
A. Install fixtures securely, in a neat and workmanlike manner, as specified in NECA 500 (commercial lighting).
B. Install suspended luminaires and exit signs using pendants supported from swivel hangers. Provide pendant length required to suspend luminaire at indicated height.
C. Support luminaires independent of ceiling frame. Support fixtures from structure.
D. Locate recessed ceiling luminaires as indicated on reflected ceiling plan.
E. Install surface mounted luminaires and exit signs plumb and adjust to align with building lines and with each other. Secure to prevent movement.
F. Mount exit signs from walls or provide rigid support (threaded rod to structure).
G. Install recessed luminaires to permit removal from below.
H. Install recessed luminaires using accessories and firestopping materials to meet regulatory requirements for fire rating.
I. Install clips to secure recessed grid-supported luminaires in place.
J. Mount exit sign at 6” above the top of the door jam or 96” AFF (whichever is less).
K. Mount wall mounted emergency lights at 6” below ceiling line or 80” AFF (whichever is less).
L. Install wall mounted luminaires, emergency lighting units, and exit signs at height as indicated on Drawings and per Architectural details and elevations.
M. Install accessories furnished with each fixture.
N. Connect luminaires, emergency lighting units, and exit signs to branch circuit outlets using flexible conduit.
O. Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within luminaire.
P. Bond products and metal accessories to branch circuit equipment grounding conductor.
Q. Install specified lamps in each emergency lighting unit, exit sign, and luminaire.

3.2 ADJUSTING
A. Aim and position adjustable emergency lighting unit lamps to achieve optimum illumination of egress path as required or as directed by Architect or authority having jurisdiction.
B. Aim and adjust luminaires as directed by manufacturer and Engineer.
C. Position exit sign directional arrows as indicated on drawings.

3.3 CLEANING
A. Clean electrical parts to remove conductive and deleterious materials.
B. Remove dirt and debris from enclosures.
C. Clean photometric control surfaces as recommended by manufacturer.
D. Clean finishes and touch up damage.

3.4 SCHEDULE - SEE DRAWINGS
END OF SECTION
DIVISION 26 - ELECTRICAL

SECTION 26 5600 - EXTERIOR LIGHTING

PART 1 GENERAL

1.1 SECTION INCLUDES
A. Exterior luminaires.

1.2 REFERENCE STANDARDS
C. IES RP-8 - Roadway Lighting.
D. NFPA 70 - National Electrical Code.

1.3 SUBMITTALS
A. See section 26 0100 – Administrative Requirements for submittal procedures.
B. Shop Drawings: Indicate dimensions and components for each luminaire that is not a standard product of the manufacturer.
C. Product Data: Provide dimensions, ratings, and performance data.
   1. LED Luminaires:
      a. Include estimated useful life, calculated based on IES LM-80 test data.

1.4 QUALITY ASSURANCE
A. Conform to requirements of NFPA 70.
B. Electrical Components: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

2.1 LUMINAIRES
A. Furnish products as indicated in Schedule included on the Drawings.

2.2 LUMINAIRES
A. LED Luminaires:
   1. Components: UL 8750 recognized or listed as applicable.
   2. Tested in accordance with IES LM-79 and IES LM-80.
   3. LED Estimated Useful Life: Minimum of 50,000 hours at 70 percent lumen maintenance, calculated based on IES LM-80 test data.

PART 3 EXECUTION

3.1 INSTALLATION
A. Coordinate locations of outlet boxes provided under Section 26 0537 as required for installation of luminaires provided under this section.
B. Install products in accordance with manufacturer's instructions.
C. Install luminaires plum and square and aligned with building lines and with adjacent luminaires.
D. Wall-Mounted Luminaires: Unless otherwise indicated, specified mounting heights are to center of luminaire.
E. Bond luminaires and metal accessories to branch circuit equipment grounding conductor.

3.2 FIELD QUALITY CONTROL
A. Inspect each product for damage and defects.
B. Operate each luminaire after installation and connection. Inspect for improper connections and operation.

3.3 ADJUSTING
A. Aim and position adjustable luminaires to achieve desired illumination as indicated or as directed by Architect. Secure locking fittings in place.
3.4 CLEANING
   A. Clean electrical parts to remove conductive and deleterious materials.
   B. Remove dirt and debris from enclosure.
   C. Clean photometric control surfaces as recommended by manufacturer.
   D. Clean finishes and touch up damage.

3.5 PROTECTION
   A. Protect installed luminaires from subsequent construction operations.

3.6 SCHEDULE - SEE DRAWINGS
END OF SECTION
DIVISION 27 - COMMUNICATIONS

SECTION 27 0130 - ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES
   A. References to Division 26 for general project information.

1.2 RELATED SECTIONS
   A. Section 26 0130 - Administrative Requirements.
   B. Section 26 0132 - Product Requirements.
   C. Section 26 0135 - Execution Requirements.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 DIVISION 26 REFERENCES
   A. Refer to the following general information sections in Division 26. These shall apply to all Division 27 labor and materials.
      1. Section 26 0130 - Administrative Requirements.
      2. Section 26 0132 - Product Requirements.
      3. Section 26 0135 - Execution Requirements.
   B. Division 27 Contractor shall serve as a sub-contractor to the Division 26 Contractor.

END OF SECTION
DIVISION 27 - COMMUNICATIONS

SECTION 27 1996 - VOICE & DATA CABLELING SYSTEM

PART 1 GENERAL

1.1 SECTION INCLUDES
A. Equipment and terminal backboards.
B. Main Voice System Wiring.
C. Voice and Data System Wiring.
D. Punchdown blocks.
E. Premises wiring and outlets.

1.2 REFERENCES
A. Category 6 requirements are found in the following American National Standards Institute (ANSI), the Electronics Industries Association/Telecommunications Industry (EIA/TIA) Standards and Technical Systems Bulletins (TSB):
C. TIA/EIA-607 - Commercial Building Bonding and Grounding Requirements for Telecommunications.

1.3 SUBMITTALS
A. See Section 26 0130 - Administrative Requirements for submittal procedures.
B. Product data:
   1. Materials list of items proposed to be provided under this section.
C. Shop Drawings: Show details of each cable type and accessories.

1.4 QUALITY ASSURANCE
A. Work shall be installed in accordance with the manufacturer's recommendations of the equipment to be supplied and installed under this contract.
B. Products: Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and indicated.

1.5 SYSTEM DESCRIPTION
A. Contractor shall provide and install the conduits, box rough-ins, backboards, cables, terminations, faceplates, patch panels, equipment racks, punchdown blocks, and testing. The Owner's data and voice system suppliers will provide the head-end equipment.
B. The Voice Cable Distribution is intended to be a Category 6 Open System Architecture in accordance with EIA/TIA 568 Standard.
C. The Data Cable Distribution is intended to be a Category 6 Open System Architecture in accordance with EIA/TIA 568 Standard.
D. All horizontal voice station wiring is home-run from the workstation outlet to the voice equipment maintaining Category 6 bend radius and cable support requirements.
E. All horizontal data station wiring is home-run from the workstation outlet to the data equipment maintaining Category 6 bend radius and cable support requirements.
F. Workstation Data Outlet shall include RJ-45/8w modular jacks, Category 6 terminations. Each jack shall be fed by an individual 4-pair station wire so all pins are active; one (1) data cable required for each data outlet and should include patch cords for both office and closet connection.
G. Workstation Voice Outlet shall include RJ-45/8w modular jacks, Category 6 terminations. Each jack shall be fed by an individual 4-pair station wire so all pins are active; one (1) voice cable required for each voice outlet and should include patch cords for both office and closet connection.

1.6 QUALIFICATIONS
A. Manufacturer: Single company that specializes in manufacturing products specified in this section and manufacturers all products specified in this section with minimum five years documented experience.
B. Approved Manufacturers:
   2. Category 6 voice and data cabling: Uniprise, Belden, Berktec, General Cable, TE Connectivity, Essex.
C. Cabling and connectivity products (devices, patch panels, etc.) must be part of a matched solution, provided by manufacturers that have been tested together and provide a fully certified and warranted end to end system.
D. Installer: Personnel installing and terminating Category 6 cabling system shall be manufacturer certified for installation and testing work and BICSI certified. Workers shall each hold valid manufacturer certification during construction period.
E. Warranty: A manufacturer product warranty shall be provided which warrants the functionality of all components for twenty years from the project completion date.

PART 2 PRODUCTS

2.1 SERVICE AND PATHWAYS
   A. Horizontal Pathway: Conform to TIA/EIA-569-A, using raceway and backboards as indicated.
   B. Any telephone, data, or combinations telephone/data outlet to be provided 4 inch by 4 inch dual device “deep” 2-1/8 inch style junction box with single gang ring with 3/4 inch conduit (or larger size noted) stubbed to accessible areas per the plans.

2.2 BACKBOARDS
   A. Telephone/Voice/Data Termination Backboards: Plywood.
      1. Coated with fire-retardant gray paint.
      2. Size: 4X4 feet

2.3 COMPONENTS
   A. Modular Outlet Faceplates:
      1. M-Series modular faceplates.
         a. Color: to match switches and receptacles.
         b. Provide blank covers for unused openings; color to match faceplate.
         c. Provide lettered labels for top and bottom of label holder.
   B. Wire Management:
      1. Closet Equipment Racks
         a. Equipment rack: 19" wide, height to accommodate patch panels.
         b. Drilled on both sides, 5/8, 5/8, 1/2 spacing.
         c. Material: Aluminum, black.
         d. Provide grounding bar at the top.
         e. Racks by Chatsworth or equal.

2.4 VOICE AND DATA SYSTEMS EQUIPMENT
   A. Cross Connect Hardware:
      1. Modular Patch Panels:
         a. Wired EIA/TIA T568B
         b. 48 port, high density type.
         c. Provide quality for new outlets shown plus ten future.
   B. Riser Cable:
      1. UL Listed Category 5, plenum rated.
         a. Unshielded, twisted pairs.
         b. Conductors: Copper.
         c. Insulation type: CMR.
            1) Lucent 20618.
         d. Wire size: 24 AWG.
         e. Number of pairs: 25 pairs.
   C. Category 6 Voice/Data Jack Modules:
      1. For use with modular Outlets.
         a. Wired EIA/TIA T568B.
         b. Color: Match the wiring devices.
D. Station Cable:
   1. UL Listed Category 6, plenum rated.
      a. Unshielded, twisted pairs.
      b. Conductors: Copper.
      c. Color: Blue.
      d. Wire size: 23 AWG.
      e. Number of pairs: 4.

E. Patch Cord Assembly - Closet:
   1. UL Listed - patch cords.
      a. Unshielded, twisted pairs.
      b. Conductors: 4 pair, copper.
      c. D8CM Mod-to-Mod cables.
      d. Closet Cable: Blue. 7ft length.
      e. Office Cable: Blue. 10ft length.
      f. Supply one closet cable and one office cable for every new voice and data jack.

F. Voice and Data Connection Labeling
   1. Label both ends of each connection.
   2. Voice and Data labels shall be: Room # -1, Room # -2, Room # -3. Example: Room 240 with three data connections would be 240-1, 240-2, and 240-3.

PART 3 EXECUTION

3.1 INSTALLATION
A. RACEWAY INSTALLATION
   1. Bond all voice and/or data conduits and cable tray together and to building grounding system.
   2. All voice and data wiring shall be installed in cable tray, raceway, conduit, or above an accessible ceiling (neatly bundled and supported).
   3. Provide voice/data labels on all ends and in pull boxes.
   4. Provide pull wire in each spare and used conduit for future use.

B. EQUIPMENT INSTALLATION
   1. Plan equipment backboard arrangements. Arrangements shall be uniform and well organized.
   2. Use commercially available wire management products to route wiring across backboards.
   3. Mark all punch down pairs in provided space on connecting blocks with indelible ink. Use room numbers as shown on the plans.
   4. Provide a #6 copper ground wire tied to the grounding system.

C. VOICE AND DATA WIRE AND CABLE INSTALLATION
   1. Plan cable installation so no cable run is longer than 90 meters.
   2. Install in accordance with manufacturer’s installation guidelines.
   3. Punchdown of pairs of station cables shall be by EIA/TIA standards.
   4. Label room number, a dash and jack. i.e. 240-1, 240-2, 240-3.
   5. The finished installation shall meet the most current Category 6 system installation standards.
   6. Splices, bridge taps, and repairs to wire and cable are not acceptable. Replace damaged cables.
   7. Maintain pair twists to termination index strip.
   8. Install pair terminations tight with no physical distortion.
   9. Replace all cabling that fails testing.

D. FIELD QUALITY CONTROL
   1. Testing Equipment; Microtest Omniscanner or equivalent.
      a. Capable of testing:
         1) NEXT (Near End Cross Talk)
         2) ELFNEXT
         3) Power Sum Cross Talk
         4) Attenuation
         5) ACR (Attenuation to Cross Talk Ratio).
         6) PSACR
         7) Length of cable; 4% or 2 feet whichever is greater.
         8) Impedance.
9) Loop Resistance.
10) Capacitance.
11) Measure Wire Map.
12) Capable of indicating pass or failure of testing.
13) Capable of providing hard copy printout results.

2. Voice and Data Wiring System Testing:
   a. All testing to be conducted under observation of Owner’s representative.
   b. Notify Owner’s representative at least 48 hours before commencing testing.
   c. All testing to be conducted using data rates introduced at intervals up to 100 Gbps as recommended by test equipment manufacturer.
   d. Perform testing on all four pairs of wire per cable.
   e. Label each cable test recorded on test equipment identical to the markings on the cable.
   f. Provide one electronic and one paper copy of results to Owner.

3. Frequency of testing:
   a. Test 100% of the cables installed. Conduct testing after terminations have been made at wall jack and the terminal board location (data) or termination block (voice).
   b. Retest all cables required to be reinstalled or reterminated.

E. Install wire and cable in accordance with manufacturer’s instructions and in accordance with TIA/EIA-568.

END OF SECTION
PART 1 GENERAL

1.1 SECTION INCLUDES
   A. References to Division 26 for general project information.

1.2 RELATED SECTIONS
   A. Section 260130 - Administrative Requirements.
   B. Section 260132 - Product Requirements.
   C. Section 260135 - Execution Requirements.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 DIVISON 26 REFERENCES
   A. Refer to the following general information sections in Division 26. These shall apply to all Division 28 labor and materials.
      1. Section 260130 - Administrative Requirements.
      2. Section 260132 - Product Requirements.
      3. Section 260135 - Execution Requirements.
   B. Division 28 Contractor shall serve as a sub-contractor to the Division 26 Contractor.

END OF SECTION
DIVISION 28 - ELECTRONIC SAFETY AND SECURITY

SECTION 28 3100 - FIRE ALARM SYSTEM

PART 1 GENERAL

1.1 SECTION INCLUDES
A. Fire alarm system design and installation, including all components, wiring, and conduit.
B. Maintenance of fire alarm system under contract for specified warranty period.

1.2 REFERENCES
A. NFPA 70 - National Electrical Code.

1.3 SUBMITTALS
A. Evidence of installer qualifications.
B. Evidence of maintenance contractor qualifications, if different from installer.
C. Inspection and Test Reports:
   1. Submit inspection and test plan prior to closeout demonstration.
   2. Submit documentation of satisfactory inspections and tests.
   3. Submit NFPA 72 "Inspection and Test Form," filled out.
D. Operating and Maintenance Data: Revise and resubmit until acceptable; have one set available during closeout demonstration:
   1. Complete set of specified design documents, as approved by authority having jurisdiction.
   2. Additional printed set of project record documents and closeout documents, bound or filed in same manuals.
   3. Contact information for firm that will be providing contract maintenance and trouble call-back service.
   4. List of recommended spare parts, tools, and instruments for testing.
   5. Replacement parts list with current prices, and source of supply.
   6. Detailed troubleshooting guide and large scale input/output matrix.
   7. Preventive maintenance, inspection, and testing schedule complying with NFPA 72; provide printed copy and computer format acceptable to the Owner.
   8. Detailed but easy to read explanation of procedures to be taken by non-technical administrative personnel in the event of system trouble, when routine testing is being conducted, for fire drills, and when entering into contracts for remodeling.
E. Project Record Documents: Have one set available during closeout demonstration:
   1. Complete set of floor plans showing actual installed locations of components, conduit, and zones.
   2. "As installed" wiring and schematic diagrams, with final terminal identifications.
   3. "As programmed" operating sequences, including control events by device, updated input/output chart, and voice messages by event.
F. Closeout Documents:
   1. Certification by manufacturer that the system has been installed in compliance with his installation requirements, is complete, and is in satisfactory operating condition.
   2. NFPA 72 "Record of Completion", filled out completely and signed by installer and authorized representative of authority having jurisdiction.

1.4 QUALITY ASSURANCE
A. Installer Qualifications: Firm with minimum 3 years documented experience installing fire alarm systems of the specified type and providing contract maintenance service as a regular part of their business.
   1. Authorized representative of control unit manufacturer; submit manufacturer’s certification that installer is authorized; include name and title of manufacturer’s representative making certification.
   2. Installer Personnel: At least 2 years of experience installing fire alarm systems.
   3. Supervisor: NICET level III or IV (3 or 4) certified fire alarm technician; furnish name and address.
B. Maintenance Contractor Qualifications: Same entity as installer or different entity with specified qualifications.
1.5 WARRANTY
   A. Provide control panel manufacturer’s warranty that system components other than wire and conduit are free from defects and will remain so for 1 year after date of Substantial Completion.
   B. Provide installer’s warranty that the installation is free from defects and will remain so for 1 year after date of Substantial Completion.

PART 2 PRODUCTS

2.1 MANUFACTURERS
   A. Fire Alarm System Panel and Components: Provided products that meet or exceed the performance of the basis of design product, products of the following are acceptable:
      1. System is based on a Notifier NFW2-100 addressable system with horn/strobe notification, or equivalent system from manufacturer listed below.
      2. SimplexGrinnell.
      4. Gamewell.

2.2 FIRE ALARM SYSTEM
   A. Fire Alarm System: Provide a new automatic fire detection and alarm systems:
      1. Provide all components necessary, regardless of whether shown in the contract documents or not.
      2. Comply with the following; where requirements conflict, order of precedence of requirements is as listed:
         a. The Americans With Disabilities Act (ADA).
         b. The requirements of the local Fire Chief.
         c. Applicable local codes.
         d. The contract documents (drawings and specifications).
         e. NFPA 101.
         f. NFPA 72.
   B. Circuits:
      1. Initiating Device Circuits (IDC): Class B, Style A.
      2. Signaling Line Circuits (SLC) Within Single Building: Class B, Style 0.5.
      3. Notification Appliance Circuits (NAC): Class B, Style W.
   C. Spare Capacity:
      1. Initiating Device Circuits: Minimum 25 percent spare capacity.

2.3 FIRE ALARM AND SMOKE DETECTION CONTROL PANEL
   A. Control Panel: Modular construction with flush wall-mounted enclosure.
   B. Provide a remote annunciators where indicated on plans with a minimum of a 80 character display.
   C. Power supply: Adequate to serve control panel modules, remote detectors, remote annunciators, door holders, smoke dampers, and relays, and alarm signaling devices. Include battery-operated emergency power supply with capacity for operating system in standby mode for 48 hours followed by alarm mode for 15 minutes.
   D. System Supervision: Component or power supply failure places system in trouble mode.
   E. Initiating Device Circuits: Supervised zone module with alarm and trouble indication; occurrence of single ground or open condition places circuit in trouble mode but does not disable that circuit from initiating an alarm.
   F. Indicating Appliance Circuits: Supervised signal module, sufficient for signal devices connected to system; occurrence of single ground or open condition places circuit in trouble mode but does not disable that circuit from signaling an alarm.
   G. Remote Station Signal Transmitter: Electrically supervised digital alarm communicator transmitter, capable of transmitting alarm and trouble signals over telephone lines to central station receiver.
   H. Auxiliary Relays: Provide sufficient SPDT auxiliary relay contacts for each detection zone to provide accessory functions specified.
   I. Provide TROUBLE ACKNOWLEDGE, DRILL, and ALARM SILENCE switch.
   J. Trouble Sequence of Operation: System or circuit trouble places system in trouble mode, which causes the following system operations:
      1. Visual and audible trouble alarm indicated by zone at fire alarm control panel.
      2. Visual and audible trouble alarm indicated at remote annunciator panel.
3. Trouble signal transmitted to central station.
4. Manual acknowledge function at fire alarm control panel silences audible trouble alarm; visual alarm is displayed until initiating failure or circuit trouble is cleared.

K. Alarm Sequence of Operation: Actuation of initiating device places circuit in alarm mode, which causes the following system operations:
1. Sound and display local fire alarm signaling devices with march time signal.
2. Transmit non-coded signal to central station.
3. Indicate location of alarm zone on fire alarm control panel and on remote annunciator panel.
4. Transmit signal to building mechanical systems to initiate shutdown of fans and damper operation.
5. Transmit signal to release door hold-open devices.

L. Alarm Reset: System remains in alarm mode until manually reset with key-accessible reset function; system resets only if initiating circuits are out of alarm mode.

M. Lamp Test: Manual lamp test function causes alarm indication at each zone at fire alarm control panel at annunciator panel.

N. Drill Sequence of Operation: Manual drill function causes alarm mode operation as described.


2.4 COMPONENTS

A. General:
1. Provide flush mounted units where installed in finish areas; in unfinished areas, surface mounted unit are acceptable.
2. Provide legible, permanent labels for each control device, using identification used in operation and maintenance data.

B. Initiating Devices:
1. Manual Pull Stations:
   a. A double action type, red LEXAN or metal, and finished in red with molded, raised-letter operating instructions of contrasting color. Station will mechanically latch upon operation and remain so until manually reset by opening with a key common with the control units.
2. Smoke Detectors:
   a. Smoke sensors shall be of the photoelectric type. Each sensor base shall contain an LED that will flash each time it is scanned by the Control Unit. In alarm condition, the LED shall be on steady.
3. Monitor Modules:
   a. Addressable type with built-in LED, programmable to monitor normal open contacts.

C. Auxiliary Devices:
1. Control Modules: Addressable type with built-in LED, programmable to operate 24v DC relays.
2. Cut-out Relays: UL listed relay, 120 volt/10 amp rated.

D. Notification Appliances:
1. Combination Audio/visuials:
   a. Audible/Visible: Combination Audible/Visible (A/V) Notification Appliances shall be listed to UL 1971 and UL 464. The strobe light shall consist of a xenon flash tube and associated lens/reflector system. Provide a label inside the strobe lens to indicate the listed candela rating of the specific strobe. The horn shall have a minimum sound pressure level of 85 dBA @ 24VDC. The audible/visible enclosure shall mount directly to standard single gang, double gang or 4" square electrical box, without the use of special adapters or trim rings.
   b. Color shall be red.
2. Horns:
   a. Piezoelectric type horn shall be listed to UL 464. The horn shall have a minimum sound pressure level of 85 dBA @ 24VDC. The horn shall mount directly to a standard single gang, double gang or 4" square electrical box, without the use of special adapter or trim rings.
   b. Color shall be red.
3. Strobes:
   a. Visible/Only: Strobe shall be listed to UL 1971. The V/O shall consist of a xenon flash tube and associated lens/reflector system. The V/O enclosure shall mount directly to standard single gang, double gang or 4" square electrical box, without the use of special adapters or trim rings. V/O appliances shall
be provided with different minimum flash intensities of 15cd, 75cd and 110cd. Provide a label inside the strobe lens to indicate the listed candela rating of the specific Visible/Only appliance.

b. Color shall be red.

c. E. Circuit Conductors: Plenum and fire alarm rated jacketed twisted pair copper, color coded and labeled. Manufacturer shall be approved by the Fire Alarm system supplier. Where conventional wiring is used, it shall by THHN and in conduit. All cabling shall be in conduit or neatly bundled above acoustical tile ceilings.

PART 3 EXECUTION

3.1 INSTALLATION
A. Install in accordance with applicable codes, NFPA 72, NFPA 70, and the contract documents.
B. Conceal all wiring, conduit, boxes, and supports where installed in finished areas.

3.2 INSPECTION AND TESTING FOR COMPLETION
A. Notify 7 days prior to beginning completion inspections and tests.
B. Notify authorities having jurisdiction and comply with their requirements for scheduling inspections and tests and for observation by their personnel.
C. Provide the services of the installer's supervisor or person with equivalent qualifications to supervise inspection and testing, correction, and adjustments.
D. Prepare for testing by ensuring that all work is complete and correct; perform preliminary tests as required.
E. Provide all tools, software, and supplies required to accomplish inspection and testing.
F. Perform inspection and testing in accordance with NFPA 72 and requirements of local authorities; document each inspection and test.
G. Correct defective work, adjust for proper operation, and retest until entire system complies with contract documents.

3.3 CLOSEOUT
A. Closeout Demonstration: Demonstrate proper operation of all functions to the Owner's Representative.
   1. Be prepared to conduct any of the required tests.
   2. Have authorized technical representative of control unit manufacturer present during demonstration.

3.4 MAINTENANCE
A. Provide to the Owner, at no extra cost, a written maintenance contract for entire manufacturer's warranty period, to include the work described below.
B. Perform routine inspection, testing, and preventive maintenance required by NFPA 72, including:
   1. Maintenance of fire safety interface and supervisory devices connected to fire alarm system.
   2. Repairs required, unless due to improper use, accidents, or negligence beyond the control of the maintenance contractor.
   3. Record keeping required by NFPA 72 and authorities having jurisdiction.
C. Provide trouble call-back service upon notification by Owner:
   1. Provide on-site response within 2 hours of notification.
   2. Include allowance for call-back service during normal working hours at no extra cost to Owner.
   3. Owner will pay for call-back service outside of normal working hours on an hourly basis, based on actual time spent at site and not including travel time; include hourly rate and definition of normal working hours in maintenance contract.

END OF SECTION
CSI Form 1.5C

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<thead>
<tr>
<th>Column</th>
<th>Description</th>
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<tr>
<td>Project:</td>
<td>Substitution Request Number:</td>
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<td>Article/Paragraph:</td>
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**Proposed Substitution:**
- Manufacturer: 
- Address: 
- Trade Name: 
- Phone: 
- Model No.: 

Attached data includes product description, specifications, drawings, photographs, and performance and test data adequate for evaluation of the request; applicable portions of the data are clearly identified.

Attached data also includes a description of changes to the Contract Documents that the proposed substitution will require for its proper installation.

**The Undersigned certifies:**
- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.

Submitted by: 
Signed by: 
Firm: 
Address: 
Telephone: 

**A/E’s REVIEW AND ACTION**
- Substitution approved - Make submittals in accordance with Specification Section 01 25 00 Substitution Procedures.
- Substitution approved as noted - Make submittals in accordance with Specification Section 01 25 00 Substitution Procedures.
- Substitution rejected - Use specified materials.
- Substitution Request received too late - Use specified materials.

Signed by: 
Date: 

Supporting Data Attached: 
- Drawings
- Product Data
- Samples
- Tests
- Reports