

# PROJECT MANUAL

# SARACENNIA FIRE STATION

Saracennia Road  
Moss Point, MS 39562

## JACKSON COUNTY

Jackson County Board of Supervisors  
P.O. Box 998 | Pascagoula, Mississippi 39568



David Machado, PE | Brad Patano, PE | Gerrod Kilpatrick, PE | Bradford Jones, AIA

918 Howard Avenue | Suite F | Biloxi | Mississippi 39530 | 228.388.1950

## REV 0: ISSUED FOR CONSTRUCTION

MPDG Project # 0004.23.001  
Sunday, April 07, 2024



## **PART 1 GENERAL**

### **1.01 PROJECT IDENTIFICATION**

- A. Project Name: Saracennia Fire Station, located at the Project Address listed below in 1.01, C.
- B. Engineer/Architect's Project Number: 0004.23.003
- C. Project Address:
  - 10221 Saracennia Road.
  - Moss Point, MS 39562.
- D. The Owner, hereinafter referred to as Owner: Jackson County Board of Supervisors
- E. Owner's Address:
  - 2915 Canty Street
  - Pascagoula, MS 39567
- F. Owner's Project Manager: Engineer/Architect.

### **1.02 NOTICE TO PROSPECTIVE BIDDERS**

- A. These documents constitute an Invitation to Bid to General Contractors for the construction of the project described below.

### **1.03 PROJECT DESCRIPTION**

- A. Summary Project Description: This project will consist of the following general scope of work. This description is provided for convenience purposes only and shall not be considered all inclusive. It is the general contractor's responsibility to become fully familiar with the existing conditions, review all of the construction document drawings, specifications, and any additional information documents in their entirety and bring forth any and all questions regarding scope confusion, misinterpretations, and/or possible errors and omissions to the Architect and/or Engineer prior to bid submission and/or start of construction.
  - 1. This project consists of new Apparatus Bay with meeting space and support space as described in the Construction Documents and Specifications.
- B. Contract Terms: Lump sum (fixed price, stipulated sum).
- C. All bid amounts must be based on the most stringent requirement called for in the complete construction document package. In addition, the most stringent requirement shown shall govern and take precedence in the event of any and all conflicts between different drawings (plans, elevations, details, sections, schedules, etc...), between different specification sections, within specification sections, and between the drawings and the specifications. It will be the General Contractor's responsibility to bring any and all discrepancies to the architect's attention for further clarity prior to submitting a formal bid.
- D. The project site is open for examination by bidders only during the following hours:
  - 1. Monday through Friday: 8:00 AM to 5:00 PM.

### **1.04 PROJECT CONSULTANTS**

- A. The Architect, hereinafter referred to as Engineer/Architect: MP Design Group.
  - 1. Address: 918 Howard Avenue, Suite F.
  - 2. City, State, Zip: Biloxi, MS 39530.
  - 3. Phone: 228-388-1950.
  - 4. Fax: 228-388-1971
  - 5. Website: [www.mpdesigngroup.us](http://www.mpdesigngroup.us)
  - 6. Plan Room: [www.mpengplans.us](http://www.mpengplans.us)
  - 7. Project E-mails: [bpatano@mpdesigngroup.us](mailto:bpatano@mpdesigngroup.us), [vanessa@mpdesigngroup.us](mailto:vanessa@mpdesigngroup.us).

### **1.05 PROCUREMENT TIMETABLE**

- A. Last Request for Substitution Due: 7 days prior to due date of bids.
- B. Last Request for Information Due: 7 days prior to due date of bids.

- C. Bid Due Date: As described in Document 001113 - Advertisement for Bids.
- D. Bid Opening: Same day, after the bids are due at the descretion of the Onwer and a time that is best determined by the Owner.
- E. Notice to Proceed: Will be issued after bid due date with anticipated start dates as shown below.
- F. Bids May Not Be Withdrawn Until: 60 days after due date.
- G. Contract Time: As described in Document 004100 - Bid Form.
- H. Final Completion date is critical due to requirements of Owner's operations.
- I. The Owner reserves the right to change the schedule or terminate the entire procurement process at any time.

#### **1.06 PROCUREMENT DOCUMENTS**

- A. Availability of Documents: Complete sets of procurement documents may be obtained:
  - 1. Bid Documents for a Stipulated Sum contract may be obtained from the website of the Architect at [www.mpengplans.us](http://www.mpengplans.us) upon receipt of a nonrefundable deposit, by cash or check, in the amount indicated on the plan room site for one set delivered in PDF format.
  - 2. Bid Documents can be obtained from PlanHouse printing in Gulfport, MS. Contact PlanHouse Printing at (228) 248-0181 for more detailed information on pricing and available construction document delivery formats.
- B. Documents may be viewed at Office of the Architect.

#### **1.07 BID SECURITY**

- A. Bids shall be accompanied by a security deposit as follows:
  - 1. Bid Bond of a sum no less than 5 percent of the Bid Amount on AIA A310 Bid Bond Form.

#### **PART 2 PRODUCTS (NOT USED)**

#### **PART 3 EXECUTION (NOT USED)**

**END OF SECTION**

**SECTION 000107  
SEALS PAGE**

**ARCHITECT OF RECORD**

**VANESSA J. HEMENWAY, AIA**

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Phone: 228.388.1950 | Fax: 228-388-1971  
Email: vanessa@mpdesigngroup.us



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**MECHANICAL AND PLUMBING ENGINEER OF RECORD**

**MICAH VAN DUJVENDIJK, P.E.**

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**ELECTRICAL ENGINEER OF RECORD**

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Email: bpatano@mpdesigngroup.us





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**END OF SECTION**

## ADVERTISEMENT FOR BIDS

NOTICE is hereby given that the Jackson County Board of Supervisors will receive written and sealed or electronic bids until the hour of 12:00 p.m. CST on May 08, 2024, and then said bids will be opened and read aloud at 1:00 pm on May 08, 2024, in the Board of Supervisors room, located at 2915 Canty St, Pascagoula, Mississippi 39567, Envelopes containing the bids must be sealed and delivered to the Purchasing Department Office located at 2915 Canty St. Suite D, Pascagoula, MS 39567 and designated as Bid for the following described, to wit:

### **Saracennia Fire Station**

This project consists of the new construction of a +/- 4,080 SF apparatus bay and site work.

The total Contract Time will be 270 consecutive calendar days and the liquidated damages will be \$500 per consecutive calendar day thereafter.

The Jackson County Board of Supervisors hereby notifies all bidders that it will affirmatively insure that in any contract entered into pursuant to this advertisement, minority business enterprises/woman business enterprises will be afforded full opportunity to submit bids in response to this invitation and will not be discriminated against on the grounds of race, color, or national origin in consideration for an award.

Contractors have the option of submitting their bids sealed in an envelope or electronically through [www.jacksoncoplans.com](http://www.jacksoncoplans.com). When submitting an electronic bid, the bid must be submitted in "pdf" format and shall contain the same information and forms as required for the paper bids. Electronic bids must be secured with a bid bond. When submitting a bid electronically, the authorized signature shall be an electronic signature or handwritten in blue-ink. In the event that an electronically submitted bid has a corrupted attachment, the bid will be considered null and void. When bids are submitted electronically, the requirement for including a certificate of responsibility, or a statement that the bid enclosed does not exceed Fifty Thousand Dollars (\$50,000.00) on the exterior of the bid envelope shall be deemed in compliance by including the same information as an attachment with the electronic bid submittal.

For an electronic bid, documents can be viewed or downloaded from [www.jacksoncoplans.com](http://www.jacksoncoplans.com). Contractors will be required to register FREE with Plan House Printing at [www.jacksoncoplans.com](http://www.jacksoncoplans.com) to submit an electronic bid. For any questions relating to the electronic submittal, please call Plan House Printing at 662-687-1209.

For sealed bids, a certified check payable to the order of Jackson County Board of Supervisors or a satisfactory Bid Bond executed by the bidder and an acceptable surety, must be submitted in an amount equal to five percent (5%) of the total bid.

All bids submitted in excess of \$50,000 by a prime or subcontractor to do any erection, building, construction, repair, maintenance or related work, must comply with Section 31-3-21, Mississippi Code of 1972, by having a current Certificate of Responsibility from the State Board of Public Contractors. The current Certificate of Responsibility Number shall be indicated on the exterior of the sealed bid envelope before it can be opened.

Resident contractors shall, in accordance with laws of the State of Mississippi, be granted preference

over non-residents in the award of the contract in the same manner and to the same extent as provided by the laws of the state of domicile of the non-resident. A non-resident contractor shall attach to his proposal a copy of this resident state's current law pertaining to such state's treatment of non-resident contractors. Any bid submitted by a nonresident contractor which does not include the nonresident contractor's current state law shall be rejected and not considered for award.

**ALL BIDS SUBMITTED FOR \$50,000 OR LESS SHALL BE SO MARKED ON THE EXTERIOR OF THE SEALED BID ENVELOPE**

Award will be made to the lowest and best bidder and the Jackson County Board of Supervisors reserves the right to reject any and all bids. Bids may be held for a period not to exceed sixty (60) days from the date of the opening of bids for the purpose of reviewing the bids and investigating the qualifications of Bidders, prior to awarding of the Contract.

**GIVEN UNDER MY HAND AND OFFICIAL SEAL OF OFFICE, THIS THE 1ST DAY OF APRIL, 2024.**

By: Josh Eldridge, Chancery Clerk  
Board of Supervisors  
P.O. Box 998  
Pascagoula, MS 39568

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**PUBLISH: April 7th and April 14th in the Sun Herald**

**Furnish proof of publication to: Machado-Patano, PLLC  
918 Howard Ave., Suite F  
Biloxi, MS 39530**

**Send invoice to: Jackson County Chancery Clerk  
2915 Canty Street, Suite R  
Pascagoula, MS 39567**

**SECTION 002113  
INSTRUCTIONS TO BIDDERS****INVITATION****1.01 BID SUBMISSION**

- A. Bids signed and under seal, executed, and dated will be received at the office of the Owner as Described in Document 001113 - Advertisement for Bids.
- B. Electronic Bid Submission will be accepted on this project. Online bids can be placed on the website of the Architect at [www.jacksoncoplans.com](http://www.jacksoncoplans.com).
- C. Offers submitted after the above time will be returned to the bidder unopened.
- D. Offers will be opened publicly after the time for receipt of bids.

**1.02 INTENT**

- A. The intent of this Bid request is to obtain an offer to perform work to complete a new Apparatus Bay with meeting space and support space located at Moss Point, Mississippi for a Stipulated Sum contract, in accordance with the Contract Documents.

**1.03 WORK IDENTIFIED IN THE CONTRACT DOCUMENTS**

- A. Work of this proposed Contract comprises remodeling, demolition, and minor site work, including general construction, mechanical, and electrical Work.
- B. All bid amounts must be based on the most stringent requirement called for in the complete construction document package. In addition, the most stringent requirement shown shall govern and take precedence in the event of any and all conflicts between different drawings (plans, elevations, details, sections, schedules, etc...), between different specification sections, within specification sections, and between the drawings and the specifications. It will be the General Contractor's responsibility to bring any and all discrepancies to the architect's attention for further clarity prior to submitting a formal bid.

**1.04 BUILDING PERMITS AND PLAN REVIEW**

- A. Refer to 011000 Summary

**1.05 CONTRACT TIME**

- A. Perform the Work in time as described in Document 000102 - Project Information.
- B. Inclement Weather: The Contract Time for the project has incorporated all days for inclement weather. No additional request inclement weather days will be allowed during the project duration. The only inclement weather delays that will be considered to be above and beyond standard adverse conditions and will be considered appropriate for the Contractor's request for additional time will be Acts of God that have directly effected the project site as follows:
  - 1. Named Storms
  - 2. Earthquakes
  - 3. Tornadoes
  - 4. Floods
  - 5. Hail Storms

**BID DOCUMENTS AND CONTRACT DOCUMENTS****2.01 DEFINITIONS**

- A. Bid Documents include the Advertisement for Bids, Instructions to Bidders, Bid Form, Information Available to Bidders, Supplements To Bid Forms and Appendices, other sample bidding and contract forms, and the proposed Contract Documents including any Addenda issued prior to receipt of bid. The Contract Documents proposed for the Work consist of the Owner-Contractor Agreement, the Conditions of the Contract (General, Supplementary, and other Conditions), the Drawings, the Specifications, and all Addenda issued prior to and all Modifications issued after execution of the Contract.

- B. All 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.
- C. Addenda are written or graphic instructions issued by the Architect prior to the execution of the Contract which modify or interpret the Bidding Documents by additions, deletions, clarifications, or corrections.
- D. A Bid is a complete and properly signed proposal to do the Work or designated portion thereof for the sums stipulated therein, submitted in accordance with the Bidding Documents.
- E. 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.
- F. 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.
- G. A Unit Price is an amount stated in the Bid as a price per unit of measurement for materials or services as described in the Bidding Documents or in the proposed Contract Document.
- H. A bidder is a person or entity who submits a Bid.
- I. A Sub-Bidder is a person or entity who submits a bid to a Bidder for materials or labor for a portion of the work.

## **2.02 CONTRACT DOCUMENTS IDENTIFICATION**

- A. The Contract Documents are identified as Saracennia Fire Station; Number 0004.23.001, as prepared by Engineer/Architect, and with contents as identified in the Project Manual.

## **2.03 AVAILABILITY**

- A. Bid Documents can also be obtained from the Plan Room website of the Architect at [www.mpdesigngroupplans.us](http://www.mpdesigngroupplans.us) upon receipt of a nonrefundable deposit, by cash or check, in the amount indicated on the plan room site for one set delivered in PDF format.
- B. Bid Documents can be obtained from PlanHouse printing in Gulfport, MS. Contact PlanHouse Printing at (228) 248-0181 for more detailed information on pricing and available construction document delivery formats.
- C. Bid Documents are made available only for the purpose of obtaining offers for this project. Their use does not grant a license for other purposes.

## **2.04 EXAMINATION**

- A. Bid Documents may be viewed at the office of Engineer/Architect .
- B. Upon receipt of Bid Documents verify that documents are complete. Notify Engineer/Architect should the documents be incomplete.
- C. Immediately notify Engineer/Architect upon finding discrepancies or omissions in the Bid Documents.

## **2.05 INQUIRIES/ADDENDA AND INTERPRETATIONS**

- A. Direct questions to Brad Patano or Vanessa Hemenway, at email: [bpatano@mpdesigngroup.us](mailto:bpatano@mpdesigngroup.us) and [Vanessa@mpdesigngroup.us](mailto:Vanessa@mpdesigngroup.us) respectively.
- B. Addenda may be issued during the bidding period. All Addenda become part of Contract Documents. Include resultant costs in the Bid Amount.
- C. Verbal answers are not binding on any party.
- D. Clarifications requested by bidders must be in writing not less than 7 days before date set for receipt of bids. The reply will be in the form of an Addendum, a copy of which will be forwarded to known recipients .

- E. Any interpretation, correction or change of the Bidding Documents will be made by Addendum issued during the bidding period. All Addenda become part of the Contract Documents. Interpretations, corrections or changes of the Bidding Documents made in any other manner will not be binding.
- F. Failure of any bidder to receive addendum issued, or to acknowledge receipt on the bid form, shall not relieve such bidder from any obligation under this bid as submitted.
- G. All bid amounts must be based on the most stringent requirement called for in the complete construction document package. In addition, the most stringent requirement shown shall govern and take precedence in the event of any and all conflicts between different drawings (plans, elevations, details, sections, schedules, etc...), between different specification sections, within specification sections, and between the drawings and the specifications. It will be the General Contractor's responsibility to bring any and all discrepancies to the architect's attention for further clarity prior to submitting a formal bid. No other method of estimating shall be used in preparing the bid proposal, unless contrary instructions are issued in the form of an Addendum before bid proposal due date.
- H. Any claim by the Contractor or Subcontractors that they, in submitting their respective bid proposals, did not include all items as shown in the Contract Documents will be given no consideration for an adjustment of any kind. If any item is specified in a Section which would not normally furnish this item, it shall be the responsibility of the Contractor to provide the work in question, without any additional cost to the Owner.

## **2.06 PRODUCT/ASSEMBLY/SYSTEM SUBSTITUTIONS**

- A. General Requirements for Substitution Requests:
  - 1. Provide complete information on required revisions to other work to accommodate each proposed substitution.
- B. Where the Bid Documents stipulate a particular product, substitutions will be considered up to 7 days before receipt of bids.
- C. Substitution Request Form:
  - 1. Submit substitution requests by completing the form in Section 004325; see this section for additional information and instructions. Use only this form; other forms of submission are unacceptable.
- D. Review and Acceptance of Request:
  - 1. When a request to substitute a product is made, Engineer/Architect may approve the proposed substitution and will issue an Addendum to known bidders.
  - 2. The submission shall provide sufficient information to determine acceptability of such products.
  - 3. Provide complete information on required revisions to other work to accommodate each proposed substitution.
  - 4. Provide products as specified unless substitutions are submitted in this manner and accepted.
- E. Submit substitution requests by completing the form in Section 004325 - Substitution Request Form - During Procurement; see this section for additional information and instructions. Use only this form; other forms of submission are unacceptable. If this form is not completed in its entirety, then it will be rejected and will have to be resubmitted.
- F. See Section 012500 - Substitution Procedures for additional requirements.

## **SITE ASSESSMENT**

### **3.01 SITE EXAMINATION**

- A. Examine the project site before submitting a bid.
- B. A visit to the project site has been arranged for bidders as follows: Immediately following the Pre-Bid Conference

- C. The currently occupied premises at the project site are open for examination by bidders only during the following hours:
  - 1. Monday through Friday: 8 AM to 5 PM.
  - 2. Contractor will be required to contact the Owner prior to arriving to schedule a time for examination.

### **3.02 PREBID CONFERENCE**

- A. A bidders conference has been scheduled as described in Document 000102 - Project Information. Meet in the main lobby of the Building. We will then relocate to a designated area as directed by the staff for the formal meeting. After the Pre-Bid Meeting we will tour the site as a group.
- B. All general contract bidders and suppliers are invited.
- C. Representatives of Engineer/Architect will be in attendance.
- D. Summarized minutes of this meeting may be circulated to all known bidders. These minutes will not form part of the Contract Documents.
- E. No verbal answers during this meeting are binding nor do they become a part of the Bid Documents. Information relevant to the Bid Documents will be recorded in an Addendum, issued to Bid Document recipients.

## **QUALIFICATIONS**

### **4.01 SUBCONTRACTORS/SUPPLIERS/OTHERS**

- A. Owner reserves the right to reject a proposed subcontractor for reasonable cause.
- B. Refer to General Conditions.

## **BID SUBMISSION**

### **5.01 SUBMISSION PROCEDURE**

- A. Bidders shall be solely responsible for the delivery of their bids in the manner and time prescribed.
- B. Submit one copy of the executed offer on the Bid Forms provided, signed and sealed with the required security in a closed opaque envelope, clearly identified with bidder's name, project name and Owner's name on the outside. If Bids are electronically submitted, then a title page containing the same information as would occur on the front of a sealed envelope must be included and must be clearly indicated as such in the file name (i.e. "open first," or "Envelope Information," etc...), so that it will be the first item opened.
- C. Bids in excess of \$50,000.00 must be marked on the outside of the envelope with the contractor's Mississippi Certificate of Responsibility Number as issued by the Mississippi Board of Contractors along with a copy of the General Contractor's proof of Mississippi license.
- D. Electronic Bid submission will be accepted on the project. Online bids can be placed on the website of the Owner through [www.jacksoncoplans.com](http://www.jacksoncoplans.com)
- E. When submitting an electronic bid, the bid must be submitted in "pdf" format and shall contain the same information and forms as required for the paper bids.

### **5.02 BID INELIGIBILITY**

- A. Bids that are unsigned, improperly signed or sealed, conditional, illegible, obscure, contain arithmetical errors, erasures, alterations, or irregularities of any kind, may at the discretion of the Owner, be declared unacceptable.
- B. Bid Forms, Appendices, and enclosures that are improperly prepared may, at the discretion of Owner, be declared unacceptable.
- C. Failure to provide security deposit, bonding or insurance requirements may, at the discretion of Owner, invalidate the bid.



- D. In the event that an electronically submitted bid has a corrupted attachment, the bid will be considered null and void. Bidders must ensure that their electronic submission can be accessed and viewed by the County immediately upon bid opening. The county will consider any file that cannot be immediately accessed and viewed at the time of the bid opening (such as, encrypted files, password protected files, or incompatible files) to be blank or incomplete as contact requires, and are therefore unacceptable. A bidder will not be permitted to unencrypt files, remove password protections, or resubmit documents after bid opening to make a file viewable if those documents are required with the bid.

## **BID ENCLOSURES/REQUIREMENTS**

### **6.01 SECURITY DEPOSIT**

- A. Bids shall be accompanied by a security deposit as follows:
1. Bid Bond of a sum no less than 5 percent of the Bid Amount on AIA A310 Bid Bond Form.  
-OR-
  2. Certified check in the amount of a sum no less than 5 percent of the Bid Amount.
- B. Endorse the certified check in the name of the Owner.
- C. The security deposit will be returned after delivery to the Owner of the required Performance and Payment Bond(s) by the accepted bidder.
- D. Include the cost of bid security in the Bid Amount.
- E. If no contract is awarded, all security deposits will be returned.

### **6.02 PERFORMANCE ASSURANCE**

- A. Accepted Bidder:
1. Provide a Performance Bond
  2. Provide a Payment Bond
  3. Provide a Schedule of Values
  4. Provide a Construction Schedule
- B. Include the cost of Performance and Payment Bonds in the Bid Amount.

### **6.03 INSURANCE**

- A. Provide an executed "Undertaking of Insurance" letter on official letterhead provided by the insurance company stating their intention to provide insurance to the bidder in accordance with the insurance requirements of the Contract Documents. This is nothing more than a letter. There is no special form required. The intent is to assure the Owner that the Bidder is capable of obtaining insurance coverage requirements set forth herein for this specific project.

### **6.04 NON COLLUSIVE AFFIDAVIT**

- A. Bids shall be accompanied with 004105 Form of Non Collusive Affidavit.

### **6.05 NON-RESIDENT CONTRACTORS**

- A. The following is excerpted from MS Code 31-3-21 Bidding process and requirements; report following award of contract, and is required for any non-resident contractor.
1. In the letting of public contracts preference shall be given to resident contractors, and a nonresident bidder domiciled in a state having laws granting preference to local contractors shall be awarded Mississippi public contracts only on the same basis as the nonresident bidder's state awards contracts to Mississippi contractors bidding under similar circumstances; and resident contractors actually domiciled in Mississippi, be they corporate, individuals, or partnerships, are to be granted preference over nonresidents in awarding of contracts in the same manner and to the same extent as provided by the laws of the state of domicile of the nonresident. When a nonresident contractor submits a bid for a public project, he shall attach thereto a copy of his resident state's current preference law, if any, pertaining to such state's treatment of nonresident contractors. Any bid submitted by a nonresident contractor which does not include the nonresident contractor's

current state law shall be rejected and not considered for award. As used in this section, the term "resident contractors" includes a nonresident person, firm or corporation that has been qualified to do business in this state and has maintained a permanent full-time office in the State of Mississippi for two (2) years prior to submission of the bid and the subsidiaries and affiliates of such a person, firm or corporation. Any public agency awarding a contract shall promptly report to the Department of Revenue the following information:

- a. The amount of the contract.
- b. The name and address of the contractor reviewing the contract.
- c. The name and location of the project.

#### **6.06 BID FORM REQUIREMENTS**

- A. Complete all requested information in the Bid Form and Appendices.

#### **6.07 BID FORM SIGNATURE**

- A. The Bid Form shall be signed by the bidder, as follows:
  1. Sole Proprietorship: Signature of sole proprietor in the presence of a witness who will also sign. Insert the words "Sole Proprietor" under the signature.
  2. Partnership: Signature of all partners in the presence of a witness who will also sign. Insert the word "Partner" under each signature.
  3. Corporation: Signature of a duly authorized signing officer(s) in their normal signatures. Insert the officer's capacity in which the signing officer acts, under each signature. Affix the corporate seal. If the bid is signed by officials other than the president and secretary of the company, or the president/secretary/treasurer of the company, a copy of the by-law resolution of their board of directors authorizing them to do so, must also be submitted with the Bid Form in the bid envelope.

#### **6.08 ADDITIONAL BID INFORMATION**

- A. Upon request by the Architect, the selected Bidder shall within seven days thereafter submit the following:
  1. A schedule of values for each major item of work included in the bid.
  2. A list of the work to be performed by the Bidder with his own work forces.
  3. A list of Subcontractors or other persons or organizations proposed for use on this project. The Bidder will be required to establish to the Architect, Owner and the Owner's Representative the reliability and responsibility of the proposed Subcontractors to furnish and perform the work. Subcontractors and other persons and organizations proposed by the Bidder and accepted by the Owner, Architect, and the Owner's Representative must be used on the work for which they were proposed and accepted and shall not be changed except with the written approval of the Owner, Architect and Owner's Representative.

#### **6.09 SELECTION AND AWARD OF ALTERNATES**

- A. Bids will be evaluated on the total of the base bid price and any combination of the Alternates. After determination of the successful bidder, consideration will be given to which Alternates will be included in the Work.

#### **6.10 QUALIFICATION OF BIDDERS**

- A. If required, a Bidder shall submit to the Architect a properly executed Contractor's Qualification Statement AIA Document A305, within five (5) days from request.
- B. The successful low bidder(s) will have to meet the following criteria to the Owners' satisfaction, prior to award of bid. Failure to do so may result in the rejection of the defaulting Contractors' Bid.
  1. The Contracting Company's ability to perform the designated scope of work.
  2. Qualified personnel and adequate work force capable of completing the specified project Work.

3. Satisfactory construction plan.
  4. Satisfactory safety plan and work history related to safety and reportable OSHA related incidences.
  5. Successful completion of a similar project and no documented letters of dissatisfaction from similar owners.
- C. Independent Contractor Status: It is understood and agreed that the contractor is an independent Contractor and not an employee of the Owner and that the Contractor shall be responsible for all necessary licenses, federal and state taxes, liability insurance, worker's compensation coverage and other obligations imposed upon him and his employees as an independent Contractor under applicable laws, rules and regulations.
- D. Indemnity to the Owner: It is understood and agreed that the Contractor shall hold the Owner harmless and indemnify the Owner against any losses, damages, or liabilities resulting from the performance of the aforesaid services by said Contractor. Contractor shall be responsible for all employee withholding, payroll and FICA taxes, and shall maintain any and all Worker's Compensation Insurance on its laborers as required by law and shall hold the Owner harmless from all claims, if any, concerning Contractor's employees or subcontractors.
- E. The Owner reserves the right to reject any Bid if the evidence submitted by, or investigation of, such bidder fails to satisfy the Owner that such bidder is properly qualified to carry out the obligations of the Contract and to complete the scope of Work. Conditional bids will not be accepted. The Owner may consider either of the following reasons as being sufficient for the disqualification of a bidder and the rejection of the bidder's proposal:
1. Submission of more than one proposal for the same work from an individual, partnership, firm or corporation under the same or different name(s),
  2. Evidence of collusion among bidders. Participants of such collusion may be disqualified for future Work of the Owner, and
  3. If the Bidder has been placed in default on another project with the Owner.
  4. Any other legal reason.

#### **6.11 DURATION OF OFFER**

- A. Bids shall remain open to acceptance and shall be irrevocable for a period of sixty (60) days after the bid closing date.

#### **6.12 ACCEPTANCE/ REJECTION OF OFFER**

- A. Owner reserves the right to accept or reject any or all offers.
- B. The Bidder acknowledges the right of the Owner to reject any or all bids and to waive any informality or irregularity in any bid received. In addition, the Bidder recognizes the right of the Owner to reject a bid if the Bidder failed to furnish required bid security or to submit the data required by the bidding documents, or if the bid is in any way incomplete or irregular. Each actual or prospective bidder agrees to waive any claim it has or may have against the Owner, or against the Architect, or against the Owner's Representative, and their respective employees and agents, arising out of or in connection with the bidding process specifically including the receipt, evaluation, recommendation, and administration of any bid.
- C. The Owner intends to award a Contract to the lowest and best Bidder within available funds, based on the sum of the base bid plus accepted alternates, if any. A bidder may be disqualified for any legally permissible reason. In making award, the Owner reserves the right to consider a bidder's experience, quality of previous work, availability of appropriate financial, material, facility, managerial or personal resources, warranties, life cycle cost and any other legal factors related to evaluating the bidder's capability to perform contract requirements in a timely and proper manner.
- D. The Owner reserves the right to cancel the award of a contract any time prior to the execution by all parties without liability against the Owner.

- E. Any protest from any bidder must be delivered to the Owner in writing within seventy-two (72) hours of bid opening.
- F. Any claim of error and request to be released from the bid by any bidder must be delivered to the Owner within twenty-four (24) hours of bid opening. Sufficient documentation and proof must accompany this written request clearly showing an error was made by the bidder.
- G. The Contract will provide for Liquidated Damages in the amounts indicated on the Bid Form. Amounts indicated are to be paid per day by the Contractor for this Project to the Owner for each calendar day after the date of substantial completion.
- H. After acceptance by Owner, Engineer/Architect on behalf of Owner, will issue to the successful bidder, a written Notice To Proceed.

**6.13 LIQUIDATED DAMAGES FOR FAILURE TO ENTER INTO CONTRACT**

- A. The successful Bidder, upon his failure or refusal to execute and deliver the Contract and bonds required within seven (7) days after he has received notice of the acceptance of his bid, shall forfeit to the Owner, as liquidated damages for such failure or refusal, the difference between his bid and the next acceptable bid, up to the maximum amount of the Bid Security.
- B. Refer to the Bid Form for the Amount and Time Frame for the Liquidated Damages.

**6.14 TIME OF COMPLETION**

- A. Bidder must agree to commence work on a date to be specified in a written "Notice to Proceed" and to substantially complete the Work within the number of calendar days indicated on the bid form.
- B. Bidders shall substantially complete all the work involved in its contract within the calendar days stated and shall be subject to damages for each calendar day of delay thereafter in accordance with the General Conditions of the Contract for Construction.

**END OF SECTION**

**SECTION 003100  
AVAILABLE PROJECT INFORMATION**

**PART 1 GENERAL**

**1.01 EXISTING CONDITIONS**

- A. Geotechnical Report: Entitled Geotech Report - Jackson County Fire Station, dated February 23, 2024 prepared by Southern Earth Sciences, Inc.
1. This document in whole is not considered part of the Contract Documents and is for reference purposes only.
  2. Original copy is attached at the end of the section.
  3. This report identifies properties of below grade conditions and offers recommendations for the design of foundations, prepared primarily for the use of Engineer/Architect.
  4. The recommendations described shall not be construed as a requirement of this Contract, unless specifically referenced in Contract Documents.
  5. This report, by its nature, cannot reveal all conditions that exist on the site. Should subsurface conditions be found to vary substantially from this report, changes in the design and construction of foundations will be made, with resulting credits or expenditures to the Contract Price accruing to Owner.

**PART 2 PRODUCTS (NOT USED)**

**PART 3 EXECUTION (NOT USED)**

**END OF SECTION**





# ECS Southeast, LLC

Geotechnical Engineering Report

**Jackson County Fire Station**

Saracennia Road  
Jackson County, Mississippi

ECS Project No. 65:1532

February 12, 2024









February 12, 2024

Mr. Nick Moody, P.E.  
MP Design Group  
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Suite F  
Biloxi, MS 39530  
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ECS Project No. 65:1532

Reference: Geotechnical Engineering Report  
**Jackson County Fire Station**  
Saracennia Road  
Jackson County, MS

Mr. Moody:

ECS Southeast, LLC (ECS) has completed the subsurface exploration, laboratory testing, and geotechnical engineering analyses for the Jackson County Fire Station project in Jackson County, MS. Our services were performed in accordance with our agreed to scope of work. This report presents our geotechnical analysis of the project along with the results of the field exploration and laboratory testing conducted, and our design and construction recommendations.

It has been our pleasure to be of service to MP Design Group during the design phase of this project. We would appreciate the opportunity to remain involved during the continuation of the design phase, and we would like to provide our services during construction phase operations as well to evaluate subsurface conditions assumed for this report. Should you have any questions concerning the information contained in this report, or if we can be of further assistance to you, please feel free to contact us.

Respectfully submitted,

**ECS Southeast, LLC**

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### APPENDICES

#### **Appendix A – Drawings & Reports**

- Site Location Diagram
- Boring Location Diagram

#### **Appendix B – Field Operations**

- Reference Notes for Boring Logs
- Boring Logs B-1 and B-2, P-1 to P-4

#### **Appendix C – Laboratory Testing**

- Laboratory Testing Results Summary



## EXECUTIVE SUMMARY

The following summarizes the main findings of the exploration, particularly those that may have a cost impact on the planned development. Further, our principal foundation recommendations are summarized. Information gleaned from the Executive Summary should not be utilized in lieu of reading the entire geotechnical report.

### PROJECT UNDERSTANDING:

- Structure Information: 4,000 square foot building with metal framing
- Considerations: Soft surficial soils, groundwater encountered at depth of approximately 3 feet

### SUBSURFACE CONDITIONS:

- Surface Material: Topsoil, approximately 6 inches with grass cover
- Probable Fill: Not encountered, but fill or deleterious materials may be present due to previous structures on site
- Potential Undercuts: Up to 6 inches to remove topsoil, approximately 2 to 4 feet in isolated areas where soft soils are encountered during proofroll
- Natural Material: Black, Brown, Tan and Gray Lean Clay (CL), Tan and Gray Fat Clay (CH), Brown Silty Clay (CL-ML), Brown Clayey Sand (SC), Light Brown, Tan, Gray and Brown Sand (SM)
- Swell Potential (PVR): Low
- Groundwater: Groundwater was encountered at approximately 3 feet below existing site grades in borings B-1 and B-2.

### DESIGN & CONSTRUCTION RECOMMENDATIONS:

- Shallow foundations
  - Max. Net Allow. Bearing Pressure
    - 1,500 psf for spread footings
  - Min. Exterior Footing Depth = 24 inches
  - Min. Interior Footing Depth = Per structural design
- Slab-on-Grade: Modulus of Subgrade Reaction of 100 pci
- Seismic Design: IBC Site Class “D”

ECS should be retained to review all project documents to confirm conformance with our recommendations, and to perform CMT testing for earthwork and foundation construction activities to document that our recommendations are strictly followed. This also allows us to quickly provide recommendations for remedial activities, where necessary.



## 1.0 INTRODUCTION

The purpose of this study was to provide geotechnical information for the design of a new fire station in Jackson County, Mississippi. The project will include a single-story, slab-on-grade building design with associated parking and drive areas. We anticipate the plan area of the building to encompass approximately 4,000 square feet. The recommendations developed for this report are based on project information supplied in a December 4, 2023, email from Nick Moody, P.E. with MP Design Group.

Our services were provided in accordance with our Proposal No. 2177P REV1, dated December 6, 2023, as authorized by Nick Moody, P.E. of MP Design Group on January 8, 2023, which includes our Terms and Conditions of Service.

This report contains the procedures and results of our subsurface exploration and laboratory testing programs, review of existing site conditions, engineering analyses, and recommendations for the design and construction of the project.

The report includes the following items:

- Observations from our site reconnaissance including current site conditions and surface topographic conditions.
- Description of the field exploration and laboratory tests performed.
- Final logs of soil test borings and records of the field exploration and laboratory tests in accordance with the standard practice of geotechnical engineers. This includes a location diagram.
- Recommendations for allowable bearing pressure for conventional shallow foundation systems and estimates of total and differential foundation settlement. This includes specific project information provided by MP Design Group and design loads anticipated by ECS.
- Recommendations for floor slab and pavement construction, including recommendations for subgrade modulus and subgrade improvements.
- Evaluation of the on-site soil characteristics encountered in the soil boring. Specifically, included is the suitability of the on-site materials for reuse as engineered fill to support ground slabs. A discussion of groundwater and its potential impact on structures and project construction has also been included.
- Recommendations regarding site preparation and construction observations and testing.





## 2.0 PROJECT INFORMATION

### 2.1 PROJECT LOCATION/CURRENT SITE USE/PAST SITE USE

The project is located on Saracennia Road in Jackson County, MS. A portion of parcel is covered with maintained grass and historical imagery shows that there was an approximately 5,000 square foot structure and a presumed concrete parking area in front. The topography of the site is relatively flat with surface elevations ranging from +12 feet MSL to +13 feet MSL. The elevations and topographic variations were estimated from Google Earth©. The location is depicted in Figure 2.1.1 shown below:



Figure 2.1.1: General Site Location Outlined in Red

## 2.2 PROPOSED CONSTRUCTION

The following information explains our understanding of the planned development including proposed buildings and related infrastructure. If ECS’s understanding of the project is not correct, especially if the structural loads or elevations are different, please contact ECS so that we may review these changes and revise our recommendations, as appropriate.

SUBJECT	DESIGN INFORMATION / ASSUMPTIONS
Building Footprint	Approximately 4,000 Square Feet
Number of Stories	Single-Story
Usage	Fire Station
Framing	Metal Framing
Anticipated Column Loads	<25 kips Maximum
Anticipated Wall Loads	<2.5 Kips Per Linear Foot (klf) Maximum
Lowest Finish Floor Elevation	~EL. 14 ft MSL (Estimated to be less than 2 feet above present site grades)

## 3.0 FIELD EXPLORATION AND LABORATORY TESTING

### 3.1 FIELD EXPLORATION PROGRAM

The field exploration was planned with the objective of characterizing the project site in general geotechnical and geological terms and to evaluate subsequent field and laboratory data to assist in the determination of geotechnical recommendations.

#### 3.1.1 Test Borings

Our scope of work included drilling a total of six (6) soil test borings. Two (2) test borings were drilled for the proposed building footprint and were advanced to a depth of approximately 25 feet below existing site grades. Four (4) test borings were drilled for the parking and drive pavements to a depth of approximately 6 feet below existing site grades. Our borings (labeled “B” in building footprints, and labeled “P” in pavement footprints) were located with a handheld GPS unit, and their approximate locations are shown on the Boring Location Diagram in Appendix A. The approximate ground surface elevations noted in this report were estimated from Google Earth©.

Representative soil samples were obtained by means of Standard Penetration Test (SPT) procedures in accordance with ASTM Specifications D-1586 in granular soils and by means of Shelby tube sampling procedures in accordance with ASTM Specifications D-1587 in cohesive soils. SPT sampling is performed by driving a split-barrel sampler into the soil in 1.5-foot intervals with a 140-lb hammer and measures the resistance of the soil to penetration of the 2-inch diameter sampler. In the Shelby tube sampling procedure, a thin walled, steel, seamless tube with sharp cutting edges is pushed hydraulically into the soil, and a relatively undisturbed sample is obtained.

Field logs of the soils encountered in the borings were maintained by ECS’s field engineer. After recovery, each geotechnical soil sample was removed for the sampler and visually classified. Representative

portions of each soil sample were then wrapped in plastic and transported to our laboratory for further visual examination and laboratory testing. After completion of the drilling operations, the boreholes were backfilled with cuttings to the existing ground surface.

### 3.2 SUBSURFACE CHARACTERIZATION

The following text provides generalized characterizations of the soil strata encountered during our subsurface exploration. For subsurface information specific information, please refer to the Boring Logs in Appendix B:

#### GENERALIZED SUBSURFACE CONDITIONS

Approximate Depth (ft)	Elevation <sup>(1)</sup> (Ft, MSL)	Stratum No.	Soil Description
0 – 0.5 ft	EL. +13.0 to +12.5	-	<b>TOPSOIL WITH GRASS COVER or CLAY SURFACE</b>
0.5 – 2.0 ft	EL. +12.5 to +11.0	I	<b>LEAN CLAY (CL) or SILTY CLAY (CL-ML), Soft, Brown</b>
2.0 – 6.5 ft	EL. +11.0 to +6.5	II	<b>LEAN CLAY (CL), Soft to Stiff, Tan and Gray</b>
6.5 – 25.0 ft	EL. +6.5 to -12.0	III	<b>CLAYEY SAND or SAND (SC or SP), Medium Dense to Very Dense, Tan and Gray</b>

Notes:

- (1) Please note that the ground surface elevations were not surveyed by a licensed surveyor; these elevations are approximate based on Google-Earth®.
- (2) Soil descriptions show generalized strata to 25'. Strata in the borings vary with depth, please see attached Boring Logs in Appendix B.

Please refer to the attached boring logs and laboratory data summary for this field exploration for a more detailed description of the subsurface conditions encountered in the borings as the stratification descriptions above are generalized for presentation purposes.

### 3.3 GROUNDWATER OBSERVATIONS

Groundwater levels, if observed, were made in the borings during drilling operations. In auger drilling operations, water is not introduced into the borehole and the groundwater position can often be evaluated by observing water flowing into and out of the excavation. Furthermore, visual observation of soil samples retrieved can often be used in evaluating the groundwater conditions.

**Groundwater was encountered during drilling operations at a depth of approximately 3 feet below surface grades in Borings B-1 and B-2.**

The highest groundwater observations are normally encountered in the late winter or early spring or following seasonal heavy rainfall events. Fluctuations in the location of the long-term water table may occur due to changes in precipitation, evaporation, surface water runoff and other factors not immediately apparent at the time of his investigation. Therefore, the groundwater conditions at this site are expected to be significantly influenced by surface water runoff and seasonal rainfall.

### 3.4 LABORATORY TESTING

The laboratory testing consisted of selected tests performed on samples obtained during our field exploration operations. Classification and index property tests were performed on representative soil samples. The soil samples were tested for Moisture Content (ASTM D2216), Atterberg Limits (ASTM D4318), Percent Passing Standard No. 200 Sieve (ASTM D1140), and Unconfined Compression (ASTM D2166).

Each sample was visually classified on the basis of texture and plasticity in accordance with ASTM D2488 Standard Practice for Description and Identification of Soils (Visual-Manual Procedures) and including USCS classification symbols. After classification, the samples were grouped in the major zones noted on the boring logs in Appendix B. The group symbols for each soil type are indicated in parentheses along with the soil descriptions. The stratification lines between strata on the logs are approximate; in situ, the transitions may be gradual.

The soil samples will be retained in our laboratory for a period of 60 days, after which, they will be discarded unless other instructions are received as to their disposition.

## 4.0 DESIGN RECOMMENDATIONS

The following recommendations have been developed based on Sections 2 and 3. If there are any changes to the project characteristics or if different subsurface conditions are encountered during construction, ECS should be consulted so that the recommendations of this report can be reviewed. Site grading information was not provided during this report; however, we have assumed that the foundation elevation will be less than 2 feet above existing site elevations. If the finished floor elevation deviates from this assumed site grades, the recommendations provided below should be evaluated by our office.

### 4.1 GEOTECHNICAL CONSIDERATIONS

Based on the subsurface conditions encountered in the borings, the anticipated loading conditions and the lowest level bearing elevation, the site appears suited for the proposed development provided the recommendations herein are strictly adhered to. The following sections detail our recommendations for the proposed development regarding foundation and below grade work.

#### 4.1.1 Presence of Expansive Soils

Based on the laboratory test results, the subsurface soils encountered within the building pad and pavement areas generally have a low swelling potential. Soils with swelling potential located above the water table and within depths that are subject to changes in moisture are expected to experience volume change and were considered in our potential vertical rise (PVR) estimation. **The potential vertical rise (PVR) is estimated to be less than 1 inch using an applied load of 1.0 psi.**

Generally, one (1) inch of PVR is acceptable as the maximum allowable value used for design and construction. However, the structural engineer must confirm if these PVR values are within acceptable limits for the specific project. These PVR estimations assume that the soils are allowed to

increase/decrease in moisture content from a relatively dry condition to a relatively wet condition over a depth of approximately 10 feet from the existing ground surface at the time of field exploration.

#### **4.1.2 Moisture Sensitive Soils**

Based on the laboratory test results, fine grained soils were disclosed directly beneath the surface layer across the site. These soils are moisture sensitive, subject to volume changes, and will become inadequate when wet of their optimum moisture content as evaluated by ASTM D698. Effective site drainage should be implemented at the onset of construction and maintained throughout the construction process. Care should be taken to keep construction traffic to a minimum across the site during wet periods. Water should not be allowed to pond on construction areas (building pads or pavement subgrade).

#### **4.1.3 Perimeter Conditions**

Positive drainage away from the structure should be provided during construction and maintained throughout the life of the proposed project. Water should not be allowed to infiltrate into the excavations during construction. Foundation soils should not be allowed to become wet. Grades must be sloped to provide effective drainage away from the building during and after construction. Adjacent concrete sidewalks and pavements should be sloped to provide drainage away from the building, and joints should be sealed; close attention should be paid to those directly abutting the building.

Roof runoff and surface drainage should be collected and discharged away from the structure to prevent wetting of the foundation soils. Roof gutters should be installed and connected to downspouts and pipes directing roof runoff into stormwater collection systems or discharged onto positively sloped pavements.

## 4.2 FOUNDATIONS

Structures with maximum column loads of 24 kips or less and provided subgrades and engineered fills are prepared as recommended in this report, the proposed structures can be supported by shallow foundations. For column loads greater than 24 kips, ECS should be consulted to provide additional recommendations. We recommend that the foundation design use the following parameters:

Design Parameter	Column Footing	Wall Footing
Net Allowable Bearing Pressure <sup>(1)</sup>	1,500 psf	
Acceptable Bearing Soil Material	Compacted Engineered Fill or Stiff Native Soil	
Minimum Width	24 inches	18 inches
Minimum Footing Embedment Depth (below slab or finished grade) <sup>(2)</sup>	24 inches	18 inches
Estimated Total Settlement <sup>(3)</sup>	About 1- inch	About 1- inch
Estimated Differential Settlement <sup>(4)</sup>	Less than 1/2 inches between columns	Less than 1/2 inches

Notes:

- (1) Net allowable bearing pressure is the applied pressure in excess of the surrounding overburden soils above the base of the foundation.
- (2) For bearing considerations and expansive soil concerns.
- (3) The calculated total settlement is for up to a 4 ft x 4 ft square footing at a maximum imposed bearing pressure of 1,500 psf. If final column loads are greater than 24 kips, ECS must be contacted to approve foundation recommendations and update settlement calculations, if needed.
- (4) Based on maximum column/wall loads and variability in borings. Differential settlement can be re-evaluated once the foundation plans are more complete.

**Potential Undercuts:** Soft soils were encountered from depths of 0 to 2 feet below existing grades in Borings B-1, B-2, P-1, and P-4, and from a depth of approximately 0 to 4 feet below existing grades in Boring B-2. If soft or loose soils are observed during footing observations, the footings should be extended to adequate bearing soils. Undercut areas should be backfilled with compacted engineered fill or lean concrete ( $f'c \geq 1,000$  psi at 28 days) to the original design bottom of footing elevation; the original footing should be constructed on top of the hardened lean concrete or engineered fill. If engineered fill is used to backfill the undercut footing, the over-excavated footings should be widened accordingly on all sides for each one (1) foot of over excavation as detailed in Figure 4.2.1 below. If lean concrete is used for backfill, the over-excavation does not require widening.

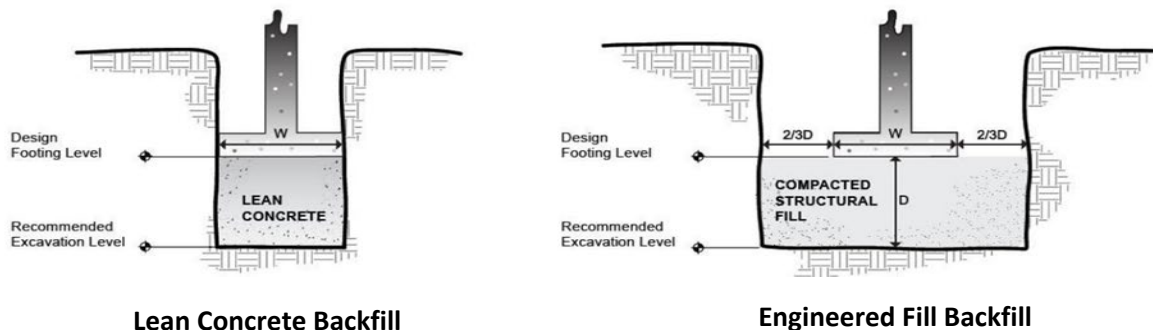


Figure 4.2.1: Backfill Detail

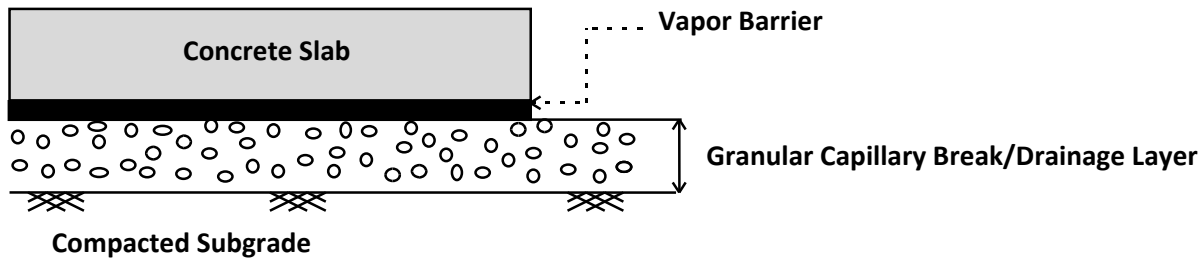
The net allowable soil bearing pressure refers to that pressure which may be transmitted to the foundation bearing soils in excess of the final minimum surrounding overburden pressure. The final footing elevation should be evaluated by ECS's geotechnical engineering personnel to evaluate that the bearing soils are capable of supporting the recommended net allowable bearing pressure and adequate for foundation construction. These evaluations should include visual observations using a T-probe or static cone penetrometer, or with the use of a Dynamic Cone Penetrometer (DCP), if necessary. Evaluations should be performed within each column footing excavation (minimum of 2 tests per column footing) and at intervals not greater than 25 feet in continuous footings. The DCP testing should extend at least 2 feet below the final foundation subgrade. A minimum DCP value of 10 blows should be used for the evaluation of the foundations.

The settlement of a structure is a function of the compressibility of the bearing materials, bearing pressure, actual structural loads, fill depths, and the bearing elevation of footings with respect to the final ground surface elevation. Estimates of settlement for foundations bearing on engineered or non-engineered fills are strongly dependent on the quality of fill placed. Factors that may affect the quality of fill include maximum loose lift thickness of the fills placed and the amount of compactive effort placed on each lift. If the recommendations outlined in this report are followed, we expect total settlements for the proposed construction to be in the range of 1 inch or less, while the differential settlement will be approximately half of the anticipated total settlement. This evaluation is based on our engineering experience and the anticipated loadings for this type of structure and is intended to aid the structural engineer with the design.

Exposure to the environment may weaken the soils at the foundation bearing level if the foundation excavations remain exposed during periods of inclement weather. Therefore, foundation concrete should be placed the same day that final excavation is achieved, and the design bearing pressure verified. If the bearing soils are softened by surface water absorption or exposure to the environment, the softened soils must be removed from the foundation excavation bottom immediately prior to placement of concrete. If the foundation excavation must remain open overnight, or if rainfall is apparent while the bearing soils are exposed, we recommend that a 1 to 3-inch thick "mud mat" of "lean" concrete be placed over the exposed bearing soils before the placement of reinforcing steel.

### 4.3 SLABS ON GRADE

Provided subgrades and engineered fills are prepared as discussed herein, the proposed floor slabs can be constructed as Ground Supported Slabs (or Slab-On-Grade) on lean natural soils, newly placed fill soils or lime treated soils. Based on the assumed finished floor elevation, it appears that the slabs will bear on native clay material or newly placed engineered fill. The following graphic depicts our soil-supported slab recommendations:



1. Drainage Layer Thickness: 4 inches
2. Drainage Layer Material: GRAVEL (GP, GW), SAND (SP, SW)

Soft or yielding soils may be encountered in some areas. Those soils should be removed and replaced with compacted engineered fill in accordance with the recommendations included in this report.

**Subgrade Modulus:** Provided the engineered fill and granular drainage layer are constructed in accordance with our recommendations, the slab may be designed assuming a modulus of subgrade reaction,  $k_1$  of **100 pci (lbs./cu. inch)**. The modulus of subgrade reaction value is based on a 1 ft by 1 ft plate load test basis.

**Vapor Barrier:** Before the placement of concrete, a vapor barrier may be placed on top of the granular drainage layer to provide additional protection against moisture penetration through the floor slab. When a vapor barrier is used, special attention should be given to surface curing of the slab to reduce the potential for uneven drying, curling and/or cracking of the slab. Depending on proposed flooring material types, the structural engineer and/or the architect may choose to eliminate the vapor barrier.

**Slab Isolation:** Soil-supported slabs should be isolated from the foundations and foundation-supported elements of the structure so that differential movement between the foundations and slab will not induce excessive shear and bending stresses in the floor slab. Where the structural configuration prevents the use of a free-floating slab such as in a drop-down footing/monolithic slab configuration, the slab should be designed with adequate reinforcement and load transfer devices to reduce risk of overstressing of the slab.



#### 4.4 SEISMIC DESIGN CONSIDERATIONS

**Seismic Site Classification:** The International Building Code (IBC) 2015/2018 requires site classification for seismic design based on the upper 100 feet of a soil profile. The methods are utilized in classifying sites, namely the shear wave velocity ( $v_s$ ) method; the unconfined compressive strength ( $s_u$ ) method; and the Standard Penetration Resistance (N-value) method. The unconfined compressive strength ( $s_u$ ) method was used in classifying this site.

SEISMIC SITE CLASSIFICATION			
Site Class	Soil Profile Name	Shear Wave Velocity, $V_s$ , (ft./s)	Soil Undrained Shear Strength (psf)
A	Hard Rock	$V_s > 5,000$ fps	N/A
B	Rock	$2,500 < V_s \leq 5,000$ fps	N/A
C	Very dense soil and soft rock	$1,200 < V_s \leq 2,500$ fps	$\geq 2000$
<b>D</b>	<b>Stiff Soil Profile</b>	<b><math>600 \leq V_s \leq 1,200</math> fps</b>	<b><math>1000 \leq S_u \leq 2000</math></b>
E	Soft Soil Profile	$V_s < 600$ fps	$< 1000$

Based upon our interpretation of the subsurface conditions, the appropriate **Seismic Site Classification is “D”** as shown in the preceding Table.

The Site Class definition should not be confused with the Seismic Design Category designation which the Structural Engineer typically assesses. If a higher site classification is beneficial to the project, we can provide additional testing methods that may yield more favorable results.

#### 4.5 PAVEMENTS

**Subgrade Characteristics:** Based on the results of our borings, it appears that the pavement subgrade will consist mainly of lean clay or silty clay soils. The soils across the site are moisture sensitive and will become difficult to work with when wet. Care should be taken if construction is performed during wet weather periods.

California Bearing Ratio [CBR] testing was not performed as part of this study. Therefore, we have assumed a CBR value of the onsite subsoil to be 3 for preliminary design purposes.

We were not provided traffic loading information, so we have assumed loadings typical of this type of project. We assumed a maximum daily traffic volume of 500 automobiles and 12 delivery trucks for medium duty pavement areas, and a maximum daily traffic volume of 250 automobiles, and three delivery trucks for light duty pavement areas. Our pavement section recommendations for medium duty (drives) pavements should accommodate occasional heavier loadings due to trash trucks, delivery vehicles and light truck traffic and may be considered for main drives. Typical pavement sections are presented below. Actual pavements sections and joint spacing, if applicable, should be designed based on specific traffic loads.

PROPOSED PAVEMENT SECTIONS					
MATERIAL	FLEXIBLE PAVEMENT		RIGID PAVEMENT		
	Medium Duty	Light Duty	Heavy <sup>(2)</sup> Duty	Medium Duty	Light Duty
Portland Cement Concrete (f' <sub>c</sub> = 4000 psi)	-	-	8 in.	6 in.	5 in.
Asphaltic Concrete Surface Course	2 inches	1 ½ inches	-		-
Asphaltic Concrete Binder Course	2 inches	1 ½ inches	-		-
Graded Aggregate Base Course <sup>(1)</sup>	6 inches	6 inches	4 inches	4 inches	4 inches
Proofrolled In-Situ lean Clay or Compacted Engineered Fill (Min. Thickness)	12 inches	12 inches	12 inches	12 inches	12 inches

Notes:

- (1) Materials should meet general requirements of the current Mississippi Department of Transportation (MDOT) Standard Specifications for Road and Bridge Construction.
- (2) Asphaltic concrete should conform to the requirement of MDOT Division 400 (Bituminous Pavement) and be compacted to a target of 94% ± 3% of the mix's theoretical maximum specific gravity (ASTM D2041 or AASHTO T209).
- (3) Graded aggregate base material should conform to the requirements of MDOT Division 300 (Bases) and be compacted to a criteria of 95% of the Standard Proctor (ASTM D698) maximum dry density within 2% of optimum moisture at the time of compaction. Lime and/or cement treated base course may be substituted for aggregate base for light duty pavement sections. Please refer to Section 5.1.4 for detailed pavement subgrade recommendations.
- (4) Large, front loading garbage trucks frequently impose concentrated front wheel loads on pavements during loading. This type of loading typically results in rutting of asphalt pavement and ultimately pavement failures. For preliminary design purposes, we recommend that the pavement in trash pickup areas consist of an 8-inch thick, 4,000 psi, reinforced concrete slab over at least 12 inches of properly compacted engineered fill material.

**Pavement Considerations:** In regions of improper surface and/or subsurface drainage, a softening of the subgrade and other problems related to the deterioration of the pavement can be expected. Esurance of positive drainage will reduce the possibility of the subgrade materials becoming saturated during the normal service period of the pavement.

The reinforced pavement in the trash pick-up area should extend to a minimum of 5 feet past the location of the expected wheel loads. When traffic loading becomes available, ECS or the Civil Engineer can design the pavements. Appropriate jointing should also be incorporated into the design of the PCC pavement which should be specified, constructed, and tested to meet the following requirements:

1. Proper pavement joint spacing and saw-cutting will be required to prevent excessive slab curling and shrinkage cracking. Joints should be sealed to prevent entry of foreign material and dowelled where necessary for load transfer and saw cutting should be performed while the concrete is in its "green" state. The design engineer should refer to ACI330R-08 for more detailed for the design of rigid pavement.
2. Portland Cement Concrete: Minimum compressive strength of 4,000 psi at 28 days.
3. Hot Mix asphaltic concrete should conform to the requirement of MDOT Division 400 (Bituminous Pavement). Engineered fill should meet the criteria for material properties and compaction recommended in Section 5.1 of this report.
4. Crushed aggregate base should be compacted to maximum lift height of eight inches to a minimum of 95 percent of the Standard Proctor (ASTM D698) maximum dry density. Aggregate should conform to the requirements of MDOT Division 300 (Bases)

Representative soil samples should be collected from the upper 2 feet of the final pavement subgrade to assess the suitability of the in-situ CBR values, prior to implementation of the pavement sections provided herein. Often during construction and preparation of the roadway subgrade, the soil materials may be improved and can sometimes yield reduced pavement sections based on the actual CBR values and traffic loads.

## 5.0 SITE CONSTRUCTION RECOMMENDATIONS

### 5.1 SUBGRADE PREPARATION

The existing soils are moisture sensitive and will become inadequate when above their optimum moisture content as evaluated by ASTM D698. Effective site drainage should be implemented at the beginning of and maintained throughout construction activities. Care should be taken to keep construction traffic to a minimum during and immediately after times of inclement weather.

Soft soils were encountered in the top 2 feet across the site and at depths of approximately 0 to 4 feet in Boring B-2. Soft soils may be encountered between and beyond our borings and should be addressed according to Section 5.1.2.

ECS should be on-site full-time during earthwork and foundation construction activities to document that our recommendations are strictly followed and to provide recommendations for remedial activities, if necessary.

#### 5.1.1 Stripping and Grubbing

The subgrade preparation should consist of removing approximately 6 inches to remove topsoil, existing fill, debris, and utilities and soft or yielding materials from the 10-foot expanded building limits, and 5 feet beyond the toe of engineered fills. **Note: If groundwater is encountered during undercut operations, site temporary dewatering may be required.**

**Note: Following stripping and grubbing the entire construction area should be proofrolled as outlined in Section 5.1.2 of this report. Soils observed to rut or deflect greater than an inch in depth should be undercut and replaced or otherwise mitigated.**

Deeper topsoil or organic laden soils may be present in wet, low-lying, and poorly drained areas. In wooded areas, the root balls may extend as deep as about 2 feet and will require additional localized stripping depth to completely remove the organics. ECS should be retained to evaluate that topsoil and poor surficial materials have been removed prior to the placement of engineered fill or construction of structures.

#### 5.1.2 Proofrolling

Following clearing activities and prior to fill placement or other construction on subgrades, the subgrades should be evaluated by an ECS field technician. The exposed subgrade should be thoroughly proofrolled

with a half loaded tandem-axle dump truck or similar construction equipment weighing a minimum of 15 tons. Proofrolling should be traversed in two perpendicular directions with overlapping passes of the vehicle under the observation of an ECS technician. This procedure is intended to assist in identifying localized yielding materials.

Where proofrolling identifies areas of yielding or “pumping” subgrade those areas should be repaired prior to the placement of subsequent engineered fill or other construction materials. Observations of yielding or “pumping” should be addressed with ECS to establish the appropriate remediation as outlined in Section 5.2.1.

## 5.2 EARTHWORK OPERATIONS

### 5.2.1 Subgrade Stabilization

Methods of stabilization include undercutting, moisture conditioning, or chemical stabilization. Test pits may be excavated to explore the shallow subsurface materials to help in determining the cause of the observed inadequate materials, and to assist in the evaluation of appropriate remedial actions to stabilize the subgrade. Anticipated methods of subgrade stabilization of the near surface soils are provided below:

**Moisture Conditioning:** If it is established that high moisture content is the cause of the inadequate subgrade, the geotechnical engineer may require the earthwork contractor process the upper 12 to 18 inches of in-situ subgrade by windrowing with a dozer or plowing with a set of heavy-duty disk harrows until soil moisture is observed to be within 2 percent of its optimum moisture content as evaluated by ASTM D698 to improve subgrade conditions before consideration other mitigation approaches. The drying effort should begin after the exposed subgrade is free of standing water and the windrowing/disking should be continuous during a period of dry weather. ECS should be onsite to periodically perform soil moisture testing. The processed areas should be sealed with compaction equipment and a flat drum roller or dozer blade at the end of the day in case of overnight rain. If weather conditions do not allow appropriate time to dry the native subgrade, the geotechnical engineer may recommend chemical treatment with lime or cement in order to provide an adequate working surface for fill placement.

**Undercut and Replace:** If other means of soil stabilization are not practical, the undercutting or removal of the inadequate subsurface material may be required. The undercutting of such material will be conducted, inspected, and tested in accordance with Section 5.1.

**Lime Stabilization:** Lime stabilization may be used to modify onsite clay soils to achieve an adequate working surface and achieve PIs between 10 and 25 for reuse as engineered fill. The amount of lime necessary to achieve lime stabilization will vary depending on the clay mineral, plasticity and type of lime used for stabilization. For estimating purposes 4 to 6% percent of lime by volume should be used; however, a laboratory lime series should be performed at the time of construction to establish the optimum lime content. Surficial samples should be collected from across the site and testing should be conducted on the composite sample. Lime treatment should conform to MDOT Division 300 (Bases) – Section 200. An ECS Field Engineer or Senior Technician should be present during lime treatment activities to observe lime quantities and document that treated areas are in conformance with the project requirements. Please note that caution should be used when powdered lime is used in closely populated areas. To control dust, a lime slurry or pelletized lime may be used where dust must be controlled. In

addition, pelletized lime will generally require 2 to 3 times the effort to properly pulverize and mix into the clay soils than a powder or slurry.

**Cement Stabilization:** When soils have PI values of 15 or below, cement stabilization should be used in lieu of lime treatment. Additionally, 12 inches of cement stabilized soil can be used as an alternative to aggregate base course for light and medium duty flexible pavement. A minimum of 10% by volume of cement is recommended to use for a cement stabilized base course. The treated soil should be compacted at least 95% of maximum dry density +/-3% the optimum moisture content. Cement treatment activities should be performed in accordance with the Mississippi Standard Specifications for Roads and Bridges (MSSRB).

### 5.2.2 Probable Fill

Fill material was not encountered in the soil borings at the time of exploration; however, historical imagery shows the site contained a structure on site in the past. Fill or deleterious material/debris may be encountered between or beyond our borings. If encountered, ECS recommends removing the existing fill and debris in its entirety and replacing it with well compacted engineered fill meeting the parameters outlined in this report.

### 5.2.3 Engineered Fill

Prior to placement of engineered fill, representative bulk samples (approximately 50 pounds) of on-site and/or off-site borrow should be submitted to ECS for laboratory testing, which will typically include Atterberg limits, natural moisture content, grain-size distribution, and moisture-density relationships (i.e., Proctors) for compaction. Import materials should be tested prior to being hauled to the site to evaluate if they meet project specifications. Alternatively, Proctor data from other accredited laboratories can be submitted if the test results are within the last 90 days.

**Satisfactory Engineered Fill Materials:** Materials satisfactory for use as Engineered Fill should consist of inorganic soils with the following engineering properties and compaction requirements.

ENGINEERED FILL INDEX PROPERTIES		
Soil Type	USCS Classification	Property
Imported Fill	CL, SC	LL < 40, PI<20, Fines Content<25%
Aggregate Base	GP	MDOT Division 300 (Bases) or similarly graded recycled aggregate
On-Site Soils	CL/CL-ML	The native Lean Clay soils encountered appear to meet the requirements for reuse, but further testing is required for confirmation.

ENGINEERED FILL COMPACTION REQUIREMENTS	
Subject	Requirement
Compaction Standard	Standard Proctor, ASTM D698
Required Compaction	95% of Max. Dry Density
Moisture Content	Optimum to +3 % Points of the Soil’s Optimum Value
Loose Thickness	8 Inches Prior to Compaction

**Fill Placement:** Excessively wet fill soils or aggregates should be scarified, aerated, and moisture conditioned prior to compaction.

**On-Site Borrow Suitability:** Natural deposits of soils that meet the definition above may be used as engineered fill on the site.

### 5.3 FOUNDATION AND SLAB OBSERVATIONS

**Protection of Foundation Excavations:** Exposure to the environment may weaken the soils at the footing bearing level if the foundation excavations remain open; therefore, foundation concrete should be placed the same day that excavations are made. Bearing soils that are weakened by surface water intrusion or exposure must be removed from the foundation excavation bottom immediately prior to placement of concrete. If the excavation must remain open overnight, or if rainfall becomes imminent while the bearing soils are exposed, a 1 to 3-inch thick “mud mat” of “lean” concrete should be placed on the bearing soils before the placement of reinforcing steel.

**Footing Subgrade Observations:** Most of the soils at the foundation bearing elevation are anticipated to be adequate for support of the proposed structure. ECS should observe the foundation subgrade prior to placing foundation concrete, to confirm the bearing soils are as recommended.

**Slab Subgrade Verification:** Prior to placement of a drainage layer, the subgrade should be prepared in accordance with the recommendations found in Section 5.1.2.

## 5.4 UTILITY INSTALLATIONS

**Utility Subgrades:** The soils encountered in our exploration are expected to be generally adequate for support of utility pipes. The pipe subgrades should be observed and probed for stability by ECS. Loose or inadequate materials encountered should be removed and replaced with adequate compacted Engineered Fill, or pipe stone bedding material.

**Utility Backfilling:** The granular bedding material (often AASHTO #57 stone) should be at least 4 inches thick, but not less than that specified by the civil engineer's project drawings and specifications. We recommend that the bedding materials be placed up to the springline of the pipe. Fill placed for support of the utilities, as well as backfill over the utilities, should conform to Section 5.2.

**Excavation Safety:** Excavations and slopes should be constructed and maintained in accordance with OSHA excavation safety standards. The contractor is solely responsible for designing, constructing, and maintaining adequate excavations and slopes. The contractor's responsible person, as defined in 29 CFR Part 1926, should evaluate the soil exposed in the excavations as part of the contractor's safety procedures. In no case should slope height, slope inclination, or excavation depth, including utility trench excavation depth, exceed those specified in local, state, and federal safety regulations. ECS is providing this information solely as a service to our client. ECS is not assuming responsibility for construction site safety or the contractor's activities; such responsibility is not being implied and should not be inferred.

## 6.0 CLOSING

ECS has prepared this report to guide the geotechnical-related design and construction aspects of the project. We performed these services in accordance with the standard of care expected of professionals in the industry performing similar services on projects of like size and complexity at this time in the region. No other representation expressed or implied, and no warranty or guarantee is included or intended in this report.

The description of the proposed project is based on information provided to ECS by MP Design Group. If any of this information is inaccurate or changes, either because of our interpretation of the documents provided or site or design changes that may occur later, ECS should be contacted so we can review our recommendations and provide additional or alternate recommendations that reflect the proposed construction.

We recommend that ECS review the project plans and specifications so we can confirm that those plans/specifications are in accordance with the recommendations of this geotechnical report.

Field observations, and quality assurance testing during earthwork and foundation installation are an extension of, and integral to, the geotechnical design. We recommend that ECS be retained to apply our expertise throughout the geotechnical phases of construction, and to provide consultation and recommendation should issues arise.

ECS is not responsible for the conclusions, opinions, or recommendations of others based on the data in this report.





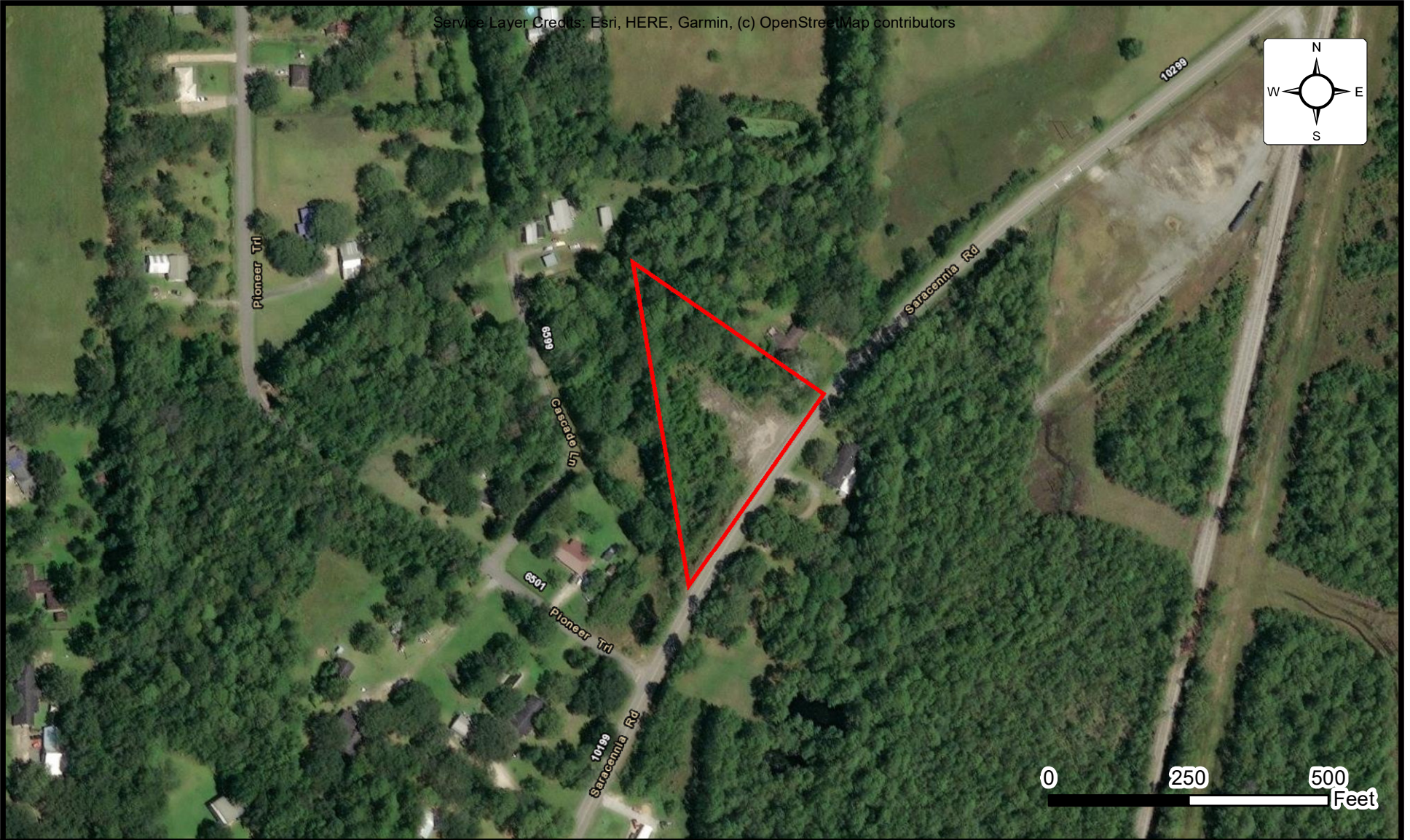
## **Appendix A - Drawings and Reports**

Site Location Diagram

Boring Location Diagram(s)



Service Layer Credits: Esri, HERE, Garmin, (c) OpenStreetMap contributors



# SITE LOCATION DIAGRAM JACKSON COUNTY FIRE STATION

SARACENNIA ROAD, JACKSON COUNTY, MISSISSIPPI  
MP DESIGN GROUP

ENGINEER OST
SCALE AS NOTED
PROJECT NO. 65:1532
FIGURE 1 OF 1
DATE 2/5/2024



# BORING LOCATION DIAGRAM JACKSON COUNTY FIRE STATION

SARACENNIA ROAD, JACKSON COUNTY, MISSISSIPPI  
MP DESIGN GROUP

ENGINEER OST
SCALE AS NOTED
PROJECT NO. 65:1532
FIGURE 1 OF 1
DATE 2/5/2024

## **Appendix B – Field Operations**

Reference Notes

Boring Logs





ECS Southeast, LLP

# REFERENCE NOTES FOR BORING LOGS

CLIENT MP Design Group

PROJECT NAME Jackson County Fire Station

PROJECT NUMBER 65-1532

## MATERIAL<sup>1,2,3</sup>



CL: LEAN CLAY  
low to medium plasticity



CL-ML: USCS Low Plasticity  
Silty Clay



SC: USCS Clayey Sand



SP: USCS Poorly-graded Sand

## DRILLING SAMPLING SYMBOLS & ABBREVIATIONS

SS	Split Spoon Sampler	PM	Pressuremeter Test
ST	Shelby Tube Sampler	RD	Rock Bit Drilling
WS	Wash Sample	RC	Rock Core, NX, BX, AX
BS	Bulk Sample of Cuttings	REC	Rock Sample Recovery %
PA	Power Auger (no sample)	RQD	Rock Quality Designation %
HSA	Hollow Stem Auger		

## PARTICLE SIZE IDENTIFICATION

DESIGNATION	PARTICLE SIZES
Boulders	12 inches (300 mm) or larger
Cobbles	3 inches to 12 inches (75 mm to 300 mm)
Gravel: Coarse	3/4 inch to 3 inches (19 mm to 75 mm)
Fine	4.75 mm to 19 mm (No. 4 sieve to 3/4 inch)
Sand: Coarse	2.00 mm to 4.75 mm (No. 10 to No. 4 sieve)
Medium	0.425 mm to 2.00 mm (No. 40 to No. 10 sieve)
Fine	0.074 mm to 0.425 mm (No. 200 to No. 40 sieve)
Silt & Clay ("Fines")	<0.074 mm (smaller than a No. 200 sieve)

## COHESIVE SILTS & CLAYS

UNCONFINED COMPRESSIVE STRENGTH, QP <sup>4</sup>	SPT <sup>5</sup> (BPF)	CONSISTENCY <sup>7</sup> (COHESIVE)
<0.25	<2	Very Soft
0.25 - <0.50	3 - 4	Soft
0.50 - <1.00	5 - 8	Firm
1.00 - <2.00	9 - 15	Stiff
2.00 - <4.00	16 - 30	Very Stiff
4.00 - 8.00	31 - 50	Hard
>8.00	>50	Very Hard

RELATIVE AMOUNT <sup>7</sup>	COARSE GRAINED (%) <sup>8</sup>	FINE GRAINED (%) <sup>8</sup>
Trace	≤ 5	≤ 5
With	10 - 20	10 - 25
Adjective (ex: "Silty")	25 - 45	30 - 45

## GRAVELS, SANDS & NON-COHESIVE SILTS

SPT <sup>5</sup>	DENSITY
<5	Very Loose
5 - 10	Loose
11 - 30	Medium Dense
31 - 50	Dense
>50	Very Dense

## WATER LEVELS<sup>6</sup>

	WL (First Encountered)
	WL (Completion)
	WL (Seasonal High Water)
	WL (Stabilized)

## FILL AND ROCK

FILL	POSSIBLE FILL	PROBABLE FILL	ROCK

<sup>1</sup>Classifications and symbols per ASTM D 2488-17 (Visual-Manual Procedure) unless noted otherwise.

<sup>2</sup>To be consistent with general practice, "POORLY GRADED" has been removed from GP, GP-GM, GP-GC, SP, SP-SM, SP-SC soil types on the boring logs.

<sup>3</sup>Non-ASTM designations are included in soil descriptions and symbols along with ASTM symbol [Ex: (SM-FILL)].

<sup>4</sup>Typically estimated via pocket penetrometer or Torvane shear test and expressed in tons per square foot (tsf).

<sup>5</sup>Standard Penetration Test (SPT) refers to the number of hammer blows (blow count) of a 140 lb. hammer falling 30 inches on a 2 inch OD split spoon sampler required to drive the sampler 12 inches (ASTM D 1586). "N-value" is another term for "blow count" and is expressed in blows per foot (bpf). SPT correlations per 7.4.2 Method B and need to be corrected if using an auto hammer.

<sup>6</sup>The water levels are those levels actually measured in the borehole at the times indicated by the symbol. The measurements are relatively reliable when augering, without adding fluids, in granular soils. In clay and cohesive silts, the determination of water levels may require several days for the water level to stabilize. In such cases, additional methods of measurement are generally employed.

<sup>7</sup>Minor deviation from ASTM D 2488-17 Note 14.

<sup>8</sup>Percentages are estimated to the nearest 5% per ASTM D 2488-17.

ECS GEOTECH. LOG - TEMPLATE WITH LAB BLANK GDT - 2/8/24 11:38 - C:\USERS\INBURKE\ONEEDRIVE - ECS CORPORATE SERVICES\DESKTOP\65-1532.GPJ

DEPTH, FT	WATER LEVEL	SYMBOL	SAMPLES	BLOWS PER 6 INCHES	BORING NO. B-1 LAT: 30.490967° LONG: -88.501777° SURFACE EL.: 13.0'	STRATUM DEPTH, FT	CLASSIFICATION					SHEAR STRENGTH								
							UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)	KSF							
STRATUM DESCRIPTION																				
				1-1-1 (2)	Brown silty clay, soft (CL-ML)			20	24	18	6									
				2-4-6 (10)	Tan and gray lean clay, stiff (CL)	2.5		22												
5				4-4-7 (11)				23												
				6-5-7 (12)	Brown clayey sand, medium dense (SC)	6.5		21												
10				1-3-1 (4)	--- Loose		21	22												
				16-23-30 (53)	Light brown sand, very dense (SP)	13.5		21												
20				10-12-17 (29)	Tan clayey sand, medium dense (SC)	18.5		21												
25				10-13-21 (34)	--- Dense			21												
					Bottom Depth of Borehole = 25 Feet	25.0														

**NOTES:**

- ∇: Water First Noticed.
- Terms and symbols defined on reference notes.

START DATE: January 11, 2024  
 COMPLETION DATE: January 11, 2024  
 TOTAL DEPTH: 25.0'  
 CAVED DEPTH: Not Applicable  
 DRY AUGER: Yes  
 WET ROTARY: Not Applicable  
 BACKFILL: Yes  
 LOGGER: J. Mallett  
 DRILL RIG: Track  
 HAMMER TYPE: Automatic



Client: MP Design Group

**LOG OF BORING NO. B-1**

Project Name: Jackson County Fire Station

Site Location: Jackson County, Mississippi

Project No.

65-1532

PM/PE

NB/JC



ECS GEOTECH. LOG - TEMPLATE WITH LAB BLANK GDT - 2/8/24 11:38 - C:\USERS\INBURKE\ONEEDRIVE - ECS CORPORATE SERVICES\DESKTOP\65-1532.GPJ

DEPTH, FT	WATER LEVEL	SYMBOL	SAMPLES	BLOWS PER 6 INCHES	BORING NO. B-2 LAT: 30.491127° LONG: -88.501655° SURFACE EL.: 13.0'	STRATUM DEPTH, FT	CLASSIFICATION				SHEAR STRENGTH						
							UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)	KSF				
					STRATUM DESCRIPTION							0.5	1.0	1.5	2.0	2.5	
5				1-1-1 (2)	Black and gray lean clay, soft (CL) --- Soft, with sand --- Tan and gray, firm			23									
6.5				6-10-15 (25)	Light brown sand, medium dense (SP)	6.5	76	23	24	14	10						
10				10-11-10 (21)				19									
15				14-23-18 (41)	--- Dense			19									
20				10-12-13 (25)	--- Medium dense			23									
25				6-18-21 (39)	--- Brown, dense			26									
25.0					Bottom Depth of Borehole = 25 Feet	25.0											

**NOTES:**

- ∇: Water First Noticed.
- Terms and symbols defined on reference notes.

START DATE: January 11, 2024  
 COMPLETION DATE: January 11, 2024  
 TOTAL DEPTH: 25.0'  
 CAVED DEPTH: Not Applicable  
 DRY AUGER: Yes  
 WET ROTARY: Not Applicable  
 BACKFILL: Yes  
 LOGGER: J. Mallett  
 DRILL RIG: Track  
 HAMMER TYPE: Automatic



Client: MP Design Group

**LOG OF BORING NO. B-2**

Project Name: Jackson County Fire Station

Site Location: Jackson County, Mississippi

Project No.

65-1532

PM/PE

NB/JC

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DEPTH, FT	WATER LEVEL	SYMBOL	SAMPLES	BLOWS PER 6 INCHES	BORING NO. P-1 LAT: 30.490757° LONG: -88.501683° SURFACE EL.: 13.0'	STRATUM DEPTH, FT	CLASSIFICATION					SHEAR STRENGTH							
							UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)	KSF						
					STRATUM DESCRIPTION														
				3-2-2 (4)	Dark brown lean clay, soft (CL)														
					--- Gray and tan, firm	110		19	25	14	11								
5				1-2-3 (5)	--- Brown and tan														
					Bottom Depth of Borehole = 6 Feet	6.0													

**NOTES:**

- Terms and symbols defined on reference notes.

START DATE: January 11, 2024  
 COMPLETION DATE: January 11, 2024  
 TOTAL DEPTH: 6.0'  
 CAVED DEPTH: Not Applicable  
 DRY AUGER: Yes  
 WET ROTARY: Not Applicable  
 BACKFILL: Yes  
 LOGGER: J. Mallett  
 DRILL RIG: Track  
 HAMMER TYPE: Automatic



Client: MP Design Group

**LOG OF BORING NO. P-1**

Project Name: Jackson County Fire Station

Site Location: Jackson County, Mississippi

Project No.

65-1532

PM/PE

NB/JC

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DEPTH, FT	WATER LEVEL	SYMBOL	SAMPLES	BLOWS PER 6 INCHES	BORING NO. P-2 LAT: 30.490879° LONG: -88.501592° SURFACE EL.: 13.0'	STRATUM DEPTH, FT	CLASSIFICATION					SHEAR STRENGTH				
							UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)	KSF			
					STRATUM DESCRIPTION							0.5	1.0	1.5	2.0	2.5
				1-3-2 (5)	Tan and black sandy lean clay, firm (CL)			22								
				WOH-1-1 (2)	--- Soft			24								
5					--- Gray and tan			21								
					Bottom Depth of Borehole = 6 Feet	6.0										

**NOTES:**

1. Terms and symbols defined on reference notes.

START DATE: January 11, 2024  
 COMPLETION DATE: January 11, 2024  
 TOTAL DEPTH: 6.0'  
 CAVED DEPTH: Not Applicable  
 DRY AUGER: Yes  
 WET ROTARY: Not Applicable  
 BACKFILL: Yes  
 LOGGER: J. Mallett  
 DRILL RIG: Track  
 HAMMER TYPE: Automatic



Client: MP Design Group

**LOG OF BORING NO. P-2**

Project Name: Jackson County Fire Station

Site Location: Jackson County, Mississippi

Project No.

65-1532

PM/PE

NB/JC

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DEPTH, FT	WATER LEVEL	SYMBOL	SAMPLES	BLOWS PER 6 INCHES	BORING NO. P-3 LAT: 30.491001° LONG: -88.501491° SURFACE EL.: 13.0'	STRATUM DEPTH, FT	CLASSIFICATION					SHEAR STRENGTH				
							UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)	KSF			
					STRATUM DESCRIPTION							0.5	1.0	1.5	2.0	2.5
				3-3-2 (5)	Tan and gray lean clay, firm (CL)			18								
				4-5-7 (12)	Tan and gray sand, medium dense (SP)	4.5		18								
					Bottom Depth of Borehole = 6 Feet	6.0		19								

**NOTES:**

- Terms and symbols defined on reference notes.

START DATE: January 11, 2024  
 COMPLETION DATE: January 11, 2024  
 TOTAL DEPTH: 6.0'  
 CAVED DEPTH: Not Applicable  
 DRY AUGER: Yes  
 WET ROTARY: Not Applicable  
 BACKFILL: Yes  
 LOGGER: J. Mallett  
 DRILL RIG: Track  
 HAMMER TYPE: Automatic



Client: MP Design Group

**LOG OF BORING NO. P-3**

Project Name: Jackson County Fire Station

Site Location: Jackson County, Mississippi

Project No.

65-1532

PM/PE

NB/JC





## **Appendix C – Laboratory Testing**

Laboratory Testing Summary





Soil Boring ID	Depth Interval (ft)	D2488	D2216	D2166/D2850		D4318			D422/D1140/D6913	D2166/D2850					D4648	D2974	Comments
		Visual Description	Moisture (%)	Unit Weight (PCF)		Atterberg Limits			%<#200 Sieve	Shear Strength (KSF)	Remolded Strength (KSF)	Failure Strain (%)	Confining Pressure (PSI)	Failure Type	Mini Vane Shear Strength (KSF)	Organic Content (%)	
				Wet	Dry	LL	PL	PI									
B-1	0.5 - 2.0	Brown silty clay (CL-ML)	20.4			24	18	6									
B-1	2.5 - 4.0	Tan and gray fat clay (CH)	22.3														
B-1	4.5 - 6.0	Tan lean clay (CL)	23.1														
B-1	6.5 - 8.0	Gray lean clay (CL)	21.2														
B-1	8.5 - 10.0	Brown clayey sand (SC)	21.9						21.1								
B-1	13.5 - 15.0	Light brown sand (SP)	20.5														
B-1	18.5 - 20.0	Tan sandy lean clay (CL)	21.4														
B-1	23.5 - 25.0	Tan sandy lean clay (CL)	21.5														

\*The classification symbol and name are based on visual-manual procedures.

Multiple Shear = MS    Vertical Shear = VS    Angle Shear = AS  
 Slickensided = SLS    Bulge = B    Crumble = C

Technical Responsibility: Stephannie Campbell

Title: Lead Lab Technician

Date: 2/9/2024

**Summary of Lab Results**  
**Project No.: 65-1532**



ECS Limited  
 11211 Industriplex Blvd. Ste. 300  
 Baton Rouge, LA 70809  
 Telephone: 225.224.2583

**Jackson County Fire Station**  
**Jackson County, Mississippi**

Soil Boring ID	Depth Interval (ft)	D2488	D2216	D2166/D2850		D4318			D422/D1140/D6913	D2166/D2850					D4648	D2974	Comments
		Visual Description	Moisture (%)	Unit Weight (PCF)		Atterberg Limits			%<#200 Sieve	Shear Strength (KSF)	Remolded Strength (KSF)	Failure Strain (%)	Confining Pressure (PSI)	Failure Type	Mini Vane Shear Strength (KSF)	Organic Content (%)	
				Wet	Dry	LL	PL	PI									
B-2	0.5 - 2.0	Black and gray lean clay with ferrous nodules (CL)	23.4														
B-2	2.0 - 4.0	Brown and gray lean clay with sand (CL)	22.8			24	14	10	75.7								
B-2	4.0 - 6.0	Medium tan and gray lean clay (CL)	21.0	127.6	105.4	33	16	17		0.517		14.5		B			
B-2	6.5 - 8.0	Light brown sand (SP)	17.9														
B-2	8.5 - 10.0	Light brown sand (SP)	18.8														
B-2	13.5 - 15.0	Light brown sand (SP)	18.8														
B-2	18.5 - 20.0	Light brown sand (SP)	23.1														
B-2	23.5 - 25.0	Brown sand (SP)	26.3														

\*The classification symbol and name are based on visual-manual procedures.

Multiple Shear = MS    Vertical Shear = VS    Angle Shear = AS  
 Slickensided = SLS    Bulge = B    Crumble = C

Technical Responsibility: Stephannie Campbell  
 Title: Lead Lab Technician  
 Date: 2/9/2024

**Summary of Lab Results**  
**Project No.: 65-1532**



**Jackson County Fire Station**  
**Jackson County, Mississippi**

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 11211 Industriplex Blvd. Ste. 300  
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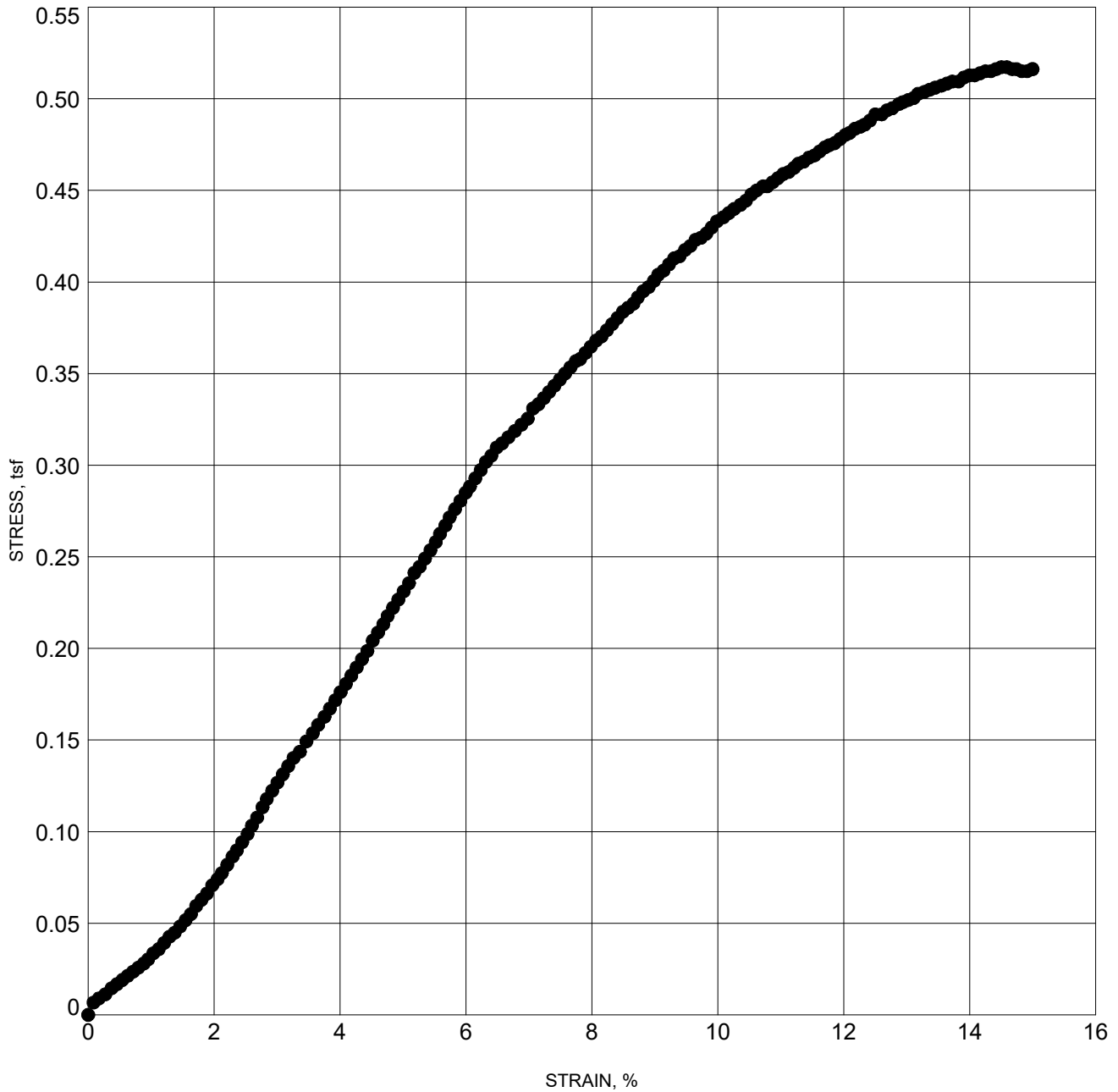
# UNCONFINED COMPRESSION TEST

CLIENT MP Design Group

PROJECT NAME Jackson County Fire Station

PROJECT NUMBER 65-1532

PROJECT LOCATION Jackson County, Mississippi



Boring ID	B-2	Depth(ft)	4.0 - 6.0	
Water Content, %	21.0	Specimen Diameter	2.859	LL = 33
Wet Density, pcf	127.6	Specimen Height	5.888	PL = 16
Dry Density, pcf	105.4	Height/diameter ratio	2.06	PL = 17
Saturation, %	92.5	Failure Stress, tsf	0.517	%200=
Void Ratio	0.62	Strain, %	14.5	Organic=Not Applicable
Description: Medium tan and gray lean clay (CL)				
Tested By:	JT/SLC	Date Tested:	1/23/2024	Reviewed By: S. Campbell
				Date Reviewed: 1/31/2024

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Soil Boring ID	Depth Interval (ft)	D2488	D2216	D2166/D2850		D4318			D422/D1140/D6913	D2166/D2850					D4648	D2974	Comments
		Visual Description	Moisture (%)	Unit Weight (PCF)		Atterberg Limits			%<#200 Sieve	Shear Strength (KSF)	Remolded Strength (KSF)	Failure Strain (%)	Confining Pressure (PSI)	Failure Type	Mini Vane Shear Strength (KSF)	Organic Content (%)	
				Wet	Dry	LL	PL	PI									
P-1	2.0 - 4.0	Medium gray and tan lean clay (CL)	19.0	130.6	109.8	25	14	11		0.908		8.2		MS			

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\*The classification symbol and name are based on visual-manual procedures.

Multiple Shear = MS    Vertical Shear = VS    Angle Shear = AS  
 Slicksided = SLS        Bulge = B                    Crumble = C

Technical Responsibility: Stephannie Campbell  
 Title: Lead Lab Technician  
 Date: 2/9/2024

**Summary of Lab Results**  
**Project No.: 65-1532**



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**Jackson County Fire Station**  
**Jackson County, Mississippi**



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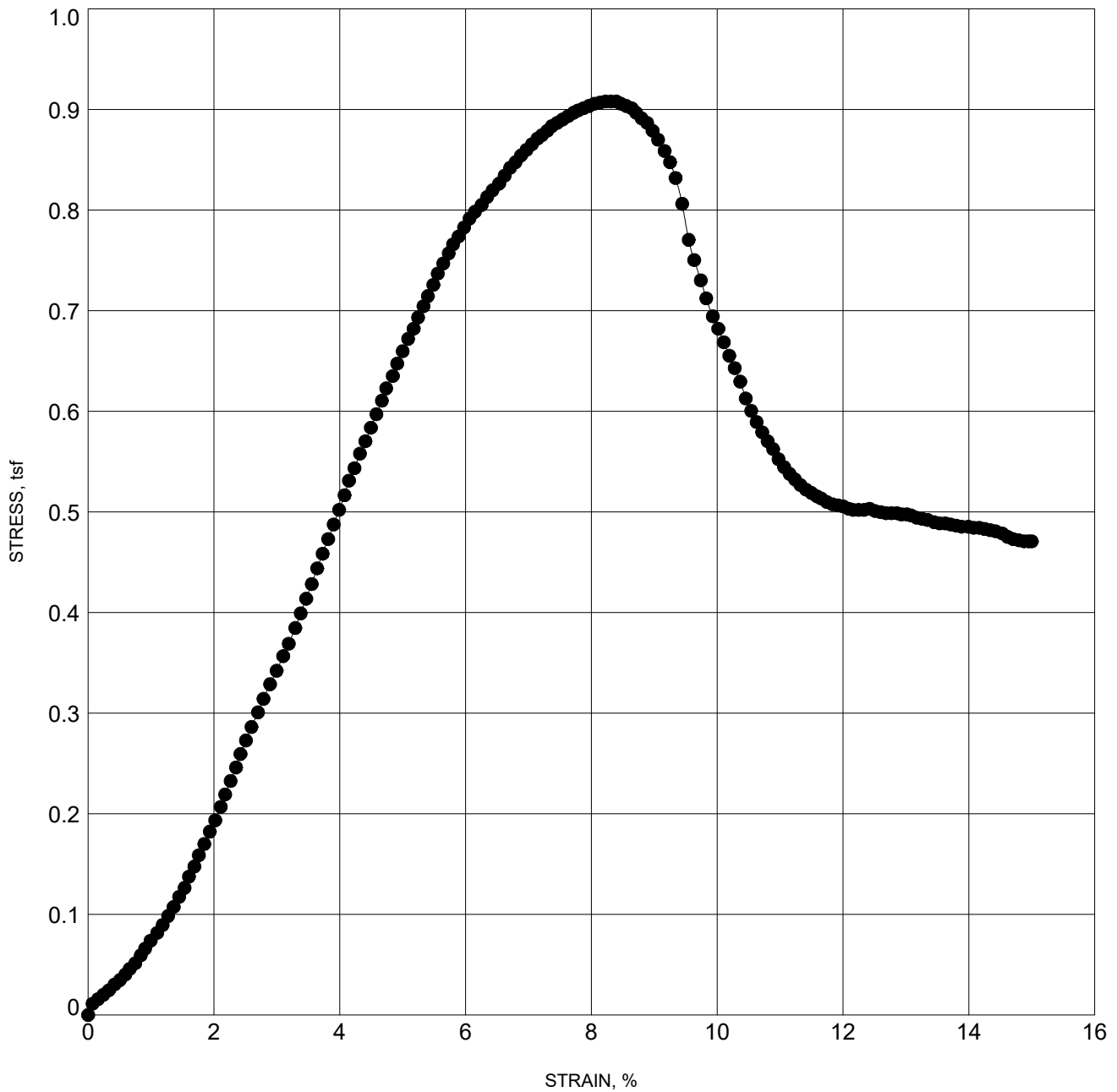
# UNCONFINED COMPRESSION TEST

CLIENT MP Design Group

PROJECT NAME Jackson County Fire Station

PROJECT NUMBER 65-1532

PROJECT LOCATION Jackson County, Mississippi



Boring ID	P-1	Depth(ft)	2.0 - 4.0	
Water Content, %	19.0	Specimen Diameter	2.864	LL =25
Wet Density, pcf	130.6	Specimen Height	5.740	PL =14
Dry Density, pcf	109.8	Height/diameter ratio	2.00	PL = 11
Saturation, %	93.1	Failure Stress, tsf	0.908	%200=
Void Ratio	0.56	Strain, %	8.2	Organic=Not Applicable
Description: Medium gray and tan lean clay (CL)				
Tested By:	J. Tortorich	Date Tested:	1/23/2024	Reviewed By: S. Campbell
				Date Reviewed: 1/31/2024

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Soil Boring ID	Depth Interval (ft)	D2488	D2216	D2166/D2850		D4318			D422/D1140/D6913	D2166/D2850					D4648	D2974	Comments
		Visual Description	Moisture (%)	Unit Weight (PCF)		Atterberg Limits			%<#200 Sieve	Shear Strength (KSF)	Remolded Strength (KSF)	Failure Strain (%)	Confining Pressure (PSI)	Failure Type	Mini Vane Shear Strength (KSF)	Organic Content (%)	
				Wet	Dry	LL	PL	PI									
P-2	0.5 - 2.0	Tan and black sandy lean clay (CL)	22.2														
P-2	2.5 - 4.0	Tan and black lean clay (CL)	23.7														
P-2	4.0 - 6.0	Gray and tan lean clay (CL)	21.4														


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\*The classification symbol and name are based on visual-manual procedures.

Multiple Shear = MS    Vertical Shear = VS    Angle Shear = AS  
 Slicksided = SLS        Bulge = B                    Crumble = C

Technical Responsibility: Stephannie Campbell  
 Title: Lead Lab Technician  
 Date: 2/9/2024

**Summary of Lab Results**  
**Project No.: 65-1532**



**Jackson County Fire Station**  
**Jackson County, Mississippi**

ECS Limited  
 11211 Industriplex Blvd. Ste. 300  
 Baton Rouge, LA 70809  
 Telephone: 225.224.2583

Soil Boring ID	Depth Interval (ft)	D2488	D2216	D2166/D2850		D4318			D422/D1140/D6913	D2166/D2850					D4648	D2974	Comments
		Visual Description	Moisture (%)	Unit Weight (PCF)		Atterberg Limits			%<#200 Sieve	Shear Strength (KSF)	Remolded Strength (KSF)	Failure Strain (%)	Confining Pressure (PSI)	Failure Type	Mini Vane Shear Strength (KSF)	Organic Content (%)	
				Wet	Dry	LL	PL	PI									
P-3	0.5 - 2.0	Tan and gray lean clay (CL)	18.4														
P-3	2.0 - 4.0	Tan and gray lean clay (CL)	18.4														
P-3	4.5 - 6.0	Tan and gray sand (SP)	18.9														


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\*The classification symbol and name are based on visual-manual procedures.

Multiple Shear = MS    Vertical Shear = VS    Angle Shear = AS  
 Slicksided = SLS                      Bulge = B                      Crumble = C

Technical Responsibility: Stephannie Campbell  
 Title: Lead Lab Technician  
 Date: 2/9/2024

**Summary of Lab Results**  
**Project No.: 65-1532**



**Jackson County Fire Station**  
**Jackson County, Mississippi**


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Soil Boring ID	Depth Interval (ft)	D2488	D2216	D2166/D2850		D4318			D422/D1140/D6913	D2166/D2850					D4648	D2974	Comments
		Visual Description	Moisture (%)	Unit Weight (PCF)		Atterberg Limits			%<#200 Sieve	Shear Strength (KSF)	Remolded Strength (KSF)	Failure Strain (%)	Confining Pressure (PSI)	Failure Type	Mini Vane Shear Strength (KSF)	Organic Content (%)	
				Wet	Dry	LL	PL	PI									
P-4	0.0 - 2.0	Soft brown lean clay (CL)	19.1	130.2	109.4	25	15	10		0.483		14.8		MS			

--

\*The classification symbol and name are based on visual-manual procedures.

Multiple Shear = MS    Vertical Shear = VS    Angle Shear = AS  
 Slicksided = SLS                      Bulge = B                      Crumble = C

Technical Responsibility: <u>Stephannie Campbell</u> Title: <u>Lead Lab Technician</u> Date: <u>2/9/2024</u>	<b>Summary of Lab Results</b> <b>Project No.: 65-1532</b>	 <b>Jackson County Fire Station</b> <b>Jackson County, Mississippi</b> ECS Limited 11211 Industriplex Blvd. Ste. 300 Baton Rouge, LA 70809 Telephone: 225.224.2583
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 Baton Rouge, LA 70809  
 Telephone: 225.224.2583

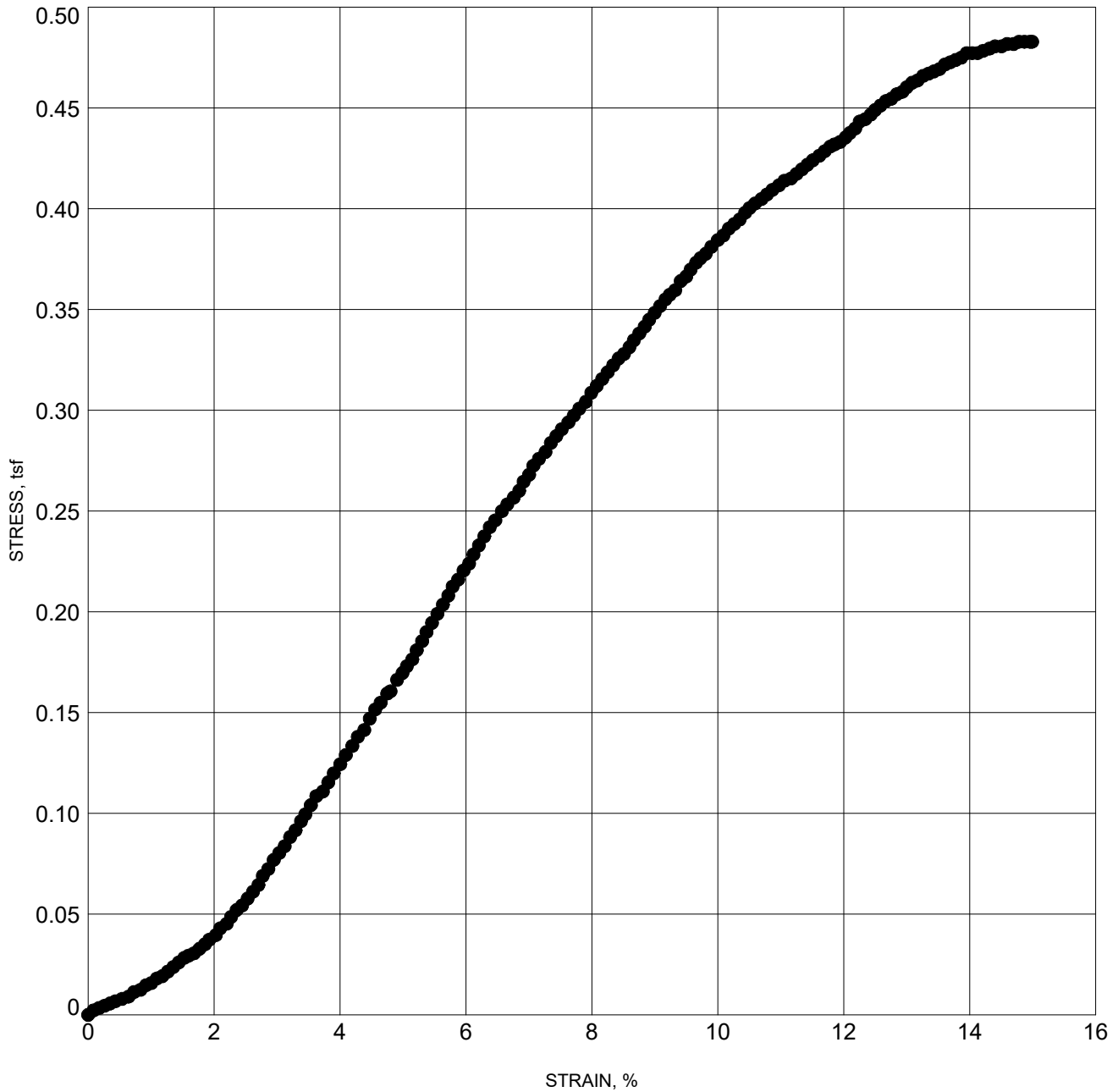
# UNCONFINED COMPRESSION TEST

CLIENT MP Design Group

PROJECT NAME Jackson County Fire Station

PROJECT NUMBER 65-1532

PROJECT LOCATION Jackson County, Mississippi



Boring ID		P-4	Depth(ft)		0.0 - 2.0
Water Content, %	19.1	Specimen Diameter	2.848	LL =25	
Wet Density, pcf	130.2	Specimen Height	5.770	PL =15	
Dry Density, pcf	109.4	Height/diameter ratio	2.03	PL = 10	
Saturation, %	92.8	Failure Stress, tsf	0.483	%200=	
Void Ratio	0.56	Strain, %	14.8	Organic=Not Applicable	
Description: Soft brown lean clay (CL)					
Tested By: J. Tortorich		Date Tested: 1/23/2024		Reviewed By: S. Campbell	
				Date Reviewed: 1/31/2024	

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# Important Information about This

# Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

**The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, clients can benefit from a lowered exposure to the subsurface problems that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed below, contact your GBA-member geotechnical engineer. Active involvement in the Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.**

## Geotechnical-Engineering Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical-engineering study conducted for a given civil engineer will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client. *Those who rely on a geotechnical-engineering report prepared for a different client can be seriously misled.* No one except authorized client representatives should rely on this geotechnical-engineering report without first conferring with the geotechnical engineer who prepared it. *And no one – not even you – should apply this report for any purpose or project except the one originally contemplated.*

## Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read it *in its entirety*. Do not rely on an executive summary. Do not read selected elements only. *Read this report in full.*

## You Need to Inform Your Geotechnical Engineer about Change

Your geotechnical engineer considered unique, project-specific factors when designing the study behind this report and developing the confirmation-dependent recommendations the report conveys. A few typical factors include:

- the client's goals, objectives, budget, schedule, and risk-management preferences;
- the general nature of the structure involved, its size, configuration, and performance criteria;
- the structure's location and orientation on the site; and
- other planned or existing site improvements, such as retaining walls, access roads, parking lots, and underground utilities.

Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light-industrial plant to a refrigerated warehouse;
- the elevation, configuration, location, orientation, or weight of the proposed structure;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.*

## This Report May Not Be Reliable

*Do not rely on this report* if your geotechnical engineer prepared it:

- for a different client;
- for a different project;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, that it could be unwise to rely on a geotechnical-engineering report whose reliability may have been affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If your geotechnical engineer has not indicated an "apply-by" date on the report, ask what it should be, and, in general, if you are the least bit uncertain about the continued reliability of this report, contact your geotechnical engineer before applying it.* A minor amount of additional testing or analysis – if any is required at all – could prevent major problems.

## Most of the "Findings" Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site's subsurface through various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing were performed.* The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgment to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team from project start to project finish, so the individual can provide informed guidance quickly, whenever needed.

## This Report's Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, *they are not final*, because the geotechnical engineer who developed them relied heavily on judgment and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* revealed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

## This Report Could Be Misinterpreted

Other design professionals' misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a full-time member of the design team, to:

- confer with other design-team members,
- help develop specifications,
- review pertinent elements of other design professionals' plans and specifications, and
- be on hand quickly whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction observation.

## Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note conspicuously that you've included the material for informational purposes only*. To avoid misunderstanding, you may also want to note that "informational purposes" means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report, but they may rely on the factual data relative to the specific times, locations, and depths/elevations referenced. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may

perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

## Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely*. Ask questions. Your geotechnical engineer should respond fully and frankly.

## Geoenvironmental Concerns Are Not Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a "phase-one" or "phase-two" environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually relate any environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures*. If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk-management guidance. As a general rule, *do not rely on an environmental report prepared for a different client, site, or project, or that is more than six months old*.

## Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, none of the engineer's services were designed, conducted, or intended to prevent uncontrolled migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, *proper implementation of the geotechnical engineer's recommendations will not of itself be sufficient to prevent moisture infiltration*. Confront the risk of moisture infiltration by including building-envelope or mold specialists on the design team. *Geotechnical engineers are not building-envelope or mold specialists*.



Telephone: 301/565-2733

e-mail: [info@geoprofessional.org](mailto:info@geoprofessional.org) [www.geoprofessional.org](http://www.geoprofessional.org)

**SECTION 004000  
PROCUREMENT FORMS AND SUPPLEMENTS**

**PART 1 GENERAL**

**1.01 FORMS**

- A. Use the following forms for the specified purposes unless otherwise indicated elsewhere in the procurement requirements.
- B. Bid Form: Section 004100 - Bid Form.
- C. Procurement Form Supplements:
  - 1. Certificate of Responsibility Number: Required on the Outside of the Envelope
  - 2. Bid Bond Form: AIA A310. Required to be submitted with the Bid.
  - 3. Proposed Schedule of Values Form: AIA G703. This does not have to be submitted with the bid, but must be provided to the Architect within seven (7) if so requested.
  - 4. Form of Non Collusive Affidavit: 004105 Form of Non Collusive Affidavit. Required to be submitted with the Bid.

**1.02 REFERENCE STANDARDS**

- A. AIA A310 - Bid Bond; 2010.
- B. AIA G703 - Continuation Sheet; 1992.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION - NOT USED**

**END OF SECTION**



**SECTION 004100  
BID FORM**

**THE PROJECT AND THE PARTIES**

**1.01 TO:**

- A. Jackson County Board of Supervisors (Owner)  
2915 Canty St.,  
Pascagoula, MS 39568

**1.02 FOR:**

- A. Project: Saracennia Fire Station  
Engineer/Architect Project Number: 0004.23.003  
10221 Saracennia Road  
Project Location Address 2  
Moss Point, Mississippi 39562

**1.03 DATE: \_\_\_\_\_ (BIDDER TO ENTER DATE)**

**1.04 SUBMITTED BY: (BIDDER TO ENTER NAME AND ADDRESS)**

- A. Bidder's Full Name \_\_\_\_\_  
1. Address \_\_\_\_\_  
2. City \_\_\_\_\_ State \_\_\_\_\_, Zip \_\_\_\_\_

**1.05 OFFER**

- A. Having examined the Place of The Work and all matters referred to in the Instructions to Bidders and the Contract Documents prepared by MP Design Group for the above mentioned project, we, the undersigned, hereby offer to enter into a Contract to perform the Work, within the time set forth herein for the Sum of:

**B. BASE BID LUMP SUM PRICE:**

\_\_\_\_\_ dollars  
(\$ \_\_\_\_\_), in lawful money of the United States of America.

**C. BID ALTERNATE NO. 01 - Spray Foam Insulation**

**MUST CIRCLE ONE:            ADDITIVE ALTERNATE            DEDUCTIVE ALTERNATE**

\_\_\_\_\_ dollars  
(\$ \_\_\_\_\_), in lawful money of the United States of America.

- D. We have included the required security deposit as required by the Instruction to Bidders.
- E. We have included the required Non Collusive Affidavit Form as required by the Instructions to Bidders.
- F. We have included the required performance assurance bonds in the Bid Amount as required by the Instructions to Bidders.
- G. We have included the cost of all local jurisdiction building permits required to complete the construction of this project in our Base Bid amount unless specifically called for otherwise in Section 012100 Allowances.
- H. All applicable federal taxes are included and state of Mississippi taxes are included in the Bid Sum.
- I. All Cash and Contingency Allowances described in Section 012100 - Allowances are included in the Bid Sum.

**1.06 ACCEPTANCE**

- A. This offer shall be open to acceptance and is irrevocable for sixty days from the bid closing date.
- B. If this bid is accepted by Owner within the time period stated above, we will:
  - 1. Furnish the required bonds within seven days of receipt of Notice of Award.
  - 2. Commence work within seven days after written Notice to Proceed of this bid.
- C. If this bid is accepted within the time stated, and we fail to commence the Work or we fail to provide the required Bond(s), the security deposit shall be forfeited as damages to Owner by reason of our failure, limited in amount to the lesser of the face value of the security deposit or the difference between this bid and the bid upon which a Contract is signed.
- D. In the event our bid is not accepted within the time stated above, the required security deposit shall be returned to the undersigned, in accordance with the provisions of the Instructions to Bidders; unless a mutually satisfactory arrangement is made for its retention and validity for an extended period of time.

**1.07 CONTRACT TIME**

- A. If this Bid is accepted, we will:
  - 1. Complete the Work in 270 calendar days from Notice to Proceed.
- B. If the Substantial Completion date falls beyond the above date based on days, we will pay to the Owner the following amount as liquidated damages, not as a penalty, for each calendar day of delay for the Project until the actual date of Substantial Completion of the Project:

**\*\*\* UP TO \$500.00 PER CALENDAR DAY \*\*\***

**1.08 UNIT PRICES**

- A. The following are Unit Prices for specific portions of the Work as listed. The following is the list of Unit Prices:
  - 1. Removal (muck out / haul off) and replacement (put back) of unsuitable soil material:

QUAN TITY	UNI T	UNIT PRICE	TOTAL EXTENSION
200	CY/ FM	\$ _____	(\$ _____)  _____ dollars

**1.09 CHANGES TO THE WORK**

- A. When Architect establishes that the method of valuation for Changes in the Work will be net cost plus a percentage fee in accordance with General Conditions, our percentage fee will be:
  - 1. 10 percent overhead and profit on the net cost of our own Work;
  - 2. 10 percent on the cost of work done by any Subcontractor.

**1.10 ADDENDA**

- A. The following Addenda have been received. The modifications to the Bid Documents noted below have been considered and all costs are included in the Bid Sum. Add additional lines if needed.
  - 1. Addendum # \_\_\_\_\_ Dated \_\_\_\_\_
  - 2. Addendum # \_\_\_\_\_ Dated \_\_\_\_\_
  - 3. Addendum # \_\_\_\_\_ Dated \_\_\_\_\_
  - 4. Addendum # \_\_\_\_\_ Dated \_\_\_\_\_
  - 5. Addendum # \_\_\_\_\_ Dated \_\_\_\_\_

**1.11 BID FORM SUPPLEMENTS**

- A. The following information is included with Bid submission:



1. Non Collusive Affidavit
  2. Bid Bond: Form AIA Document A310
  3. Letter from Insurance Company
  4. Statement of Non Debarment
  5. Proof of Contractor's State License
  6. Non-Resident Contractors: Attach a copy of your state's current law (refer to Instructions to Bidders for additional information)
- B. If requested by the Engineer/Architect, we agree to submit the following Supplements to Bid Forms within 7 days after submission of this bid for additional bid information:
1. Proposed Schedule of Values Form

**1.12 BID FORM SIGNATURE(S)**

I certify that I am authorized to enter into a binding contract, if this Proposal is accepted.

---

Name of Business (Complete legal spelling as represented at the state Contractor's Board)

---

Signature of Signee

---

Printed Name of Authorized Signing Officer and Title

**1.13 IF THE BID IS A JOINT VENTURE OR PARTNERSHIP, ADD ADDITIONAL FORMS OF EXECUTION FOR EACH MEMBER OF THE JOINT VENTURE IN THE APPROPRIATE FORM OR FORMS AS ABOVE.**

**END OF SECTION**



**SECTION 004105  
FORM OF NON COLLUSIVE AFFIDAVIT**

**PART 1 GENERAL**

**1.01 FORM OF NON-COLLUSION AFFIDAVIT IS AS FOLLOWS:**

- A. A copy of the Non-Collusion Affidavit is attached to the end of this Section. It will be the General Contractor's (Bidders) responsibility to complete this form in its entirety and submit it with and in his bid package.

**PART 2 PRODUCTS (NOT USED)**

**PART 3 EXECUTION (NOT USED)**

**END OF SECTION**



### NON-COLLUSION AFFIDAVIT

The undersigned bidder or agent, being duly sworn on oath, says that he/she has not, nor has any other member, representative, or agent of the firm, company, corporation or partnership represented by him, entered into any combination, collusion or agreement with any person relative to the price to be bid by anyone at such letting nor to prevent any person from bidding nor to include anyone to refrain from bidding, and that this bid is made without reference to any other bid and without any agreement, understanding or combination with any other person in reference to such bidding.

He/She further says that no person or persons, firms, or corporation has, have or will receive directly or indirectly, any rebate, fee gift, commission or thing of value on account of such sale.

### OATH AND AFFIRMATION

I HEREBY AFFIRM UNDER THE PENALTIES FOR PERJURY THAT THE FACTS AND INFORMATION CONTAINED IN THE FOREGOING BID FOR PUBLIC WORKS ARE TRUE AND CORRECT.

Dated this \_\_\_\_ day of \_\_\_\_\_, \_\_\_\_\_

\_\_\_\_\_  
General Contractor (GC) Company Name

\_\_\_\_\_  
Printed Name and Title of GC's Representative

\_\_\_\_\_  
Signature of GC's Representative

### NOTARY PUBLIC ACKNOWLEDGEMENT

STATE OF \_\_\_\_\_

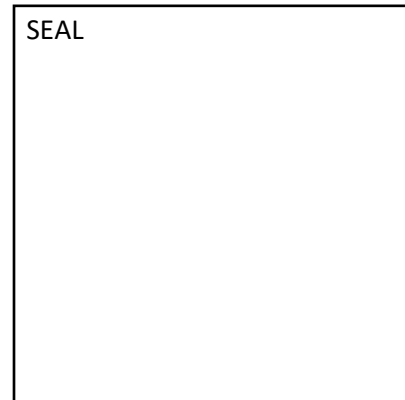
COUNTY OF \_\_\_\_\_

Before me, a Notary Public, personally appeared the above named and swore that the statements contained in the foregoing document are true and correct.

Subscribed and sworn to me this \_\_\_\_ day of \_\_\_\_\_, \_\_\_\_\_.

\_\_\_\_\_  
Signature

My Commission Expires: \_\_\_\_\_





**SECTION 004325  
SUBSTITUTION REQUEST FORM - DURING PROCUREMENT**

**PART 1 GENERAL**

**1.01 SUBSTITUTION REQUEST FORM IS AS FOLLOWS:**

- A. A copy of the Substitution Request Form that must be used is attached at the end of this section.
  - 1. No other forms will be allowed.
  - 2. Any additional information that can be provided to substantiate the substitution request will be gladly accepted.
  - 3. An incomplete Substitution Request Form will be immediately rejected.

**1.02 RELATED REQUIREMENTS**

- A. Section 002113 - Instructions to Bidders

**PART 2 PRODUCTS (NOT USED)**

**PART 3 EXECUTION (NOT USED)**

**END OF SECTION**





**Project:** \_\_\_\_\_

**Specification Section Number and Paragraph:** \_\_\_\_\_

**Contract Drawings Affected:** \_\_\_\_\_

**Proposed Manufacturer:** \_\_\_\_\_

**Proposed Product Substitution:** \_\_\_\_\_

**Proposed Product Description:** \_\_\_\_\_

**EFFECTS OF PROPOSED PRODUCT SUBSTITUTION**

**PROVIDE THE FOLLOWING:** (If you answer yes to any of the following, then provide additional explanation)

- 1. Attach list of at least 3 projects where proposed substitution has been used within past 6 to 12 months include name, address, and telephone number of Owner and Architect.
- 2. Does substitution affect dimensions indicated on Drawings? (Y/N) \_\_\_\_\_
- 3. Does substitution affect Work of other Specification Sections? (Y/N) \_\_\_\_\_
- 4. Does substitution require any modifications to the design, changes to Drawings, or revisions to specifications? (Y/N) \_\_\_\_\_

**CONTRACTOR'S / BIDDER'S RESPONSIBILITY**

Undersigned accepts responsibility for coordination of proposed substitution and accepts all additional costs resulting from the incorporation of proposed substitution into the Project per Section 01600. The only response to this Request for Substitution will be by Addendum.

**SUBMITTED BY**

(Include name, address, telephone, and contract person of manufacturer/supplier of proposed substitution)

Contact Name: \_\_\_\_\_

Contact Address: \_\_\_\_\_

Contact Telephone: \_\_\_\_\_

**Signature and date:** \_\_\_\_\_

**ARCHITECT / ENGINEER REVIEW**

Reviewed by: \_\_\_\_\_ Date: \_\_\_\_\_

Comments:  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



**SECTION 005000  
CONTRACTING FORMS AND SUPPLEMENTS****PART 1 GENERAL****1.01 AGREEMENT AND CONDITIONS OF THE CONTRACT**

- A. See Section 005200 - Agreement Form for the Agreement form to be executed.
- B. See Section 007200 - General Conditions for the General Conditions.
- C. The Agreement is based on AIA A101.
- D. The General Conditions are based on AIA A201.

**1.02 FORMS**

- A. Use the following forms for the specified purposes unless otherwise indicated elsewhere in Contract Documents.
- B. Bond Forms:
  - 1. Bid Bond Form: AIA A310.
    - a. Must be submitted with the Bid Form.
  - 2. Performance and Payment Bond Form: AIA A312.
    - a. A Performance Bond and a Payment (Labor and Material) Bond are required as a condition of this Contract.
    - b. Simultaneous with delivery of the executed contract, the Contractor shall furnish a surety bond or bonds as security for the faithful performance of this Contract and for the payment of all persons performing labor on the project under this Contract and furnishing materials in connection with this Contract in the amount of 100% of the contract sum for payment, executed on AIA Document A312.
    - c. The surety on such bond or bonds will be a duly authorized surety company who is licensed by the State of Mississippi's Commissioner of Insurance and who has a B++ or higher rating in accordance with the most recent edition of the A.M. Best Company, Inc., Key Rating Guide.
    - d. All bonds shall be countersigned by a Mississippi resident agent with the name and address typed or lettered legibly.
    - e. All bonds must be accompanied by an appropriate Power of Attorney.
- C. Post-Award Certificates and Other Forms:
  - 1. Architect's Submittal Transmittal Letter Form: Attached at the end of this section.
  - 2. Schedule of Values Form: AIA G703.
  - 3. Application for Payment Forms: AIA G702 with AIA G703 (for Contractors).
- D. Clarification and Modification Forms:
  - 1. Architect's Request for Interpretation Form: Attached to the end of this section.
  - 2. Architect's Substitution Request Form (During the Bidding/Negotiating Stage): Attached at the end of this section.
  - 3. Architect's Supplemental Instructions Form: AIA G710.
  - 4. Construction Change Directive Form: AIA G714.
  - 5. Change Order Form: AIA G701.
- E. Closeout Forms:
  - 1. Certificate of Substantial Completion Form: AIA G704.
  - 2. Affidavit of Release of Liens Form: AIA 706A.

**1.03 REFERENCE STANDARDS**

- A. AIA A101 - Standard Form of Agreement Between Owner and Contractor where the basis of Payment is a Stipulated Sum; 2017.
- B. AIA A201 - General Conditions of the Contract for Construction; 2017.

- C. AIA A310 - Bid Bond; 2010.
- D. AIA A312 - Performance Bond and Payment Bond; 2010.
- E. AIA G701 - Change Order; 2017.
- F. AIA G702 - Application and Certificate for Payment; 1992.
- G. AIA G703 - Continuation Sheet; 1992.
- H. AIA G704 - Certificate of Substantial Completion; 2017.
- I. AIA G710 - Architect's Supplemental Instructions; 2017.
- J. AIA G714 - Construction Change Directive; 2017.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION - NOT USED**

**END OF SECTION**

Project Name:

Project Number:

RFI Number	Submitted To	Submitted By	Copies To
Date			
Subject	Discipline		Co-Author
Specification Section	Drawing Reference		
Information Requested (suggest solution, if possible):			Date Requested:
Response			
.....			
.....			
.....			
.....			
.....			
.....			

By responding to the RFI, we do not agree to any additional costs and/or time. Any additional costs and/or time shall be submitted in accordance with the Contract Documents.

Date Answered:

Answered By:



**SUBMITTAL IDENTIFICATION**

Submittal No. \_\_\_\_\_

**Contractor to Complete**

Project Name: \_\_\_\_\_

MP Project Number: \_\_\_\_\_

General Contractor: \_\_\_\_\_

Submittal Subcontractor: \_\_\_\_\_

Date Submitted to MP: \_\_\_\_\_

Specification Number: \_\_\_\_\_

Specification Description: \_\_\_\_\_

**Architect/Engineer to Complete**

Date Returned: \_\_\_\_\_

Method Returned: \_\_\_\_\_

Returned To: \_\_\_\_\_





**SECTION 005200  
AGREEMENT FORM**

**PART 1 GENERAL**

**1.01 FORM OF AGREEMENTS ARE AS FOLLOWS:**

- A. Standard Form of Agreement Between Owner and Contractor, American Institute of Architects Document A101, 2017 Edition will be used for the Contract.
- B. Standard Form Insurance and Bonds, American Institute of Architects Document A101, 2017 Exhibit A will be used for the Contract.
- C. Prospective bidders should read and understand the Agreement forms before submitting bids or executing the Agreement.
- D. Draft copies of these Agreements are available at the Architect's office for the Contractor's examination M-F from 8-5. The Agreements are incorporated by reference as though fully written herein.

**1.02 RELATED REQUIREMENTS**

- A. Section 007200 - General Conditions.
- B. Section 007300 - Supplementary Conditions.

**PART 2 PRODUCTS (NOT USED)**

**PART 3 EXECUTION (NOT USED)**

**END OF SECTION**



**SECTION 006200  
INSURANCE AND BONDS****PART 1 GENERAL****1.01 INSURANCE**

- A. The Contractor is responsible for maintaining the following insurance coverages described herein.
- B. **PROPERTY INSURANCE (BUILDER'S RISK)**
1. The Contractor shall purchase and maintain, from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located, property insurance written on a Builder's Risk "all-risks" completed value or equivalent policy form and sufficient to cover the total value of the entire Project on a replacement cost basis. The Owner's property insurance coverage shall be no less than the amount of the initial Contract Sum, plus the value of subsequent Modifications and labor performed and materials or equipment supplied by others. The property insurance shall be maintained until Substantial Completion. This insurance shall include the interests of the Owner, Contractor, Subcontractors, and Sub-subcontractors in the Project as insureds. This insurance shall include the interests of mortgagees as loss payees.
- C. **COMMERCIAL GENERAL LIABILITY (CGL) INSURANCE**
1. Commercial General Liability Insurance for the Project shall be written on an occurrence form with policy limits of not less than Two Million Dollars (\$2,000,000) each occurrence, Four Million Dollars (\$4,000,000) general aggregate, and Two Million Dollars (\$2,000,000) aggregate for products-completed operations hazard, providing coverage for claims including:
    - a. damages because of bodily injury, sickness or disease, including occupational sickness or disease, and death of any person;
    - b. personal injury and advertising injury;
    - c. damages because of physical damage to or destruction of tangible property, including the loss of use of such property;
    - d. bodily injury or property damage arising out of completed operations; and
    - e. the Contractor's indemnity obligations under the General Conditions.
  2. The Contractor's Commercial General Liability policy shall not contain an exclusion or restriction of coverage for the following:
    - a. Claims by one insured against another insured, if the exclusion or restriction is based solely on the fact that the claimant is an insured, and there would otherwise be coverage for the claim.
    - b. Claims for property damage to the Contractor's Work arising out of the products-completed operations hazard where the damaged Work or the Work out of which the damage arises was performed by a Subcontractor.
    - c. Claims for bodily injury other than to employees of the insured.
    - d. Claims for indemnity of the General Conditions arising out of injury to employees of the insured.
    - e. Claims or loss excluded under a prior work endorsement or other similar exclusionary language.
    - f. Claims or loss due to physical damage under a prior injury endorsement or similar exclusionary language.
    - g. Claims related to residential, multi-family, or other habitational projects, if the Work is to be performed on such a project.
    - h. Claims related to roofing, if the Work involves roofing.
    - i. Claims related to exterior insulation finish systems (EIFS), synthetic stucco or similar exterior coatings or surfaces, if the Work involves such coatings or surfaces.

- j. Claims related to earth subsidence or movement, where the Work involves such hazards.
- k. Claims related to explosion, collapse and underground hazards, where the Work involves such hazards.

**D. AUTOMOBILE LIABILITY INSURANCE**

- 1. Automobile Liability Insurance covering vehicles owned, and non-owned vehicles used, by the Contractor, with policy limits of not less than One Million Dollars (\$1,000,000) per accident, for bodily injury, death of any person, and property damage arising out of the ownership, maintenance and use of those motor vehicles along with any other statutorily required automobile coverage.

**E. EMPLOYERS' LIABILITY INSURANCE (WORKER'S COMP)**

- 1. Employers' Liability Insurance with policy limits not less than One Million Dollars (\$1,000,000) each accident, One Million Dollars (\$1,000,000) each employee, and One Million Dollar (\$1,000,000) policy limit by not less than per statute.
- 2. Employers' Liability Insurance with policy limits not less than Two Million Dollars (\$2,000,000) each accident, One Million Dollars (\$1,000,000) each employee, and Two Million Dollar (\$2,000,000) policy limit.

**1.02 SECURITY BONDS FOR FAITHFUL PERFORMANCE**

- A. A Performance Bond and a Payment (Labor and Material) Bond are required as a condition of this Contract.
- B. Simultaneous with delivery of the executed contract, the Contractor shall furnish a surety bond or bonds as security for the faithful performance of this Contract and for the payment of all persons performing labor on the project under this Contract and furnishing materials in connection with this Contract in the amount of 100% of the contract sum for payment, executed on AIA Document A312.
- C. The surety on such bond or bonds will be a duly authorized surety company who is licensed by the State of Mississippi's Commissioner of Insurance and who has a B++ or higher rating in accordance with the most recent edition of the A.M. Best Company, Inc., Key Rating Guide.
- D. All bonds shall be countersigned by a Mississippi resident agent with the name and address typed or lettered legibly.
- E. All bonds must be accompanied by an appropriate Power of Attorney.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION - NOT USED**

**END OF SECTION**

**SECTION 007200  
GENERAL CONDITIONS**

**PART 1 GENERAL**

**1.01 GENERAL CONDITIONS ARE AS FOLLOWS:**

- A. Standard Form of General Conditions of the Contract for Construction, American Institute of Architects Document A201, 2017 Edition will be used for the Contract.
- B. If a conflict exists between the General Conditions and the Specifications, the Specifications shall rule. Any party discovering a conflict between the Specifications and the General Conditions shall immediately notify the Architect in writing.
- C. Prospective bidders should read and understand the General Conditions before submitting bids or executing the Agreement.
- D. A copy of the Agreement is available at the Architect's office for the Contractor's examination on M-F from 8-5. The Agreement is incorporated by reference as though fully written herein.

**RELATED REQUIREMENTS**

**2.01 SECTION 007300 - SUPPLEMENTARY CONDITIONS.**

**END OF SECTION**



**SECTION 007300  
SUPPLEMENTARY CONDITIONS**

**PART 1 GENERAL**

**1.01 SUMMARY**

- A. These Supplementary Conditions amend and supplement the General Conditions defined in Document 007200 - General Conditions and other provisions of Contract Documents as indicated below. Provisions that are not so amended or supplemented remain in full force and effect.
- B. The terms used in these Supplementary Conditions that are defined in the General Conditions have the meanings assigned to them in the General Conditions.

**1.02 MODIFICATIONS TO GENERAL CONDITIONS**

- A. AIA A201 2007 JCBOS Supplemental Conditions; attached herein.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION - NOT USED**

**END OF SECTION**





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# GENERAL CONDITIONS

## SECTION 00 7200

### PART 1 - GENERAL

#### 1.01 DESCRIPTION

A. **SCOPE:** The **General Conditions of the Contract for Construction**, AIA Document A201, Seventeenth Edition, 2017, Articles 1 through 15 inclusive, is a part of this Contract and is incorporated herein.

B. **BIDDING COPY:** For the purpose of bidding, Contractors are presumed to be familiar with AIA Document A201, a copy of which may be obtained from the Professional, or examined in the Professional's office.

**\*\*\* END OF SECTION \*\*\***

**DIVISION 0**



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**SUPPLEMENTARY CONDITIONS**  
**SECTION 00 7300**  
**PART 1 – GENERAL**

**1.01 Description**

- A. **Owner:** These supplements are necessary because the Owner is a political subdivision of the State of Mississippi and occupies a different position from that of the usual Owner.
- B. **Document:** The following supplements modify, change, delete from, or add to the **General Conditions of the Contract**, AIA Document A201, Seventeenth Edition, 2017. When any Article of the **General Conditions** is modified, or deleted, by these Supplementary Conditions, the unaltered provisions of that Article, Paragraph, Subparagraph, or Clause will remain in effect.

**Article 1**  
**GENERAL PROVISIONS**

**1.1 Basic Definitions**

**1.1.1 The Contract Documents**

Change this subparagraph to read as follows:

The Contract Documents are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and consist of the Agreement, Conditions of the Contract (General, Supplementary and Special Conditions), Drawings, Specifications and Addenda issued prior to the execution of the Contract, other documents listed in the Agreement, and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive, or (4) a written order for minor changes in the Work issued by the Prime Professional. The Contract Documents also include the advertisement or invitation for bids or proposals, Instructions to Bidders, and the Contractor's bid or proposal.

**1.1.2 The Contract**

Change each instance of the word "Architect" to "Prime Professional" and each instance of the word "Architect's" to "Prime Professional's".

**1.1.7 Instruments of Service**

Change the word "Architect" to "Prime Professional" and change the word "Architect's" to "Prime Professional's".

**1.1.8 Change this Subparagraph to read as follows:**

**Article 1.1.8 INITIAL RECOMMENDER**

The Initial Recommender is the person identified in the Standard Form of Agreement between the Owner and the Contractor to render opinions and/or recommendations on Claims in accordance with Article 15.2. However, the Owner shall have final decision-making authority on all claims and matters.

**1.2.1 Change this Subparagraph to read as follows:**

The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by

**DIVISION 0**

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the Contractor and unless otherwise provided in the Contract Documents, this shall include all labor, materials, equipment, tools, machinery, water, heat, utilities, transportation, and other facilities and services, whether temporary or permanent and whether or not incorporated in the Work. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results. In case of any direct conflict among the Contract Documents, the specifications shall take precedence over the drawings, supplemental or special conditions shall take precedence over more general conditions or requirements, details shall take precedence over plans, and larger scale drawings shall take precedence over smaller scale drawings.

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

- 1.5.1 Change each instance of the word “Architect” to “Prime Professional” and each instance of the word “Architect’s” to “Prime Professional’s” and add a new sentence at the end of this Subparagraph:

This Paragraph in no way supersedes the Owner's document rights set forth in the separate Agreement Between the Owner and the Professional.

**1.6 Notice**

- 1.6.1 Change this Subparagraph to read as follows:

Except as otherwise provided in Section 1.6.2, where the Contract Documents require one party to notify or give notice to the other party, such notice shall be provided in writing to the designated representative of the party to whom the notice is addressed and shall be deemed to have been duly served if delivered in person, by mail, by courier, or by electronic transmission if transmitted to the government or business issued e-mail address of the respective party.

**1.7 Digital Data Use and Transmission**

Delete the last sentence of this Paragraph.

**1.8 Building Information Models Use and Reliance**

Change this Paragraph to read as follows:

Any use of, or reliance on, all or a portion of a building information model without agreement to protocols governing the use of, and reliance on, the information contained in the model and without having those protocols set forth in written documents shall be at the using or relying party’s sole risk and without liability to the other party and its contractors or consultants, the authors of, or contributors to, the building information model, and each of their agents and employees.

**Article 2**  
**OWNER**

**2.1 General**

- 2.1.1 Change this Subparagraph to read as follows:

Wherever in these Documents the word “Owner” appears, it shall be understood to mean Jackson County, Mississippi, and its authorized representatives and is referred to throughout the Contract Documents as if singular in number. The Owner’s representative is authorized to informally represent the Board and act as a liaison to Owner with respect to the project. Except as otherwise provided in Subparagraph 4.2.1, the Prime Professional does not have such authority. In all decisions, Jackson

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County, Mississippi, can be bound only after written authorization and approval as reflected on its minutes.

2.1.2 Delete this Subparagraph in its entirety.

**2.2 Evidence of the Owner’s Financial Arrangements**

2.2.1 Delete this Subparagraph in its entirety.

2.2.2 Delete this Subparagraph in its entirety.

2.2.3 Delete this Subparagraph in its entirety.

2.2.4 Delete this Subparagraph in its entirety.

**2.3 Information and Services Required of the Owner**

2.3.1 Delete this Subparagraph in its entirety.

2.3.2 Add the word “or Engineer” following each instance of the word “Architect” and add the words “or engineering respectively” following each instance of the word “architecture”.

2.3.3 Add the words “or Engineer” following each instance of the word “Architect”.

2.3.6 Change this Subparagraph to read as follows:

Unless otherwise provided in the Contract Documents, the Contractor will be furnished, free of charge, such copies of Drawings and Project Manuals as are reasonably necessary, but in no instance to exceed three (3) copies, for the execution of the Work.

**2.4 Owner’s Right to Stop the Work**

Change this Subparagraph to read as follows:

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents as required by Section 12.2 or fails to carry out Work in accordance with the Contract Documents, the Owner may issue, or direct the Prime Professional to issue, a written order to the Contractor to stop the Work or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Section 6.1.3. The rights and remedies under this Subparagraph are in addition to and do not in any respect limit any other rights of the Owner, including the right to terminate in accordance with Article 14.

**2.5 Owner’s Right to Carry Out the Work**

Change this Subparagraph read as follows:

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

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may file a Claim pursuant to Article 15.

**Article 3**  
**CONTRACTOR**

**3.1 General**

3.1.1 Add the following sentence at the end of 3.1.1:

The relationship of Contractor to Owner shall be that of independent contractor, and nothing in the Contract Documents is intended to nor should it be construed as creating any other relationship, expressed or implied, between Owner and Contractor.

3.1.3 Change the word “Architect” to “Prime Professional” and change the word “Architect’s” to “Prime Professional’s”.

**3.2 Review of Contract Documents and Field Conditions by Contractor**

3.2.2 Change each instance of the word “Architect” to “Prime Professional”.

3.2.3 Change each instance of the word “Architect” to “Prime Professional”.

3.2.4 Change the word “Architect” to “Prime Professional”.

**3.3 Supervision and Construction Procedures**

3.3.1 Change each instance of the word “Architect” to “Prime Professional”.

**3.4 Labor and Materials**

3.4.1 Add the following sentence to the end of Article 3.4.1:

No materials to be incorporated in the Work or otherwise used in the construction of the Project shall contain any material subject to EPA regulations or listed by it as carcinogenic or toxic.

3.4.2 Change each instance of the word “Architect” to “Prime Professional”.

3.4.4 Add a new Subparagraph as follows:

**Employee Status Verification System** If applicable, the Contractor represents and warrants that it will ensure its compliance with the Mississippi Employment Protection Act, Section 71-11-1, et seq. of the Mississippi Code Annotated (Supp. 2008), and will register and participate in the status verification system for all newly hired employees. The term “employee” as used herein means any person that is hired to perform work within the State of Mississippi. As used herein, “status verification system” means the Illegal Immigration Reform and Immigration Responsibility Act of 1996 that is operated by the United States Department of Homeland Security, also known as the E-Verify Program, or any other successor electronic verification system replacing the E-Verify Program. The Contractor agrees to maintain records of such compliance and, upon request of the County or State and approval of the Social Security Administration or Department of Homeland Security, where required, to provide a copy of each such verification to the County and/or State. The Contractor further represents and warrants that any person assigned to perform services hereunder meets the employment eligibility requirements of all immigration laws of the State of Mississippi. The Contractor understands and agrees that any breach of these warranties may subject the Contractor to the following: (a) termination of this Agreement and ineligibility for any state or public contract in Mississippi for up to three (3) years, with notice of such cancellation/termination being made public, or (b) the loss of any license, permit, certification or

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other document granted to the Contractor by an agency, department or governmental entity for the right to do business in Mississippi for up to one (1) year, or (c) both. In the event of such cancellation/termination, the Contractor would also be liable for any additional costs incurred by the County due to the contract cancellation or loss of license or permit.

3.4.5 Add a new Subparagraph as follows:

In providing labor for the proper execution and completion of the Work, the Contractor shall comply with the provisions of Section 31-5-19 of the Mississippi Code of 1972, Annotated.

3.4.6 Add a new Subparagraph as follows:

In providing materials for the proper execution and completion of the Work, the Contractor shall comply with the provisions of Section 31-5-23 of the Mississippi Code of 1972, Annotated.

3.4.7 Add a new Subparagraph as follows:

Contractor represents that it has independently investigated, considered and understands the labor conditions in the area surrounding the Project and acknowledges that such conditions may impact the Contractor's cost and/or time of performance of the Contract. Therefore, Contractor further represents that the Contract Price is based upon Contractor's independent investigations into such labor conditions and that the Contract time is reasonable and the date of Substantial Completion is obtainable. As a result, Contractor assumes the risk of increased costs, if any, incurred by it arising out of or related to such labor conditions and acknowledges that Contractor and its surety will reimburse Owner for any additional costs Owner incurs arising out of or related to such labor conditions.

3.5 **Warranty**

3.5.1 Change each instance of the word "Architect" to "Prime Professional".

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

3.7.1 Change this Subparagraph to read as follows:

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

3.7.2 Change this Subparagraph to read as follows:

At no additional cost to the Owner, the Contractor shall comply with and give notices required by all laws, statutes, ordinances, codes, safety requirements, rules and regulations of whatever nature that apply to the Project, whether enacted or adopted before or after bid opening. If the Contractor observes that portions of the Contract Documents are in conflict therewith, the Contractor shall promptly notify the Owner and Prime Professional, in writing, and necessary changes shall be accomplished by appropriate modifications.

3.7.3 Delete the words "knowing it to be" from this Subparagraph.

3.7.4 Change each instance of the word "Architect" to "Prime Professional" and change the word "Architect's" to "Prime Professional's".

3.7.5 Change the word "Architect" to "Prime Professional".

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3.8 **Allowances**

3.8.2.3 Replace the word “shall” with “may”

3.9 **Superintendent**

3.9.2 Change this Subparagraph to read as follows:

The Contractor, as soon as practicable after award of the Contract, and prior to commencement of any on-site Work, shall notify the Owner and Prime Professional of the name, qualifications and references of the proposed superintendent and any assistant superintendents where provided for in the Contract Documents. Within 14 days of receipt of the information, the Prime Professional shall notify the Contractor stating whether the Owner or the Prime Professional (1) has reasonable objection to the proposed superintendent based upon information provided or other requirements provided for in the Contract Documents or (2) requires additional information or time for review. Failure of the Prime Professional to respond within the 14-day period shall constitute notice of no reasonable objection.

3.9.3 Change the word “Architect” to “Prime Professional”.

3.10 **Contractor’s Construction and Submittal Schedules**

3.10.1 Change this Subparagraph to read as follows:

The Contractor, promptly after being awarded the Contract, and no later than fifteen days after the date established in the Notice to Proceed, shall submit, for the Owner’s and Prime Professional’s information, a Contractor’s construction schedule for the Work. The schedule shall contain detail appropriate for the Project, including (1) the date of commencement of the Work, interim schedule milestone dates, and the date of Substantial Completion; (2) an apportionment of the Work by construction activity; and (3) the time required for completion of each portion of the Work. The schedule shall provide for the orderly progression of the Work to completion and shall not exceed the time limits current under the Contract Documents. Submission of a schedule that indicates or expresses an intent to complete Work prior to the time limits established by the Contract Documents shall not make the Owner liable to the Contractor for any failure to achieve early completion or obligate the Owner to take or prevent any actions to facilitate the Contractor’s completion prior to the expiration of the Contract Time. The schedule shall be revised monthly or at more frequent intervals as required by the conditions of the Work and Project.

3.10.2 Change each instance of the word “Architect’s” to “Prime Professional’s” and change the word “Architect” to “Prime Professional”.

3.10.3 Change the word “Architect” to “Prime Professional” and delete the word “general”.

3.11 **Documents and Samples at the Site**

Change each instance of the word “Architect” to “Prime Professional”.

3.12 **Shop Drawings, Product Data and Samples**

3.12.4 Change each instance of the word “Architect” to “Prime Professional”.

3.12.5 Change each instance of the word “Architect” to “Prime Professional”.

3.12.6 Change the word “Architect” to “Prime Professional”.

3.12.7 Change the word “Architect” to “Prime Professional”.

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3.12.8 Change each instance of the word “Architect’s” to “Prime Professional’s” and change the word “Architect” to “Prime Professional”.

3.12.9 Change the word “Architect” to “Prime Professional” and change the word “Architect’s” to “Prime Professional’s”.

3.12.10.1 Change each instance of the word “Architect” to “Prime Professional”.

3.12.10.2 Change each instance of the word “Architect” to “Prime Professional”.

3.15 **Cleaning Up**

3.15.2 Change this Subparagraph to read as follows:

If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and the cost thereof shall be assessed to the Contractor.

3.16 **Access to Work**

Change this Paragraph to read as follows:

The Contractor shall provide the Owner, Prime Professional, Separate Contractors and their authorized representatives with access to the Work in preparation and progress wherever located. This shall include the provision of lifts, ladders, scaffolding and/or equivalent for access to elevated work.

3.17 **Royalties, Patents and Copyrights**

Change each instance of the word “Architect” to “Prime Professional”.

3.18 **Indemnification**

3.18.1 Change this Subparagraph to read as follows:

To the fullest extent allowed by law, Contractor shall indemnify, defend, save and hold harmless, protect, and exonerate the Owner, Prime Professional, Prime Professional’s consultants, as well as Jackson County, Mississippi, its Board Members, officers, employees, agents, and representatives, from and against all claims, demands, liabilities, suits, actions, damages, losses, and costs of every kind and nature whatsoever, including, without limitation, court costs, investigative fees and expenses, and attorneys’ fees, arising out of or caused by Contractor’s and/or its partners, principals, agents, employees, and/or subcontractors in the performance of or failure to perform this Agreement. In the County’s sole discretion, Contractor may be allowed to control the defense of any such claim, suit, etc. In the event Contractor defends said claim, suit, etc., Contractor shall use legal counsel acceptable to the County; Contractor shall be solely liable for all reasonable costs and/or expenses associated with such defense and the County shall be entitled to participate in said defense. Contractor shall not settle any claim, suit, etc., without the County’s concurrence, which the County shall not unreasonably withhold.

**Article 4**  
**ARCHITECT**

Change the title of this article from “ARCHITECT” to “PRIME PROFESSIONAL”.

4.1 **General**

4.1.1 Change this Subparagraph to read as follows:

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The Prime Professional is the person identified as the Professional in the Agreement Between the Owner and the Contractor and retained by the Owner pursuant to Section 2.3.2.

4.1.2 Change the word “Architect” to “Prime Professional”, and delete the following words: “Contractor and Architect. Consent shall not be reasonably withheld.”

4.2 **Administration of the Contract**

4.2.1 Change the word “Architect” to “Prime Professional” and change the first line of this Subparagraph to read as follows:

The Prime Professional will provide administration of the Contract as described in the Contract Documents, and will be the Owner’s representative during construction until the end of the period for correction of Work as described in Section 12.2.

4.2.2 Change each instance of the word “Architect” to “Prime Professional”.

4.2.3 Change each instance of the word “Architect” to “Prime Professional”.

4.2.4 Change each instance of the word “Architect” to “Prime Professional” and each instance of the word “Architect’s” to “Prime Professional’s”.

4.2.5 Change the word “Architect’s” to “Prime Professional’s” and change the word “Architect” to “Prime Professional”.

4.2.6 Change each instance of the word “Architect” to “Prime Professional”.

4.2.7 Change each instance of the word “Architect” to “Prime Professional” and each instance of the word “Architect’s” to “Prime Professional’s”.

4.2.8 Change each instance of the word “Architect” to “Prime Professional”.

4.2.9 Change the word “Architect” to “Prime Professional”.

4.2.10 Change each instance of the word “Architect” to “Prime Professional” and the word “Architect’s” to “Prime Professional’s”.

4.2.11 Change the word “Architect” to “Prime Professional” and the word “Architect’s” to “Prime Professional’s” and change the word “decide” to “provide opinions on”.

4.2.12 Change each instance of the word “Architect” to “Prime Professional” and change in each instance the word “decisions” to “opinions”.

4.2.13 Delete this Subparagraph in its entirety.

4.2.14 Change each instance of the word “Architect” to “Prime Professional”.

**Article 5**  
**SUBCONTRACTORS**

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

5.2.1 Change this Subparagraph to read as follows:

Unless otherwise stated in the Contract Documents or the bidding requirements, the Contractor, prior to award of the Contract by the Owner, shall furnish in writing to the Owner through the Prime Professional, the names, classifications, and COR #'s of Sub-

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Contractors over Fifty Thousand Dollars (\$50,000.00) (as well as entities who are to furnish materials or equipment fabricated to a special design) proposed for each principal portion of the Work. Such list shall also include any Mechanical, Plumbing, or Electrical Sub-Contractor as listed on Proposal Form regardless of amount. Within 7 days of receipt of the information, the Prime Professional shall notify the Contractor whether the Owner or the Prime Professional (1) has reasonable objection to any such proposed Sub-Contractor or entity based upon information provided or other requirements provided for in the Contract Documents or (2) requires additional information or time for review. Failure of the Prime Professional to respond within the 7-day period shall constitute notice of no reasonable objection. Where a Project involves a Mississippi Landmark or a building and/or site potentially eligible for such designation, the Contractor shall also furnish documentation that all Sub-Contractors, regardless of Sub-Contract amount, have at least the minimum number of years of successful experience specified by the Prime Professional in work on previous projects involving State or National Landmarks of similar type, scale and complexity and that all key personnel to be utilized to perform the Work are experienced craftsmen with not less than five (5) years of experience.

5.2.2 Change this Subparagraph to read as follows:

The Contractor shall not contract with a proposed Sub-Contractor or entity to whom the Owner or Prime Professional has made reasonable and timely objection. Other than the Mechanical, Plumbing, or Electrical Sub-Contractors as listed on the Proposal Form, the Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection. Only where the listed Mechanical, Plumbing, or Electrical Sub-Contractor has (1) closed their business (2) entered into bankruptcy or (3) refuses to enter into a contract with the Contractor will substitution of such Sub-Contractor be permitted prior to the execution of the Agreement Between the Owner and Contractor. Substitution for refusal to enter into contract shall not be permitted if the reason for such refusal is due to unilateral reduction by Contractor of such Sub-Contractor's bid price.

5.2.3 Change this Subparagraph to read as follows:

If the Owner or Prime Professional has reasonable objection to a Sub-Contractor or entity proposed by the Contractor, other than the Mechanical, Plumbing, or Electrical Sub-Contractors as listed on the Proposal Form, the Contractor shall propose another to whom the Owner or Prime Professional has no reasonable objection. Neither the Contract Sum nor Contract Time may be increased or decreased due to any change in Sub-Contractor or entity. Failure of Contractor to identify Sub-Contractors or entities to whom the Owner and Prime Professional have no reasonable objections within 10 working days of initial submission shall result in the bid or proposal being deemed non-responsive at which time the Owner may elect to award to the next lowest responsive, responsible bidder or rebid the project.

5.2.4 Change this Subparagraph to read as follows:

Following the execution of the Agreement Between the Owner and Contractor, the Contractor shall not substitute a Sub-Contractor, person or entity previously selected without written consent of the Owner. The Contractor's unauthorized substitution of any Subcontractor, person or entity shall entitle the Owner to reject the work, materials or product furnished and require removal and replacement at no additional cost to the Owner. In no case shall substitution of Mechanical, Plumbing or Electrical Sub-Contractors be permitted except where such Sub-Contractor has (1) closed their business (2) entered into bankruptcy (3) becomes in arrears or (4) becomes involved in an ongoing dispute with the Contractor related to the Sub-Contractor's execution, workmanship, or timely performance of their portion of the Work.

5.4 **Contingent Assignment of Subcontracts**

5.4.1 Delete this Subparagraph in its entirety.

5.4.2 Delete this Subparagraph in its entirety.

5.4.3 Delete this Subparagraph in its entirety.

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**Article 6**  
**CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS**

**6.1 Owner’s Right to Perform Construction and to Award Separate Contracts**

6.1.1 Change this Subparagraph to read as follows:

The Owner reserves the right to perform construction or operations related to the Project with the Owner’s own forces, and to award separate contracts in connection with other portions of the Project or other construction or operations on the site.

6.1.4 Delete this Subparagraph in its entirety.

**6.2 Mutual Responsibility**

6.2.2 Change each instance of the word “Architect” to “Prime Professional”.

6.2.3 Delete Last Sentence.

6.2.5 Delete this Subparagraph in its entirety.

6.3 Change the word “Architect” to “Prime Professional”.

**Article 7**  
**CHANGES IN THE WORK**

**7.1 General**

Add the following to the end of 7.1.3:

Except as permitted in Article 7.3, a change in the Contract Sum or the Contract Time shall only be accomplished by written change order. Therefore, the Contractor acknowledges that it is not entitled to a change in the Contract Sum or the Contract Time in the absence of a written change order on the basis of the course of conduct or dealings between the parties and/or the Owner’s express or implied acceptance of alterations or additions to the Work and/or the Owner has been unjustly enriched by the Contractor’s Work or any other basis otherwise allowed by law or the facts and Contractor agrees that any such extra or changed work was performed by it as a volunteer.

**7.2 Change Orders**

7.2.1 Change each instance of the word “Architect” to “Prime Professional”.

7.2.2 Add a new Subparagraph as follows:

The maximum mark-up included in a Change Order for profit and overhead is limited to ten percent (10%) of the total of the actual cost for materials, labor and subcontracts. Profit and overhead include: all taxes, fees, permits, insurance, bond, job superintendent, job and home office expense. All Sub-Contractors and Sub-Sub-Contractors shall acquiesce to the same requirements when participating in a Change Order.

7.2.3 Add a new Subparagraph as follows:

In order to facilitate consideration of change order requests, all such requests, except those involving an amount less than \$500 must be accompanied by a complete itemization of costs, including labor, materials and subcontractor costs which shall likewise be itemized. Changes for more than \$500 may not be approved without such itemization.

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7.2.4 Add a new Subparagraph as follows:

Contractor's execution of a change order constitutes a final settlement to the Contract Sum, construction schedule and the Contract Time for all matters relating to or arising out of the change in the Work that is the subject of the change order.

7.3 **Construction Change Directives**

7.3.4 Change the word "Architect" to "Prime Professional".

7.3.4.1 Change the word "Architect" to "Prime Professional".

7.3.6 Change this Subparagraph to read as follows:

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

7.3.7 Change this Subparagraph to read as follows:

A Construction Change Directive signed by the Contractor indicates the Contractor's agreement therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall become effective once signed by the Prime Professional and the Owner and will subsequently be incorporated into a Change Order.

7.3.8 Change the word "Architect" to "Prime Professional".

7.3.9 Change this Subparagraph to read as follows:

Until such time that a Construction Change Directive is recorded as a Change Order, the Contractor may not request payment for Work completed under the Construction Change Directive in Applications for Payment.

7.3.10 Change each instance of the word "Architect" to "Prime Professional".

7.4 Change each instance of the word "Architect" to "Prime Professional" and the word "Architect's" to "Prime Professional's".

**Article 8**  
**TIME**

8.1 **Definitions**

8.1.2 Change this Subparagraph to read as follows:

The date of commencement of the Work is the date established in the Notice to Proceed.

8.1.3 Change the word "Architect" to "Prime Professional".

8.2 **Progress and Completion**

8.2.1 Change this Subparagraph to read as follows:

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

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completing the Work within the Contract Time, and acknowledges that such period includes time for all applicable submittals, selections, reviews, approvals, inspections, meetings, as well as discovery and investigation of any latent conditions.

8.2.2 Change this Subparagraph to read as follows:

The Contractor shall not knowingly commence the Work prior to the date established in the Notice to Proceed or the effective dates of bond and insurance required to be furnished by the Contractor.

### 8.3 **Delays and Extensions of Time**

8.3.1 Change this Subparagraph to read as follows:

No delay, interference, hindrance or disruption, from whatever source or cause, in the commencement or progress of the Contractor's Work shall be a basis for an extension of time and/or additional compensation, unless the delay, interference, hindrance or disruption (1) is without the fault and not the responsibility of the Contractor, its Sub-Contractors and/or suppliers and (2) directly affects the overall completion of the Work as reflected on the critical path of the Contractor's updated and accepted construction schedules. If the Owner, in consultation with the Prime Professional determines a delay is justified, then the Contract Time shall be extended for such reasonable time as the Owner, in consultation with the Prime Professional, may determine. Such determination shall take into consideration the critical path of the Work and will be reduced by any float in the Contractor's Construction Schedule that does not affect the overall completion of the Work. Except where such delay is due to suspension by the Owner in accordance with Article 14 or such delay has the effect of stopping all progress of the Work for 14 calendar days or more, the Contract Sum will not be increased for additional general overhead expenses. Any claim for loss or any delay occasioned by any Sub-Contractor or entity under contract with the Contractor, shall be settled between the Contractor and such other Sub-Contractor or entity.

8.3.2 Change this Subparagraph to read as follows:

All claims by the Contractor for or relating to a change in Contract Time must follow the procedures set forth in Articles 15.1.2 and 15.1.5, including the requirement that the Contractor give written notice of any Claim within twenty-one (21) days after occurrence of the event giving rise to such a Claim or within twenty-one (21) days after the Contractor first recognizes the condition giving rise to the Claim, whichever is later.

8.3.4 Add a new Subparagraph as follows:

The Contractor expressly agrees that the Owner shall have the benefit of any float in the construction schedule and that delays to construction activities, which do not affect the overall completion of the Work, do not entitle the Contractor to any extension in the Contract Time and/or increase in Contract Sum.

## Article 9 PAYMENTS AND COMPLETION

### 9.2 **Schedule of Values**

Change this Paragraph to read as follows:

Where the Contract is based on a stipulated sum, the Contractor shall submit to the Prime Professional, at least 10 working days before the first Application for Payment, a schedule of values allocating the entire Sum to the various portions of the Work. The schedule of values shall be prepared in the form, and supported by the data to substantiate its accuracy, required by the Prime Professional. This schedule, unless objected to by the Prime Professional or Owner, shall be used as a basis for reviewing the Contractor's Applications for Payment. Any subsequent changes to the schedule of values shall be submitted to the Prime Professional and supported by such data to substantiate its accuracy as the Prime Professional may require, and unless objected to by the Prime Professional or Owner, shall be used as a basis for reviewing the Contractor's subsequent Applications for Payment.

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### 9.3 Applications for Payment

#### 9.3.1 Add a new sentence to the end of this Subparagraph:

The form of Application for Payment will be AIA Document G702, Application and Certification for Payment, supported by AIA Document G703, Continuation Sheet, or a computer generated form containing similar data.

#### 9.3.1.1 Delete this Subparagraph in its entirety.

#### 9.3.1.3 Add a new Clause to Subparagraph 9.3.1 as follows:

On any contract as described herein, of which the total amount is Two Hundred Fifty Thousand Dollars (\$250,000.00) or greater, or on any contract with a subcontractor, regardless of amount, five percent (5%) shall be retained until the Work is at least fifty percent (50%) complete, on schedule and satisfactory in the Prime Professional's opinion, at which time fifty percent (50%) of the retainage held to date shall be returned, subject to consent of surety, to the prime contractor for distribution to the appropriate subcontractors and suppliers; provided, however, that future retainage shall be withheld at the rate of two and one-half percent (2 1/2%). When submitting request for reduction in retainage, the Contractor will include, with the application, a Consent of Surety to Reduction which is AIA Form G707A, and a Power of Attorney. (Code 31-5-33)

#### 9.3.1.4 Add a new Clause to Subparagraph 9.3.1 as follows:

The Contractor must submit each month with this Application for Payment a separate letter stating that he is requesting an extension of time or that he had no need for an extension for that period of time. No payment on a monthly application will be considered due and payable until the letter is received. Complete justification such as weather reports or other pertinent correspondence must be included for each day's request for extension. A Contractor's letter, or statement, will not be considered as adequate justification. The receipt of this request and data by the Owner will not be considered as approval of the Owner or Prime Professional in any way.

#### 9.3.2.1 Add a new Clause to Subparagraph 9.3.2 as follows:

Payment in an amount not greater than the documented cost paid by the Contractor for materials stored at some location other than the Project site, may be approved by the Prime Professional and the Owner after the Contractor has submitted the following items:

- .1 An acceptable Lease Agreement between the General Contractor and the owner of the land, or building, where the materials are stored covering the specific area where the materials are located.
- .2 Consent of Surety, or other acceptable Bond, to cover the materials stored off-site.
- .3 All Perils Insurance coverage for the full value of the materials stored off-site.
- .4 A Bill of Sale from the Manufacturer to the General Contractor for the stored materials.
- .5 A complete list and inventory of materials manufactured, stored and delivered to the storage site and of materials removed from the storage site and delivered to the job site.
- .6 A review by the Prime Professional of the materials stored off-site prior to release of payment. Where the storage location is greater than 50 miles of the building site, the Contractor shall pay or reimburse reasonable travel costs of the Prime Professional and/or his Consultants for such review.
- .7 Proof of payment of stored materials verified by the supplier must be submitted to the Prime Professional within thirty (30) days of the Application for Payment on which payment for said materials was made. If proof of payment is not submitted within thirty (30) days, then payment for said materials will be deducted from the next application for payment and withheld until proof of payment is received.
- .8 Guarantee no storage costs, additional delivery fees, or subsequent costs to the Owner.

### 9.4 Applications for Payment

#### 9.4.1 Change each instance of the word "Architect" to "Prime Professional" and the word "Architect's" to "Prime Professional's".

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9.4.2 Change each instance of the word “Architect” to “Prime Professional” and each instance of the word “Architect’s” to “Prime Professional’s”.

9.5 **Decisions to Withhold Certification**

9.5.1 Change each instance of the word “Architect” to “Prime Professional” and the word “Architect’s” to “Prime Professional’s”.

9.5.1.7 Delete the word “repeated” from this Clause.

9.5.1.8 Add the following as Article 9.5.1.8:

.8 The letter from the Contractor which is required by Article 9.3.1.4 has not been received.

9.5.2 Change the word “Architect” to “Prime Professional”.

9.5.3 Delete this Subparagraph in its entirety.

9.5.4 Change each instance of the word “Architect” to “Prime Professional”.

9.6 **Progress Payments**

9.6.1 Change this Subparagraph to read as follows:

The Owner agrees to make payment in accordance with Mississippi law. Subject to the conditions of the contract, the Owner shall place the Certificate for Payment, following receipt of same from the Prime Professional, on its next regular monthly claims docket for approval and make all undisputed payments to the Contractor in the amount certified.

9.6.2 Change the first line of this Subparagraph to read as follows:

The Contractor shall pay each Sub-Contractor and material supplier, in accordance with Section 31-5-27 of the Mississippi Code 1972, Annotated, in proportion to the percentage of work completed by each less applicable retainage.

9.6.3 Change each instance of the word “Architect” to “Prime Professional”.

9.6.4 Change the word “Architect” to “Prime Professional”.

9.6.7 Change the word “Unless” in the First Sentence to the phrase “Whether or not”.

9.6.9 Add a new Subparagraph as follows:

The amount retained by the Contractor from each payment to each Sub-Contractor and material supplier shall not exceed the percentage retained by the Owner from the Contractor.

9.6.9.1 Add a new Clause to Subparagraph 9.6.9 as follows:

The Contractors shall submit monthly certification, in accordance with Section 31-5-25 of the Mississippi Code 1972, Annotated, on Owner’s “Affidavit Certifying Payment to All Subcontractors” form, to the Prime Professional indicating payments to subcontractors on prior payment request.

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9.6.10 Add a new Subparagraph as follows:

Contractor understands and agrees that the Owner, as a political subdivision of the State of Mississippi, is exempt from the payment of taxes. All payments shall be in United States currency. No payment, including final payment, shall be construed as acceptance of defective or incomplete work, and the Contractor shall remain responsible and liable for full performance.

9.7 **Failure of Payment**

Change this Paragraph to read as follows:

The Contractor and the Owner shall be subject to the remedies as prescribed in Section 31-5-25 of the Mississippi Code 1972, Annotated.

9.8 **Substantial Completion**

9.8.1 Add the following sentence to the end this Subparagraph to read as follows:

In order to be considered occupiable or utilizable by the Owner, all life safety systems must be operable and tested and the commissioning requirements for the Work or designated portion thereof must be complete.

9.8.3 Change this Subparagraph to read as follows:

Upon receipt of the Contractor's list, the Prime Professional will promptly visit the site to determine whether the Work or designated portion thereof is substantially complete. If, in the opinion of the Prime Professional, the Work or designated portion thereof is not substantially complete, the Prime Professional will not proceed with inspection and the Prime Professional will report the reasons for such determination to the Contractor. In such case, the Contractor shall then submit a revised list and request for inspection when these reasons have been resolved.

9.8.4 Change this Subparagraph to read as follows:

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

9.8.5 Add the following to the end of Article 9.8.5:

Contractor's execution of the Certificate of Substantial Completion constitutes Contractor's representation that the items on the list accompanying the Certificate can and will be completed by Contractor and his subcontractors within thirty (30) days of Contractor's execution of the Certificate. Based upon this representation by Contractor and upon the acknowledgment of the Prime Professional that the listed items remaining can be completed within thirty (30) days, the Owner agrees to execute the Certificate of Substantial Completion. If Contractor fails to complete the items on the list within thirty (30) days of Contractor's execution of the Certificate, then the Owner, at its option and without prejudice to any other rights or remedies it may have under this Contract or otherwise and without notice to Contractor or Surety, may proceed to have same completed and to deduct the reasonable costs thereof from the amounts then due or thereafter to become due to Contractor.

9.8.6 Add a new Subparagraph as follows:

The costs of inspections made by the Prime Professional which are not required by Articles 4, 9.8 or 9.10 or 12 of the General Conditions and any other inspection required by Article 12 other than the year-end inspection itself, will be the responsibility

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of the Contractor and will be deducted by the Owner from the Application for Payment submitted after the Owner's receipt of the Prime Professional's statement for its costs of additional inspections. These costs are not the result of Contractor's failure to timely complete the Contract within the specified time and, therefore, such costs are in addition to and not a part of any liquidated damages calculation, if any.

**9.9 Partial Occupancy or Use**

9.9.1 Change each instance of the word "Architect" to "Prime Professional".

9.9.1.1 Add a new Subparagraph as follows:

The Owner's occupancy or use of any completed or partially completed portions of the Work shall not affect Contractor's obligation to complete incomplete items on the list attached to the Certificate of Substantial Completion within the time fixed in the Certificate and does not waive Owner's right to obtain completion of incomplete items at Contractor's expense upon Contractor's failure to timely complete same.

9.9.2 Change the word "Architect" to "Prime Professional".

**9.10 Final Completion and Final Payment**

9.10.1 Change this Subparagraph and add the associated Clauses to read as follows:

When, in the opinion of the Contractor, the Work is ready for final inspection and acceptance by the Owner, the Contractor shall make such notice to the Prime Professional.

1. Upon receipt of the Contractor's notice that the Work is ready for final inspection and acceptance by the Owner, the Prime Professional will promptly visit the site and assess the state of the Work to determine if it is ready for final inspection by the Owner. If, in the Prime Professional's judgment, the Work is not ready for final inspection, the Prime Professional will report the reasons for such determination to the Contractor. In such case, the Contractor shall then submit a revised request for final inspection when these reasons have been resolved.
2. Once the Prime Professional determines the Work is ready for final inspection, the Prime Professional will call for final inspection of the Project with the Owner for the purpose of determining whether the Work is acceptable under the Contract Documents.
3. The final inspection shall be conducted in the presence of the Owner and a list of defects or discrepancies, if any, will be compiled into a final punch list furnished to all parties.
4. Once corrections of all final punch list items have been confirmed by the Prime Professional, the Prime Professional will provide a letter recommending final acceptance of the Work to the Owner.

9.10.2 Change this Subparagraph to read as follows:

Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Prime Professional (1) final application for payment, (2) consent of surety to final payment, (3) power of attorney, (4) Contractor's affidavit of release of liens, (5) Contractor's affidavit of payment of debts and claims, (6) Contractor's guarantee of work, (7) Project Record Documents and (8) certificates, warranties, guarantees, bonds or documents as called for in the individual sections of the Project Manual. The final payment will be reduced by the value of any amounts assessed to the Contractor per Section 2.5 Owner's Right to Carry Out the Work, Section 6.3 Owners Right to Clean Up, or Section 9.11 Liquidated Damages where such amounts have not been reconciled by a Change Order per Section 7.2 prior to final acceptance unless such amounts have been resolved via separate agreement(s) between the Owner and the Contractor.

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9.10.4 Delete this Subparagraph in its entirety.

9.11 **Liquidated Damages**

9.11.1 Add a new Paragraph as follows:

Time being of the essence and a matter of material consideration thereof, a reasonable estimate in advance is established to cover losses incurred by the Owner if the Project is not substantially complete on the date set forth in the Contract Documents. The Contractor and his Surety will be liable for and will be assessed by the Owner the sums as indicated in the Standard Form of Agreement between the Owner and Contractor stipulated in Paragraph 2.2 of the Standard Form of Agreement Between the Owner and the Contractor as fixed and agreed as liquidated damages for each calendar day of delay until the Work is substantially complete unless circumstances dictate otherwise in the discretion of the Owner. The Contractor and his Surety acknowledge that losses to the Owner caused by the delay of the Contractor are not readily ascertainable and that the amount estimated per day and established as liquidated damages is reasonable and not a penalty.

**Article 10**

**PROTECTION OF PERSONS AND PROPERTY**

10.2 **Safety of Persons and Property**

10.2.5 Change this Subparagraph to read as follows:

The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Clauses 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, a Sub-Contractor, a Sub-Sub-Contractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Clauses 10.2.1.2 and 10.2.1.3. The Contractor may make a Claim for the cost to remedy the damage or loss attributable to acts or omissions of the Owner or Prime Professional and not attributable to the fault or negligence of the Contractor. Where damage or loss is insured under property insurance required by the Contract Documents, the Contractor shall promptly report, file and facilitate the claim process so as to minimize any impacts on the timely completion of the Work. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Paragraph 3.18.

10.2.9 Add new Subparagraph as follows:

10.2.9 The Contractor shall be responsible for the adequate strength and safety of all scaffolding, staging and hoisting equipment and for temporary shoring, bracing and tying.

10.3 **HAZARDOUS MATERIALS**

10.3.2 Delete this Subparagraph in its entirety.

10.3.3 Delete this Subparagraph in its entirety.

10.3.4 Delete this Subparagraph in its entirety.

10.3.5 Change this Subparagraph to read as follows:

The Contractor shall indemnify and hold harmless the Owner for any and all claims, damages, losses, expenses, attorney's fees, including but not limited to the cost and expense the Owner incurs (1) for remediation of a material or substance the Contractor brings to the site and negligently handles, or (2) where the Contractor fails to perform its obligations under Section 10.3.1.

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10.3.6 Delete this Subparagraph in its entirety.

**Article 11**  
**INSURANCE AND BONDS**

**11.1 Contractor's Insurance and Bonds**

11.1.1 Change this Subparagraph to read as follows:

The Contractor shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Contractor shall purchase and maintain the required insurance from an insurance company or companies licensed to do business in Mississippi and against which the Owner has no reasonable objections. The Owner, Prime Professional and Prime Professional's consultants shall be named as additional insureds under the Contractor's commercial general liability policy or as otherwise described in the Contract Documents.

Insurance shall be purchased to protect the Contractor for not less than the limits of liability specified by Article 11 or required by law, whichever coverage is greater, which may arise out of or result from the Contractor's operations and completed operations under the Contract and for which the Contractor may be legally liable, whether such operations be by the Contractor or by a Sub-Contractor or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable.

The Contractor's certificate of insurance must state that the Owner and Prime Professional are additional insureds under the referenced CGL policy and that all of Contractor's contractual liabilities, including but not limited to its indemnity obligations, are covered by such CGL policy. Any language contained on the certificate of insurance form or elsewhere to the contrary is deemed stricken. The certificate of insurance must also state that all of Contractor's contractual liabilities, including but not limited to its indemnity obligations, are covered. Any terms and conditions contained in the certificate of insurance which are contrary to the Contractor's contractual obligations are hereby stricken from the certificate.

Certificates of insurance acceptable to the Owner shall be filed with the Owner prior to final execution of the Contract. Furnish one copy of the Certificate herein required for each copy of the Agreement, specifically setting forth evidence of all coverage required by Article 11. Furnish to the Owner copies of any endorsements that are subsequently issued amending limits of coverage.

Copies of all Policies, including Policy Jackets, must accompany Certificates of Insurance. The Owner may also require that a true copy of all policies specified be filed with it. Each and every policy and certificate must contain an endorsement stating that the insurance company will not, prior to the completion of the project or any policy expiration date shown on the policy and certificate, whichever occurs first, terminate the policy or change any coverage therein without first mailing to the Owner, by registered mail, written notice of such action at least thirty (30) days prior to the termination or change.

11.1.2: Change this Subparagraph to read:

The Contractor shall furnish and pay for a Performance Bond and Labor and Material Payment Bond of a company qualified to do business in the State of Mississippi, and which is acceptable to the Owner, in an amount equal to 100% of the Contract Sum, as security for the true and faithful performance of the Contract and payment in full of all subcontractors and persons performing labor, services, materials, machinery and fixtures in connection with the Work.

The executed bonds, together with the bonding agent's power of attorney, shall be furnished to the Owner along with the executed Contract and number of copies reasonably required. The bonds shall provide that the surety waives the requirements of notice of any change in the Work which does not exceed 20% of the Contract Sum and of any extension of time granted to the Contractor. The Contractor shall deliver the required bonds to the Owner not later than the date of execution of the Contract.

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11.1.5 : Add a new subparagraph to read:

Contractor's limits of liability shall be written for amounts not less than the following, or greater amounts if required by law or if deemed necessary by the Contractor to protect his interests:

<b>.1</b>	<b>General Liability</b> Commercial General Liability (including XCU) General Aggregate Products & Completed Operations Personal & Advertising Injury Bodily Injury & Property Damage Fire Damage Liability Medical Expense	\$1,000,000.00 Aggregate \$1,000,000.00 Aggregate \$ 500,000.00 Per Occurrence \$1,000,000.00 Per Occurrence \$ 50,000.00 Per Occurrence \$ 5,000.00 Per Person
<b>.2</b>	<b>Owners and Contractors Protective Liability:</b>  Bodily Injury & Property Damage Bodily Injury & Property Damage	\$1,000,000.00 Aggregate \$ 500,000.00 Each Occurrence
<b>.3</b>	<b>Automobile Liability</b> (Owned, Non-owned & Hired Vehicles) Bodily Injury  Property Damage	\$1,000,000.00 Per Person \$2,000,000.00 Per Accident \$1,000,000.00 Per Accident
<b>.4</b>	<b>Excess or Umbrella Liability</b>	\$1,000,000.00 General Aggregate
<b>.5</b>	<b>Workers' Compensation</b>  EMPLOYERS' LIABILITY Accident Disease Disease	As required by statute  \$100,000.00 Per Occurrence \$500,000.00 Policy Limit \$100,000.00 Per Employee
<b>.6</b>	<b>Property Insurance</b>  Builder's Risk OR Installation Floater	Equal to Value of Work  Equal to Value of Work

Property Damage Liability insurance will provide Explosion, Collapses and Underground Coverages where applicable.

11.1.6 Add a new Subparagraph to read as follows:

Insurance shall be maintained without interruption from the date of commencement of the Work until the date of final payment unless otherwise noted on the Certificate of Substantial Completion.

11.1.7 Add a new Subparagraph to read as follows:

If the Contractor fails to purchase and maintain such insurance and the Owner is damaged by such failure, then the Contractor shall be liable to the Owner for all such damages incurred by the Owner.

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11.1.8 Add a new Subparagraph as follows:

If the coverages are provided on a claims-made basis, the policy date or retroactive date shall predate the Contract; the termination date, or the policy, or applicable extended reporting period shall be no earlier than the termination date of coverages required to be maintained after final payment.

11.1.9 Add a new Subparagraph as follows:

If any insurance requires deductibles, the Contractor shall pay costs not covered because of such deductibles.

11.1.10 Add a new Subparagraph as follows:

The Owner as fiduciary shall have power to adjust and settle a loss with Insurers unless one of the parties in interest shall object in writing within five (5) days after occurrence of loss.

## 11.2 **Owner's Insurance**

Delete this Paragraph in its entirety and substitute the following:

The Contractor shall purchase and maintain such insurance as will protect the Owner and Prime Professional from their contingent liability to others for damages because of bodily injury, including death, and property damage, which may arise from operations under this Contract and other liability for damages which the Contractor is required to insure under any provision of this Contract. Certificate of this insurance will be filed with the Owner and will be the same limits set forth in 11.1.5.

11.2.1 Delete this Subparagraph in its entirety.

11.2.2 Delete this Subparagraph in its entirety.

11.2.3 Delete this Subparagraph in its entirety.

## 11.3 **Waivers of Subrogation**

11.3.1 Delete this Subparagraph in its entirety.

11.3.2 Delete this Subparagraph in its entirety.

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

Delete this Paragraph in its entirety.

## 11.5 **Adjustment and Settlement of Insured Loss**

11.5.1 Delete this Subparagraph in its entirety.

11.5.2 Delete this Subparagraph in its entirety.

## Article 12

### **UNCOVERING AND CORRECTION OF WORK**

#### 12.1 **Uncovering of Work**

12.1.1 Change each instance of the word "Architect's" to "Prime Professional's", change the word "Architect" to "Prime Professional",

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and add the words “or Contract Sum” at the end of this sentence.

12.1.2 Change each instance of the word “Architect” to “Prime Professional”.

12.2 **Correction of Work**

12.2.1 Change the word “Architect” to “Prime Professional” and the word “Architect’s” to “Prime Professional’s”.

12.2.2.1 Change the word “Architect” to “Prime Professional”.

12.2.6 Add a new Subparagraph to read:

Upon request by the Owner and prior to the expiration of one year from the date of Substantial Completion, the Prime Professional will conduct, and the Contractor and all major subcontractors shall attend, a meeting with the Owner to review the facility, operations and performance.

**Article 13**  
**MISCELLANEOUS PROVISIONS**

13.1 **Governing Law**

Change this Paragraph to read as follows:

The Contract shall be governed by the laws of the State of Mississippi.

13.2 **Successors and Assigns**

13.2.1 Change this Subparagraph to read as follows:

The Contractor binds itself, its partners, successors, assigns and legal representatives to covenants, agreements and obligations contained in the Contract Documents. Except as provided in Section 13.2.2, neither party to the Contract shall assign the Contract as a whole without written consent of the other. If either party attempts to make an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

13.3 **Rights and Remedies**

13.3.2 Change the word “Architect” to “Prime Professional”.

13.4 **Tests and Inspections**

13.4.1 Change each instance of the word “Architect” to “Prime Professional”.

13.4.2 Change each instance of the word “Architect” to “Prime Professional”.

13.4.3 Change the word “Architect” to “Prime Professional’s”.

13.4.4 Change the word “Architect” to “Prime Professional”.

13.4.5 Change each instance of the word “Architect” to “Prime Professional”.

13.5 Delete this Paragraph in its entirety.

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**Article 14**  
**TERMINATION OR SUSPENSION OF THE CONTRACT**

**14.1 Termination by the Contractor**

14.1.1.3 Change the word “Architect” to “Prime Professional”.

14.1.1.4 Delete this Clause in its entirety.

14.1.3 Change the word “Architect” to “Prime Professional” and delete “as well as reasonable overhead and profit on Work not executed, and costs incurred by reason of such termination”.

14.1.4 Change the word “Architect” to “Prime Professional”.

**14.2 Termination by the Owner for Cause**

14.2.1.1 Delete the word “repeatedly” from this Clause.

14.2.1.3 Delete the word “repeatedly” from this Clause and delete the word “or” from this Clause.

14.2.1.4 Change the period to a semi-colon.

14.2.1.5 Add a new Clause as follows:

fails to achieve Substantial Completion of the Project within the time limits established by the Contract Documents and/or fails to complete the list of items attached to the Certificate of Substantial Completion; or

14.2.1.6 Add a new Clause as follows:

fails to meet any deadline required by the Contract. Contractor acknowledges that time is of the essence of this Contract and that all deadlines required by the Contract are critical to timely completion of the Contract. Therefore, Contractor agrees that its failure to meet any deadline constitutes a substantial and material breach of this Contract, entitling the Owner to terminate the Contract.

14.2.2 Change the word “Architect” to “Prime Professional” and change the words “certification by” to “advice of”.

14.2.4 Delete the First Sentence and change the words “Decision Maker” to “Recommender”.

14.2.5 Add a new Subparagraph as follows:

If the Owner terminates the Contract for cause, and it is determined for any reason that the Contractor was not actually in default under the Contract at the time of termination, the Contractor shall be entitled to recover from the Owner the same amount as the Contractor would be entitled to receive under a termination for convenience as provided by Article 14.4. The foregoing shall constitute the Contractor’s sole and exclusive remedy for termination of the Contract. In no event shall the Contractor be entitled to special, consequential, or exemplary damages, nor shall the Contractor be entitled to anticipated profits resulting from termination of this Contract.

**14.4 Termination by the Owner for Convenience**

14.4.3 Delete from the last line of Article 14.4.3 the phrase “along with reasonable overhead and profit on the Work not executed” and add after the end of that sentence: “The Contractor shall not be entitled to receive any payment for either overhead or profit on work not performed.”

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**Article 15**  
**CLAIMS AND DISPUTES**

**15.1 Claims**

15.1.2 Change this Subparagraph to read as follows:

**Commencement of Statutory Limitation Period**

The Owner and Contractor shall commence all claims and causes of action within the time period specified by applicable state law.

15.1.3.1 Change each instance of the word “Architect” to “Prime Professional”.

15.1.3.2 Change the word “Decision Maker” to “Recommender”

15.1.4.2 Change this Subparagraph to read as follows:

Where both the Owner and the Contractor concur with the Initial Recommender’s recommendation, the Contract Sum and Contract Time shall be adjusted in accordance with Article 7 and the Prime Professional will issue Certificates for Payment in accordance with the recommendation of the Initial Recommender.

15.1.7 Delete this Subparagraph in its entirety.

15.2 Change this Title to read “Initial Recommendation”

15.2.1 Change this Subparagraph to read as follows:

Claims, excluding those where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2 or arising under Sections 10.3 and 10.4, shall be referred to the Initial Recommender for initial recommendation. The Prime Professional will serve as the Initial Recommender. An initial recommendation by the Initial Recommender shall be required as a condition precedent to litigation of all Claims between the Contractor and Owner arising prior to the date final payment is due, unless 30 days have passed after the Claim has been referred to the Initial Recommender with no recommendation having been rendered by the Initial Recommender. The Initial Recommender will not decide disputes between the Contractor and persons or entities other than the Owner.

15.2.2 Change the words “Decision Maker” to “Recommender” and change the words “approve the Claim” to “recommend approval of the Claim to the Owner”.

15.2.3 Change the words “Decision Maker” to “Recommender” and change the word “decision” to “recommendation”.

15.2.4 Change the words “Decision Maker” to “Recommender” and change the last sentence to read “Upon receipt of the response or supporting data, if any, the Initial Recommender will either recommend to the Owner rejection or approval of the Claim in whole or in part within thirty (30) days.”

15.2.5 Change the Subparagraph to read as follows:

The Initial Recommender will render an initial recommendation to approve the Claim, or indicate that the Initial Recommender is unable to resolve the Claim. This initial recommendation shall (1) be in writing; (2) state the reasons therefor; and (3) notify the parties and the Prime Professional, if the Prime Professional is not serving as the Initial Recommender, of any recommended change in the Contract Sum or Contract Time or both. Where the Owner concurs with the recommendation it is binding on the parties but subject to litigation.

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15.2.6 Delete this Subparagraph in its entirety.

15.2.6.1 Delete this Clause in its entirety.

15.3 **Mediation**

15.3.1 Change this Subparagraph to read as follows:

Claims, disputes, or other matters in controversy arising out of or related to the Contract except those waived as provided for in Section 9.10.5 may be subject to mediation upon mutual agreement of the Owner and Contractor. A request for mediation shall be made in writing and delivered to the other party to the Contract.

15.3.2 Delete this Subparagraph in its entirety.

15.3.3 Delete this Subparagraph in its entirety.

15.4 **Arbitration**

15.4.1 Delete this Subparagraph in its entirety.

15.4.1.1 Delete this Clause in its entirety.

15.4.2 Delete this Subparagraph in its entirety.

15.4.3 Delete this Subparagraph in its entirety.

15.4.4 Delete this Subparagraph in its entirety.

15.4.4.1 Delete this Clause in its entirety.

15.4.4.2 Delete this Clause in its entirety.

15.4.4.3 Delete this Clause in its entirety.

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**SECTION 009000  
ADDENDA**

**PART 1 GENERAL**

**1.01 SUMMARY**

- A. Any addenda to the drawings or specifications issued before or during the time of bidding shall be included in the proposal and become a part of the Contract.
- B. Indicate receipt of addenda on the proposal form.

**1.02 PART 2 PRODUCTS (NOT USED)**

**1.03 PART 3 EXECUTION (NOT USED)**

**END OF SECTION**



**SECTION 011000  
SUMMARY****PART 1 GENERAL****1.01 PROJECT**

- A. Project Name: Saracennia Fire Station
- B. Owner's Name: Jackson County Board of Supervisors.

**1.02 PROJECT DESCRIPTION**

- A. Description: Refer to Section 000102 Project Information
- B. Alternates: refer to Division 1 Section "Alternates" for information.
- C. All accessories or incidental items not specifically shown and detailed in the specifications herein, which are necessary and/or required to complete the work within the intent of the specifications, shall be included by the Contractor without additional cost to the Owner.
- D. All bid amounts must be based on the most stringent requirement called for in the complete construction document package. In addition, the most stringent requirement shown shall govern and take precedence in the event of any and all conflicts between different drawings (plans, elevations, details, sections, schedules, etc...), between different specification sections, within specification sections, and between the drawings and the specifications. It will be the General Contractor's responsibility to bring any and all discrepancies to the architect's attention for further clarity prior to submitting a formal bid.

**1.03 BUILDING PERMITS AND PLAN REVIEW**

- A. Building Permits:
  - 1. All Building Permits including all special subcontractor permits will be required for this project.
  - 2. The General Contractor will be required to apply for and pull all permits in their name.
  - 3. The General Contractor will be required to pay for all permits. Refer to Allowances section for any specified amount that may be allocated for the paying of said permits. If there is no set allowance provided, then it will be the General Contractor's responsibility to coordinate with the AHJ and provide for the costs of all permits in his base bid amount.
- B. Plan Review:
  - 1. The project will be required to go through the plans review process with the Authority Having Jurisdiction (AHJ).
  - 2. The General Contractor will be required to pay for all plans review fees. Refer to Allowances section for any specified amount that may be allocated for the paying of said plan review. If there is no set allowance provided, then it will be the General Contractor's responsibility to coordinate with the AHJ and provide for the costs of the plan review in his base bid amount.
  - 3. The General Contractor will be responsible for providing and paying for all hard copy sets of plans and specifications required by the AHJ for their completion of the plan review process.

**1.04 DESCRIPTION OF ALTERATIONS WORK**

- A. Scope of demolition and removal work is indicated on drawings.
- B. Scope of alterations work is indicated on drawings.

**1.05 WORK BY OWNER (EXCLUDED FROM BID WORK)**

- A. Some items will be furnished and installed by Owner under separate contracts. Contractors shall coordinate and cooperate with these separate contractors including scheduling, delivery and installation dates, storage of materials, and use of utilities.
  - 1. Loose Furniture

2. Promethean Boards
3. Security Cameras
4. Refrigerators
5. Copy Machines

#### **1.06 GENERAL INFORMATION**

- A. All work shall be performed in a professional manner and workmanlike manner.
- B. Submittals: Submittals shall be submitted in accordance with Division 1 Section "Submittals".
- C. Scheduling: The contractor shall prepare a construction schedule showing each construction activity, based on the project specification divisions, prior to starting work.
- D. The Contractor will be expected to cooperate with the Owner and his representative in pursuing work continuously and with the highest degree of efficiency possible.
- E. The Contractor will be required to finish the job and leave the site in a condition similar to starting project.
- F. Inclement Weather: The Contract Time for the project has incorporated all days for inclement weather. No additional request inclement weather days will be allowed during the project duration. The only inclement weather delays that will be considered to be above and beyond standard adverse conditions and will be considered appropriate for the Contractor's request for additional time will be Acts of God that have directly effected the project site as follows:
  1. Named Storms
  2. Earthquakes
  3. Tornadoes
  4. Floods
  5. Hail Storms
- G. Storm Damage: Should warnings of winds of gale force or stronger be issued, the Contractor shall take every practical precaution to minimize danger to persons and damage to property. These precautions shall be coordinated through the Owner's Representative and shall include closing all openings; removing all loose materials, tools, and equipment from exposed locations; as well as removing or securing scaffolding and other temporary work.
- H. Interruption of Utility Service: Interruptions to utility services shall be minimized. Necessary outages shall be coordinated with the Owner a minimum of 10 days in advance of the planned outage.

#### **1.07 OWNER OCCUPANCY/WORKING CONDITIONS**

- A. Workmen shall be limited to the use of only those areas necessary to perform the work.
- B. Owner intends to occupy the Project upon Substantial Completion.
- C. Cooperate with Owner to minimize conflict and to facilitate Owner's operations.
- D. The Contractor shall take all necessary and prudent safety precautions to ensure the safety of the workforce and other exposed personnel.

#### **1.08 CONTRACTOR USE OF SITE AND PREMISES**

- A. Construction Operations: Limited to areas permitted by Law, Ordinances, Permits, and Contract Documents..
- B. Provide access to and from site as required by law and by Owner:
  1. Do not obstruct roadways, sidewalks, or other public ways without permit and/or permission by Owner.
- C. Contractor shall not unreasonably encumber site with materials or equipment.
- D. Contractor shall assume full responsibility for protection and safe-keeping of products sorted on premises.
  1. Move any stored materials/products which interfere with operations of other Contractors.

2. Obtain and pay for, use of additional storage or work areas needed for operations.
  3. Refer to Division 1 Section "Temporary Facilities and Controls" for additional information.
- E. No Smoking (Tobacco) Policy:
1. Smoking and other tobacco products including vaping are prohibited within and outside of all buildings. This applies to **ALL** buildings including the project site during all times of construction.
- F. No Weapons Policy:
1. No deadly weapons of any kind are permitted on the property.
- G. No Alcohol Policy:
1. No alcoholic beverages of any kind are permitted on the property.
- H. Utility Outages and Shutdown:
1. Limit disruption of utility services to hours the existing surrounding building is unoccupied.
  2. Do not disrupt or shut down life safety systems, including but not limited to fire sprinklers and fire alarm system, without 7 days notice to Owner and authorities having jurisdiction.
  3. Prevent accidental disruption of utility services to other facilities.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION - NOT USED**

**END OF SECTION**





**SECTION 012000  
PRICE AND PAYMENT PROCEDURES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Procedures for preparation and submittal of applications for progress payments.
- B. Documentation of changes in Contract Sum and Contract Time.
- C. Change procedures.
- D. Procedures for preparation and submittal of application for final payment.

**1.02 RELATED REQUIREMENTS**

- A. Section 005000 - Contracting Forms and Supplements: Forms to be used.
- B. Section 007200 - General Conditions.
- C. Section 012100 - Allowances.

**1.03 SCHEDULE OF VALUES**

- A. Use Schedule of Values Form: AIA G703, edition stipulated in the Agreement.
- B. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit draft to Engineer/Architect for approval.
- C. Forms filled out by hand will not be accepted.
- D. Submit Schedule of Values in duplicate within 15 days after date established in Notice to Proceed.
- E. Format: Utilize the Table of Contents of this Project Manual. Identify each line item with number and title of the specification section. Identify site mobilization, bonds and insurance, and allowances .
- F. Revise schedule to list approved Change Orders, with each Application For Payment.

**1.04 APPLICATIONS FOR PROGRESS PAYMENTS**

- A. Payment Period: Submit at intervals stipulated in the Agreement.
- B. Forms filled out by hand will not be accepted.
- C. For each item, provide a column for listing each of the following:
  - 1. Item Number.
  - 2. Description of work.
  - 3. Scheduled Values.
  - 4. Previous Applications.
  - 5. Work in Place and Stored Materials under this Application.
  - 6. Authorized Change Orders.
  - 7. Total Completed and Stored to Date of Application.
  - 8. Percentage of Completion.
  - 9. Balance to Finish.
  - 10. Retainage.
- D. Notarize certification by signature of authorized officer.
- E. Use data from approved Schedule of Values. Provide dollar value in each column for each line item for portion of work performed and for stored products.
- F. List each authorized Change Order as a separate line item, listing Change Order number and dollar amount as for an original item of work.
- G. Submit one electronic and three hard-copies of each Application for Payment.
- H. Include the following with the application:

1. Transmittal letter as specified for submittals in Section 013000.
  2. Construction progress schedule, revised and current as specified in Section 013000.
  3. Allowance Tracking Report/Spreadsheet
  4. Current construction photographs specified in Section 013000.
  5. Partial release of liens from major subcontractors and vendors.
  6. Back up information and pictures will be required for stored materials.
  7. Monthly OAC Meeting agenda and Meeting minutes.
- I. When Engineer/Architect requires substantiating information, submit data justifying dollar amounts in question. Provide one copy of data with cover letter for each copy of submittal. Show application number and date, and line item by number and description.

#### **1.05 MODIFICATION PROCEDURES**

- A. For minor changes not involving an adjustment to the Contract Sum or Contract Time, Engineer/Architect will issue instructions directly to Contractor.
- B. For other required changes, Engineer/Architect will issue a document signed by Owner instructing Contractor to proceed with the change, for subsequent inclusion in a Change Order.
1. The document will describe the required changes and will designate method of determining any change in Contract Sum or Contract Time.
  2. Promptly execute the change.
- C. For changes for which advance pricing is desired, Engineer/Architect will issue a document that includes a detailed description of a proposed change with supplementary or revised drawings and specifications, a change in Contract Time for executing the change Contractor shall prepare and submit a fixed price quotation within 7 days.
- D. Contractor may propose a change by submitting a request for change to Engineer/Architect, describing the proposed change and its full effect on the work, with a statement describing the reason for the change, and the effect on the Contract Sum and Contract Time with full documentation. Document any requested substitutions in accordance with Section 01 6000.
- E. Computation of Change in Contract Amount: As specified in the Agreement and Conditions of the Contract.
1. For change requested by Engineer/Architect for work falling under a fixed price contract, the amount will be based on Contractor's price quotation.
  2. For change requested by Contractor, the amount will be based on the Contractor's request for a Change Order as approved by Engineer/Architect.
- F. Substantiation of Costs: Provide full information required for evaluation.
1. On request, provide the following data:
    - a. Quantities of products, labor, and equipment.
    - b. Taxes, insurance, and bonds.
    - c. Overhead and profit.
    - d. Justification for any change in Contract Time.
    - e. Credit for deletions from Contract, similarly documented.
  2. Support each claim for additional costs with additional information:
    - a. Origin and date of claim.
    - b. Dates and times work was performed, and by whom.
    - c. Time records and wage rates paid.
    - d. Invoices and receipts for products, equipment, and subcontracts, similarly documented.
- G. Execution of Change Orders: Engineer/Architect will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.
- H. After execution of Change Order, promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as a separate line item and adjust the

Contract Sum.

- I. Promptly revise progress schedules to reflect any change in Contract Time, revise sub-schedules to adjust times for other items of work affected by the change, and resubmit.
- J. Promptly enter changes in Project Record Documents.

**1.06 APPLICATION FOR FINAL PAYMENT**

- A. Prepare Application for Final Payment as specified for progress payments, identifying total adjusted Contract Sum, previous payments, and sum remaining due.
- B. Application for Final Payment will not be considered until the following have been accomplished:
  - 1. All closeout procedures specified in Section 017000.

**END OF SECTION**



**SECTION 012100  
ALLOWANCES****PART 1 GENERAL****1.01 SUMMARY**

- A. This Section sets forth the following allowances to be included in the Contract:
  - 1. Contingency Allowance
  - 2. AHJ Plan Review Fee
  - 3. Utility Connection allowance
- B. Conditions:
  - 1. The Contractor shall include in his base bid the cash and/or material allowances as described hereinafter for the purchase of materials as described or as to be determined herein.
    - a. Any GC overhead, profit, bond, insurance, and tax amounts must be carried as an additional cost, where applicable, in a separate line item on the contractor's bid amount and subsequent schedule of values and shall be included in the GC's Base Bid amount.
  - 2. All specified allowances shall appear as a separate line item amount, matching the amount specified herein, on the contractor's AIA Document G703, schedule of values.

**1.02 ALLOWANCE CONDITIONS AND REQUIREMENTS**

- A. The Contractor shall include in his Base Bid the cash and/or material allowances as described hereinafter for the purchase of materials as described or as to be determined herein.
- B. Purchase products under allowance as directed by Architect/Engineer or as specified herein.
- C. All specified allowances shall appear as a separate line item amount, matching the amount specified herein, on the contractor's AIA Document G703, Schedule of Values.
- D. Use of any allowance shall be specifically authorized in writing upon approval by authorized Owner Representative AND the Architect. A final accounting of all contingency funds used will be made by issuance of a change order at the end of the project.
- E. At close-out of Contract, funds remaining in Allowances will be credited to owner by Change Order. In addition to the balance of the allowance all applicable costs for overhead, profit, bond, insurance and taxes will be added to the allowance change order credit. Overhead amounts that can be clearly documented as being expended over the course of the project will be excluded from this added amount to the allowance credit. Refer to AIA A201 General Conditions for further information.
- F. Contractor shall solicit a minimum of three (3) quotes for material and labor to be performed under all allowances.
- G. General Contractor's overhead, profit, bond, insurance, and tax amounts or any other additional costs CANNOT be included in these proposals or the final proposal. The General Contractor's overhead, profit, bond, insurance, and tax amounts in relation to all allowances shall be included in the General Contractor's Base Bid amount. In addition, the GC's Base Bid included overhead amounts allocated to these allowances shall include all GC associated costs, whether direct or indirect, that may be tied to any and all additional work required. These items shall include but are not limited to the following:
  - 1. Additional Man Hours (both standard and overtime)
  - 2. Drive Time
    - a. Vehicle maintenance or wear and tear
    - b. Fuel Costs
    - c. Research
    - d. Paperwork
    - e. Phone Calls

- f. Equipment Rental
- H. Sub Contractor's costs Included in Cash Allowances: Cost of product to Contractor or subcontractor, less applicable trade discounts.
  - 1. Net cost of product
  - 2. Delivery to site
  - 3. Installation
  - 4. Labor
  - 5. Insurance
  - 6. Payroll
  - 7. Taxes
  - 8. Bonding
  - 9. Sub Contractor's Overhead and Profit (O&P).
  - 10. Equipment Rental
- I. Engineer/Architect Responsibilities:
  - 1. Consult with Contractor for consideration and selection of products, suppliers , and installers.
  - 2. Select products in consultation with Owner and transmit decision to Contractor.
  - 3. Prepare Change Order.
- J. Contractor Responsibilities:
  - 1. Assist Engineer/Architect in selection of products, suppliers , and installers.
  - 2. Obtain proposals from suppliers and installers and offer recommendations.
  - 3. On notification of which products have been selected, execute purchase agreement with designated supplier and installer.
  - 4. Arrange for and process shop drawings, product data, and samples. Arrange for delivery.
  - 5. Promptly inspect products upon delivery for completeness, damage, and defects. Submit claims for transportation damage.
- K. Differences in costs will be adjusted by Change Order.

### 1.03 ALLOWANCE SCHEDULE:

- A. **General Contingency Allowance:**
  - 1. In addition to the work shown on the contract documents, the contractor shall include in the base bid contract amount the following lump sum cash allowance amount:
    - a. Seventy Five Thousand Dollars (\$75,000).
- B. **AHJ Plan Review and Permitting Fee Allowance:**
  - 1. Include the following lump sum allowance amount in base bid contract sum for payment of Plan Review and Permitting within scope of Work and specified herein:
    - a. Two Thousand Dollars (\$2,000).
  - 2. Allowance to be used for Jackson County **Building Permit** and **Plan Review** fee.
  - 3. Fees for Electrical, Plumbing, and Mechanical permits are additional and shall be included by each Trade as per Jackson County Building Permit Fee Schedule, and are not included in the above allowance.
- C. **Utility Connection Allowance:**
  - 1. In addition to the work shown on the contract documents include in the base bid contract amount the following lump sum cash allowance amount:
    - a. Twenty Five Thousand Dollars (\$25,000).

### 1.04 SELECTION/DELIVERY/INSTALLATION PROCESS

- A. Architect shall consult with Contractor in coordination of products and suppliers and shall make selection of products to be used.
- B. Contractor shall assist Architect in determining qualified suppliers, obtain proposals from suppliers for Architect's review, and enter into purchase agreement with designated supplier

chosen.

- C. Contractor is responsible for arranging delivery, unloading and inspecting products for damage and defects.
- D. Contractor shall comply with requirements of referenced specification section for installation and/or install per Manufacturer's recommendations.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION - NOT USED**

**END OF SECTION**





**SECTION 012200  
UNIT PRICES****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Measurement and payment criteria applicable to Work performed under a unit price payment method.

**1.02 RELATED REQUIREMENTS**

- A. Document 002113 - Instructions to Bidders: Instructions for preparation of pricing for Unit Prices.
- B. Section 012000 - Price and Payment Procedures: Additional payment and modification procedures.

**1.03 COSTS INCLUDED**

- A. Unit Prices included on the Bid Form shall include full compensation for all required labor, products, tools, equipment, plant, transportation, services and incidentals; erection, application or installation of an item of the Work; overhead and profit.

**1.04 UNIT QUANTITIES SPECIFIED**

- A. Quantities indicated in the Bid Form are for bidding and contract purposes only. Quantities and measurements of actual Work will determine the payment amount.

**1.05 MEASUREMENT OF QUANTITIES**

- A. Contractor will take all measurements and compute quantities. Measurements and quantities will be verified by Engineer/Architect or Engineer of Record.
- B. Assist by providing necessary equipment, workers, and survey personnel as required.
- C. Measurement by Volume: Measured by cubic dimension using mean length, width and height or thickness. Soils muck out volume will be determined by Field Measure (FM).
- D. Measurement by Area: Measured by square dimension using mean length and width or radius. Area will be determined by Field Measure (FM).

**1.06 PAYMENT**

- A. Payment for Work governed by unit prices will be made on the basis of the actual measurements and quantities of Work that is incorporated in or made necessary by the Work and accepted by the Engineer/Architect, multiplied by the unit price.
- B. Only payment for unforeseen unsuitable soils above and beyond what is already called out to be removed in the Geotech Report or any of the Construction Document Drawings shall will be deducted from the Removal/Replacement of Unsuitable Soils Allowance amount.
- C. Payment will not be made for any of the following:
  - 1. Products wasted or disposed of in a manner that is not acceptable.
  - 2. Products determined as unacceptable before or after placement.
  - 3. Products not completely unloaded from the transporting vehicle.
  - 4. Products placed beyond the lines and levels of the required Work.
  - 5. Products remaining on hand after completion of the Work.
  - 6. Loading, hauling, and disposing of rejected Products.

**1.07 DEFECT ASSESSMENT**

- A. Replace Work, or portions of the Work, not complying with specified requirements.

**1.08 SCHEDULE OF UNIT PRICES**

- A. The General Contractor shall provide a unit price per cubic yard (CY) field measured (FM) for the removal (muck out / haul off) and replacement (put back) of unsuitable soil material. The

imported material shall be a borrow fill select sand material approved by the engineer and as per specified under 312323 - Fill. If unsuitable material is encountered below the plan subgrade this unit pricing amount will be used to charge against either the general contingency allowance or a specific unsuitable soils allowance as called for under 012100 Allowances.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION - NOT USED**

**END OF SECTION**

**SECTION 012300  
ALTERNATES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Description of administrative and procedural requirements for Alternates.
- B. Description of Alternates.

**1.02 RELATED REQUIREMENTS**

- A. Document 002113 - Instructions to Bidders: Instructions for preparation of pricing for Alternates.

**1.03 ACCEPTANCE OF ALTERNATES**

- A. Alternates quoted on Bid Forms will be reviewed and accepted or rejected at Owner's option. Accepted Alternates will be identified in the Owner-Contractor Agreement.
- B. Bidder will be required to mark on the Bid Form whether or not the Alternates listed herein are ADDITIVE or DEDUCTIVE.
- C. Coordinate related work and modify surrounding work to integrate the Work of each Alternate designated in the Contract.
  - 1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.
  - 2. Execute accepted alternates under the same conditions as other work of the Contract.

**1.04 SCHEDULE OF ALTERNATES**

- A. **Alternate No. 01:**
  - 1. This alternate will remove the use of Pre Engineered Metal building insulation in the wall and the roof and replace with with Open Cell Spray Foam insulation to a thickness as required to meet the R-value as indicated in the drawings.
  - 2. The metal roof shall change from the currently specified roof system to a 24ga. Superlok SSR roof with fixed clips. Provide a 20 year standard no dollar limit water tight warranty.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION - NOT USED**

**END OF SECTION**



**SECTION 012500  
SUBSTITUTION PROCEDURES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Procedural requirements for proposed substitutions.

**1.02 RELATED REQUIREMENTS**

- A. Section 002113 - Instructions to Bidders: Restrictions on timing of substitution requests.

**1.03 DEFINITIONS**

- A. Substitutions: Changes from Contract Documents requirements proposed by Contractor to materials, products, assemblies, and equipment.
  - 1. Substitutions for Cause: Proposed due to changed Project circumstances beyond Contractor's control.
    - a. Unavailability.
    - b. Regulatory changes.
  - 2. Substitutions for Convenience: Proposed due to possibility of offering substantial advantage to the Project.
    - a. Substitution requests offering advantages solely to the Contractor will not be considered.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION**

**3.01 GENERAL REQUIREMENTS**

- A. A Substitution Request for products, assemblies, materials, and equipment 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, equipment, assembly, or system.
  - 2. Agrees to provide the same warranty for the substitution as for the specified product.
  - 3. Agrees to provide same or equivalent maintenance service and source of replacement parts, as applicable.
  - 4. Agrees to coordinate installation and make changes to other work that may be required for the work to be complete, with no additional cost to Owner.
  - 5. Waives claims for additional costs or time extension that may subsequently become apparent.
  - 6. Agrees to reimburse Owner and Engineer/Architect for review or redesign services associated with re-approval by authorities.
- B. A Substitution Request for specified installer constitutes a representation that the submitter:
  - 1. Has acted in good faith to obtain services of specified installer, but was unable to come to commercial, or other terms.
- C. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents. Burden of proof is on proposer.
  - 1. Note explicitly any non-compliant characteristics.
- D. Content: Include information necessary for tracking the status of each Substitution Request, and information necessary to provide an actionable response.
  - 1. Forms indicated in the Project Manual are adequate for this purpose, and must be used.
- E. Limit each request to a single proposed substitution item.
  - 1. Submit an electronic document, combining the request form with supporting data into single document.

**3.02 SUBSTITUTION PROCEDURES DURING PROCUREMENT**

- A. Submittal Time Restrictions:
  - 1. Section 002113 - Instructions to Bidders specifies time restrictions and the documents required for submitting substitution requests during the bidding period.
- B. Submittal Form (before award of contract):
  - 1. Submit substitution requests by completing the form included in this project manual. See this form for additional information and instructions. Use only this form; other forms of submission are unacceptable.

**3.03 SUBSTITUTION PROCEDURES DURING CONSTRUCTION**

- A. Submittal Form (after award of contract):
  - 1. Submit substitution requests by completing the form attached to this project manual. See this section for additional information and instructions. Use only this form; other forms of submission are unacceptable.
- B. Submit request for Substitution for Cause within 14 days of discovery of need for substitution, but not later than 14 days prior to time required for review and approval by Engineer/Architect, in order to stay on approved project schedule.
- C. Submit request for Substitution for Convenience immediately upon discovery of its potential advantage to the project, but not later than 14 days prior to time required for review and approval by Engineer/Architect, in order to stay on approved project schedule.
  - 1. In addition to meeting general documentation requirements, document how the requested substitution benefits the Owner through cost savings, time savings, greater energy conservation, or in other specific ways.
  - 2. Document means of coordinating of substitution item with other portions of the work, including work by affected subcontractors.
  - 3. Bear the costs engendered by proposed substitution of:
    - a. Owner's compensation to the Engineer/Architect for any required redesign, time spent processing and evaluating the request.
    - b. Other construction by Owner.
    - c. Other unanticipated project considerations.
- D. Substitutions will not be considered under one or more of the following circumstances:
  - 1. When they are indicated or implied on shop drawing or product data submittals, without having received prior approval.
  - 2. Without a separate written request.
  - 3. When acceptance will require revisions to Contract Documents.

**3.04 RESOLUTION**

- A. Engineer/Architect may request additional information and documentation prior to rendering a decision. Provide this data in an expeditious manner.
- B. Engineer/Architect will notify Contractor in writing of decision to accept or reject request.
  - 1. Engineer/Architect's decision following review of proposed substitution will be noted on the submitted form.

**3.05 ACCEPTANCE**

- A. Accepted substitutions change the work of the Project. They will be documented and incorporated into work of the project by Change Order, Construction Change Directive, Architectural Supplementary Instructions, or similar instruments provided for in the Conditions of the Contract.

**END OF SECTION**

**SECTION 013000  
ADMINISTRATIVE REQUIREMENTS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. General administrative requirements.
- B. Preconstruction meeting.
- C. Progress meetings.
- D. Contractor Driven Site Meetings or Site Inspections.
- E. Construction progress schedule.
- F. Progress photographs.
- G. Coordination drawings.
- H. Submittals for review, information, and project closeout.
- I. Number of copies of submittals.
- J. Requests for Interpretation (RFI) procedures.
- K. Submittal procedures.

**1.02 RELATED REQUIREMENTS**

- A. Section 016000 - Product Requirements: General product requirements.

**1.03 GENERAL ADMINISTRATIVE REQUIREMENTS**

- A. Comply with requirements of Section 017000 - Execution and Closeout Requirements for coordination of execution of administrative tasks with timing of construction activities.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION**

**3.01 COLLABORATION SOFTWARE**

- A. Summary
  - 1. The Contractor will be required to utilize a web based construction project management collaboration software to submit, track, distribute and collaborate on project documentation and action items.
  - 2. The intent of utilizing a web based construction management application is to reduce cost and schedule risk, improve quality and safety, and maintain a healthy team dynamic by improving information flow, reducing non-productive activities, reducing rework and decreasing turnaround times.
- B. Software
  - 1. General Contractor will be required to use Procore ([www.procore.com](http://www.procore.com))
  - 2. Access to said software be provided by the Architect/Engineer at no cost to the General Contractor.
  - 3. If unfamiliar, the Architect/Engineer's staff will assist the General Contractor in using the software or they will provide the resources necessary for the General Contractor to understand how to use the software.
- C. Architect/Engineer Responsibilities
  - 1. Upload signed/stamped drawings and any subsequent Architect/Engineer driven changes or revisions to the drawings.
  - 2. Upload signed/stamped specifications and any subsequent Architect/Engineer driven changes or revisions to the specifications.
  - 3. Add Design Team and Owner Contact Information
  - 4. Uploading all WCPR's as deemed necessary by the Architect/Engineer.

5. Uploading all ASI's as deemed necessary by the Architect/Engineer.
  6. Uploading all contracts as deemed necessary by the Architect/Engineer.
  7. Creation of set distribution lists to the design team and Owner only.
  8. Creation of Defficiency Reports as deemed necessary by the Architect/Engineer.
  9. Site Visit Reports as deemed necessary by the Architect/Engineer.
- D. Contractor's Responsibilities:
1. Do not remove people from a set distribution list that preloads on RFIs and Submittals; only add to it.
  2. Make sure attachments actually attach in all RFIs, Submittals, and transmittals. Transmittals mostly because they have to select the 'ADD' button once the attachment is uploaded.
  3. Provide us with a Subcontractor list so that they are able to easily distribute information to their subs via Procore.
  4. Submittals must be created in the software:
    - a. Submittal titles must be by specification section. Grouping multiple specification sections into one submittal will result in immediate rejection.
    - b. The Contractor will be responsible for submitting all RFIs and Submittals through the software and assigning them to the appropriate parties.
    - c. Architects / Engineers / Consultants etc. are responsible for posting all responses to these items via the software, including all relevant attachments.
    - d. The Contractor will distribute responses to all affected subcontractors and confirm agreement with the response by closing the item.
    - e. GC is the only one to create submittals. They will create them on behalf of their subs when needed. The subs should never create the submittal themselves.
    - f. Once a submittal is labeled as 'Reject and Resubmit' the GC needs to close it out and create the revision as a completely new submittal. Never create the revision WITHIN the original submittal.
    - g. Distribute and CLOSE all submittals once you have received a sufficient review/response from the Architect/Engineer.
    - h. Be sure to select a spec section for submittals.
  5. Project Schedules must be uploaded to the software in one of the follwoing accepted formats:
    - a. Microsoft Project
    - b. Primavera P3
    - c. Primavera P6
    - d. Asta Powerpoint
  6. Emails must be generated in the software
  7. Daily Logs must be created in the software
  8. RFI's must be created in the software
  9. All project photos must be uploaded to the software

### 3.02 PRECONSTRUCTION MEETING

- A. Engineer/Architect will schedule a meeting within 7 days after Notice of Award.
- B. Attendance Required:
1. Owner.
  2. Engineer/Architect.
  3. Contractor.
- C. Agenda:
1. Execution of Owner-Contractor Agreement.
  2. Submission of executed bonds and insurance certificates.
  3. Submission of list of subcontractors, list of products, schedule of values, and progress schedule.



4. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
  5. Owners requirements and work constraints.
- D. Record minutes and distribute copies within two days after meeting to participants, with two copies to Engineer/Architect, Owner, participants, and those affected by decisions made.

### **3.03 PROGRESS MEETINGS**

- A. Schedule and administer meetings throughout progress of the Work at maximum monthly intervals.
- B. Make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.
- C. Attendance Required:
1. Contractor.
  2. Owner.
  3. Engineer/Architect.
  4. Contractor's superintendent.
  5. Major subcontractors.
- D. Agenda:
1. Review minutes of previous meetings.
  2. Review of work progress.
  3. Field observations, problems, and decisions.
  4. Identification of problems that impede, or will impede, planned progress.
  5. Review of submittals schedule and status of submittals.
  6. Review of off-site fabrication and delivery schedules.
  7. Maintenance of progress schedule.
  8. Corrective measures to regain projected schedules.
  9. Planned progress during succeeding work period.
  10. Maintenance of quality and work standards.
  11. Effect of proposed changes on progress schedule and coordination.
  12. Other business relating to work.
- E. Record minutes and distribute copies within two days after meeting to participants, with two copies to Engineer/Architect, Owner, participants, and those affected by decisions made.

### **3.04 CONTRACTOR DRIVEN SITE MEETINGS AND PROJECT INSPECTIONS**

- A. All site inspections, site visits, site meetings, etc.... not previously scheduled, which are required for any reason, arranged, or scheduled by the general contractor, or any of the project's subcontractors, vendors, suppliers, etc.... that require the involvement of any employee of MP Design Group or any consultant of MP Design Group shall be arranged and finalized in writing at least forty-eight (48) hours in advance with MP Design Group.

### **3.05 CONSTRUCTION PROGRESS SCHEDULE**

- A. If preliminary schedule requires revision after review, submit revised schedule within 10 days.
- B. Within 7 days after review of preliminary schedule, submit draft of proposed complete schedule for review.
1. Include written certification that major contractors have reviewed and accepted proposed schedule.
- C. Within 3 days after joint review, submit complete schedule.
- D. Submit updated schedule with each Application for Payment.

### **3.06 REQUESTS FOR INTERPRETATION (RFI)**

- A. Definition: A request seeking one of the following:

1. An interpretation, amplification, or clarification of some requirement of Contract Documents arising from inability to determine from them the exact material, process, or system to be installed; or when the elements of construction are required to occupy the same space (interference); or when an item of work is described differently at more than one place in Contract Documents.
- B. Preparation: Prepare an RFI immediately upon discovery of a need for interpretation of Contract Documents. Failure to submit a RFI in a timely manner is not a legitimate cause for claiming additional costs or delays in execution of the work.
  1. Prepare a separate RFI for each specific item.
  2. Combine RFI and its attachments into a single electronic file. PDF format is preferred.
- C. Reason for the RFI: Prior to initiation of an RFI, carefully study all Contract Documents to confirm that information sufficient for their interpretation is definitely not included.
  1. Include in each request Contractor's signature attesting to good faith effort to determine from Contract Documents information requiring interpretation.
  2. Unacceptable Uses for RFIs: Do not use RFIs to request the following:
    - a. Approval of submittals (use procedures specified elsewhere in this section).
    - b. Approval of substitutions (see Section - 016000 - Product Requirements)
    - c. Changes that entail change in Contract Time and Contract Sum (comply with provisions of the Conditions of the Contract).
    - d. Different methods of performing work than those indicated in the Contract Drawings and Specifications (comply with provisions of the Conditions of the Contract).
  3. Improper RFIs: Requests not prepared in compliance with requirements of this section, and/or missing key information required to render an actionable response. They will be returned without a response, with an explanatory notation.
  4. Frivolous RFIs: Requests regarding information that is clearly indicated on, or reasonably inferable from, Contract Documents, with no additional input required to clarify the question. They will be returned without a response, with an explanatory notation.
- D. Content: Include identifiers necessary for tracking the status of each RFI, and information necessary to provide an actionable response.
  1. Official Project name and number, and any additional required identifiers established in Contract Documents.
  2. Owner's, Engineer/Architect's, and Contractor's names.
  3. Discrete and consecutive RFI number, and descriptive subject/title.
  4. Issue date, and requested reply date.
  5. Reference to particular Contract Document(s) requiring additional information/interpretation. Identify pertinent drawing and detail number and/or specification section number, title, and paragraph(s).
  6. Annotations: Field dimensions and/or description of conditions which have engendered the request.
  7. Contractor's suggested resolution: A written and/or a graphic solution, to scale, is required in cases where clarification of coordination issues is involved, for example; routing, clearances, and/or specific locations of work shown diagrammatically in Contract Documents. If applicable, state the likely impact of the suggested resolution on Contract Time or the Contract Sum.
- E. Attachments: Include sketches, coordination drawings, descriptions, photos, submittals, and other information necessary to substantiate the reason for the request.
- F. RFI Log: Prepare and maintain a tabular log of RFIs for the duration of the project.
  1. Maintain on the Electronic Document Submittal Service.
- G. Review Time: Engineer/Architect will respond and return RFIs to Contractor within seven calendar days of receipt. For the purpose of establishing the start of the mandated response period, RFIs received after 12:00 noon will be considered as having been received on the

following regular working day.

1. Response period may be shortened or lengthened for specific items, subject to mutual agreement, and recorded in a timely manner in progress meeting minutes.
- H. Responses: Content of answered RFIs will not constitute in any manner a directive or authorization to perform extra work or delay the project. If in Contractor's belief it is likely to lead to a change to Contract Sum or Contract Time, promptly issue a notice to this effect, and follow up with an appropriate Change Order request to Owner.
1. Response may include a request for additional information, in which case the original RFI will be deemed as having been answered, and an amended one is to be issued forthwith. Identify the amended RFI with an R suffix to the original number.
  2. Do not extend applicability of a response to specific item to encompass other similar conditions, unless specifically so noted in the response.
  3. Upon receipt of a response, promptly review and distribute it to all affected parties, and update the RFI Log.
  4. Notify Engineer/Architect within seven calendar days if an additional or corrected response is required by submitting an amended version of the original RFI, identified as specified above.

### **3.07 SUBMITTAL SCHEDULE**

- A. Submit to Engineer/Architect for review a schedule for submittals in tabular format.
1. Submit at the same time as the preliminary schedule specified in Section - 013216 - Construction Progress Schedule.

### **3.08 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. The contractor who prepared the submittals for review must represent that they are licensed and qualified to perform the work in the submittal, and said work is in full compliance with applicable codes.
- C. Stamping the Submittals: The General Contractor is not required to stamp the submittal prior to submission to the Architect/Engineer for their review. However; it is highly encouraged, and if there is no General Contractor review stamp on a submittal then by default the General Contractor has agreed with the following statement:
1. Acceptance is for general compliance with the contract documents only. The contractor is responsible for confirming and correlating all quantities and dimensions; selecting fabrication processes and techniques for construction; coordinating its work with that of all other trades; and performing its work in a safe and satisfactory manner.
- D. The contractor agrees that all submittals have been reviewed by the Architect and/or Engineer only for conformance with the design concept of the project and with the information delineated in the contract drawings and specifications. A returned review whether marked as "No Exceptions" or "Exceptions as Noted" does not waive any provisions of the contract documents. Contractor shall verify all details, dimensions and quantities, and coordinate with the work of other trades. Architect and/or Engineer's review of a submittal shall not relieve the contractor from responsibility for deviations, errors, or omissions in the shop drawings or submittals.
- E. Samples will be reviewed for aesthetic, color, or finish selection.
- F. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 017800 - Closeout Submittals.

**3.09 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. Manufacturer's field reports.
  - 7. Other types indicated.

**3.10 SUBMITTALS FOR PROJECT CLOSEOUT**

- A. Submit Correction Punch List for Substantial Completion.
- B. Submit Final Correction Punch List for Substantial Completion.
- C. When the following are specified in individual sections, submit them at project closeout in compliance with requirements of Section 017800 - Closeout Submittals:
  - 1. Project record documents.
  - 2. Operation and maintenance data.
  - 3. Warranties.
  - 4. Bonds.
  - 5. Other types as indicated.
- D. Submit for Owner's benefit during and after project completion.

**3.11 SUBMITTAL PROCEDURES**

- A. General Requirements:
  - 1. Use a separate submittal identification number and submittal transmittal cover page for each specification section. Do not combine multiple specification sections into one submittal; if done, it will be immediately rejected for resubmission without time extension.
  - 2. Transmit using approved form.
    - a. Use Contractor's form, subject to prior approval by Engineer/Architect.
  - 3. Sequentially identify each item. For revised submittals use original number and a sequential numerical suffix.
  - 4. Identify: Project; Contractor; subcontractor or supplier; pertinent drawing and detail number; and specification section number and article/paragraph, as appropriate on each copy.
  - 5. 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.
    - a. Submittals from sources other than the Contractor, or without Contractor's stamp will not be acknowledged, reviewed, or returned.
  - 6. Deliver each submittal on date noted in submittal schedule, unless an earlier date has been agreed to by all affected parties, and is of the benefit to the project.
    - a. Upload submittals in electronic form to Electronic Document Submittal Service website.
  - 7. Schedule submittals to expedite the Project, and coordinate submission of related items.
    - a. For each submittal for review, allow 10 working days excluding delivery time to and from the Contractor.
    - b. For sequential reviews involving Engineer/Architect's consultants, Owner, or another affected party, allow an additional 7 working days.
  - 8. Identify variations from Contract Documents and product or system limitations that may be detrimental to successful performance of the completed work.
  - 9. When revised for resubmission, identify all changes made since previous submission.

10. Incomplete submittals will not be reviewed, unless they are partial submittals for distinct portion(s) of the work, and have received prior approval for their use.
- B. Product Data Procedures:
1. Submit only information required by individual specification sections.
  2. Collect required information into a single submittal.
  3. Do not submit (Material) Safety Data Sheets for materials or products.
  4. Submit manufacturer's standard published data. **Where multiple choices occur on a submittal, it will be the Contractor's responsibility to clearly mark in contrasting color by means of underlining, highlighting, circling, ect... each copy to identify applicable products, models, options, and other data.** Unmarked copies will be immediately rejected and sent back to the General Contractor. Supplement manufacturers' standard data to provide information specific to this Project.
- C. Shop Drawing Procedures:
1. Prepare accurate, drawn-to-scale, original shop drawing documentation by interpreting Contract Documents and coordinating related work.
  2. Do not reproduce Contract Documents to create shop drawings.
  3. Generic, non-project-specific information submitted as shop drawings do not meet the requirements for shop drawings.
  4. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances. **Canned or Typical drawings, unless they specifically apply to the project, will be immediatly rejected.**
- D. Samples Procedures:
1. Transmit related items together as single package.
  2. Identify each item to allow review for applicability in relation to shop drawings showing installation locations.
  3. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
    - a. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.
    - b. **All submissions for the chosing of a products color must be physical samples indicating the products true and final color.** Digital and or printed samples will not be accepted.
- E. Transmit each submittal with a copy of approved submittal identification form.
- F. Contractor bears responsibility for all additional costs or work associated with work performed or materials installed prior to a returned approved submittal.

### 3.12 SUBMITTAL REVIEW

- A. Submittals for Review: Engineer/Architect will review each submittal, and provide no exceptions, or take other appropriate action.
- B. Submittals for Information: Engineer/Architect will acknowledge receipt and review. See below for actions to be taken.
- C. Engineer/Architect's actions will be reflected by marking each returned submittal using virtual stamp on electronic submittals.
- D. Engineer/Architect's actions on items submitted for review:
1. No Exceptions
    - a. Purchase, Fabrication, delivery, and/or installation may take place.
  2. Exceptions as Noted
    - a. Contractor's option to resubmit. However; all mark ups must be incorporated in the construction whether acknowledged in a resubmittal or not.
  3. Revise and Resubmit

- a. Must be resubmitted
- 4. Incomplete Submittal
  - a. Must be resubmitted
- 5. Submit Specified Item
  - a. Must be resubmitted
- 6. Submittal Rejected
  - a. Must be resubmitted
- E. Engineer/Architect's and consultants' actions on items submitted for information:

**END OF SECTION**

**SECTION 014000  
QUALITY REQUIREMENTS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Submittals.
- B. Quality assurance.
- C. References and standards.
- D. Testing and inspection agencies and services.
- E. Contractor's construction-related professional design services.
- F. Contractor's design-related professional design services.
- G. Control of installation.
- H. Mock-ups.
- I. Tolerances.
- J. Manufacturers' field services.
- K. Defect Assessment.

**1.02 REFERENCE STANDARDS**

- A. ASTM C1021 - Standard Practice for Laboratories Engaged in Testing of Building Sealants; 2008 (Reapproved 2023).
- B. ASTM C1077 - Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation; 2024.
- C. ASTM C1093 - Standard Practice for Accreditation of Testing Agencies for Masonry; 2023.
- D. ASTM D3740 - Standard Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction; 2023.
- E. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection; 2023.
- F. ASTM E543 - Standard Specification for Agencies Performing Nondestructive Testing; 2021.
- G. IAS AC89 - Accreditation Criteria for Testing Laboratories; 2021.

**1.03 CONTRACTOR'S CONSTRUCTION-RELATED PROFESSIONAL DESIGN SERVICES**

- A. **CIRCLE ONE:            ADDITIVE ALTERNATE            DEDUCTIVE ALTERNATE**
- B. Coordination: Contractor's professional design services are subject to requirements of project's Conditions for Construction Contract.
- C. Provide such engineering design services as may be necessary to plan and safely conduct certain construction operations, pertaining to, but not limited to the following:
  - 1. Temporary sheeting, shoring, or supports.
  - 2. Temporary bracing.

**1.04 CONTRACTOR'S DESIGN-RELATED PROFESSIONAL DESIGN SERVICES**

- A. Coordination: Contractor's professional design services are subject to requirements of project's Conditions for Construction Contract.
- B. Base design on performance and/or design criteria indicated in individual specification sections.
- C. Scope of Contractor's Professional Design Services: Provide for the following items of work:
  - 1. Structural Design of Steel Trusses: As described in Section 054400 - Cold-Formed Metal Trusses.

**1.05 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Test Reports: After each test/inspection, promptly submit two copies of report to Engineer/Architect and to Contractor.
  - 1. Include:
    - a. Date issued.
    - b. Project title and number.
    - c. Name of inspector.
    - d. Date and time of sampling or inspection.
    - e. Identification of product and specifications section.
    - f. Location in the Project.
    - g. Type of test/inspection.
    - h. Date of test/inspection.
    - i. Results of test/inspection.
    - j. Compliance with Contract Documents.
    - k. When requested by Engineer/Architect, provide interpretation of results.
- C. Certificates: When specified in individual specification sections or by code, submit certification by the manufacturer and Contractor or installation/application subcontractor to Engineer/Architect, in quantities specified for Product Data.
  - 1. Indicate material or product complies with or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
- D. Erection Drawings: Submit drawings for Engineer/Architect's benefit as contract administrator or for Owner.
  - 1. Submit for information for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents.

**1.06 QUALITY ASSURANCE**

- A. Testing Agency Qualifications:
  - 1. Prior to start of work, submit agency name, address, and telephone number, and names of full time registered Engineer and responsible officer.
  - 2. Submit copy of report of laboratory facilities inspection made by NIST Construction Materials Reference Laboratory during most recent inspection, with memorandum of remedies of any deficiencies reported by the inspection.

**1.07 REFERENCES AND STANDARDS**

- A. For products and workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- B. Comply with reference standard of date of issue current on date of Contract Documents, except where a specific date is established by applicable code.
- C. Obtain copies of standards where required by product specification sections.
- D. Maintain copy at project site during submittals, planning, and progress of the specific work, until Substantial Completion.
- E. Should specified reference standards conflict with Contract Documents, request clarification from Engineer/Architect before proceeding.
- F. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of Engineer/Architect shall be altered from Contract Documents by mention or inference otherwise in any reference document.



**1.08 TESTING AND INSPECTION AGENCIES AND SERVICES**

- A. Owner shall employ and pay for services of an independent testing agency to perform specified testing and inspection as required by Section 014533 Code Required Special Inspections and Procedures. General contractor shall coordinate required testing(s).
- B. As indicated in individual specification sections, Contractor shall employ and pay for services of an independent testing agency to perform other specified testing that is not specifically called for in Section 014533 Code Required Special Inspections and Procedures.
- C. Employment of agency in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents.
- D. Employed Agency:
  - 1. Testing agency: Comply with requirements of ASTM E329, ASTM E543, ASTM C1021, ASTM C1077, ASTM C1093, and ASTM D3740.
  - 2. Laboratory Qualifications: Accredited by IAS according to IAS AC89.
  - 3. Laboratory: Authorized to operate in the State in which the Project is located.
  - 4. Laboratory Staff: Maintain a full time registered Engineer on staff to review services.
  - 5. Testing Equipment: Calibrated at reasonable intervals either by NIST or using an NIST established Measurement Assurance Program, under a laboratory measurement quality assurance program.

**PART 2 PRODUCTS - NOT USED****PART 3 EXECUTION****3.01 CONTROL OF INSTALLATION**

- A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.
- B. Comply with manufacturers' instructions, including each step in sequence.
- C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Engineer/Architect before proceeding.
- D. Comply with specified standards as minimum quality for the work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Have work performed by persons qualified to produce required and specified quality.
- F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.
- G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

**3.02 MOCK-UPS**

- A. Before installing portions of the Work where mock-ups are required, for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work. The purpose of mock-up is to demonstrate the proposed range of aesthetic effects and workmanship.
- B. Accepted mock-ups establish the standard of quality the Engineer/Architect will use to judge the Work.
- C. Integrated Exterior Mock-ups: Construct integrated exterior mock-up as indicated on drawings. Coordinate installation of exterior envelope materials and products as required in individual Specification Sections. Provide adequate supporting structure for mock-up materials as necessary.
- D. Notify Engineer/Architect seven (7) working days in advance of dates and times when mock-ups will be constructed.

- E. Tests shall be performed under provisions identified in this section and identified in the respective product specification sections.
- F. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.
- G. Obtain Engineer/Architect's approval of mock-ups before starting work, fabrication, or construction.
  - 1. Engineer/Architect will issue written comments within five (5) working days of initial review and each subsequent follow up review of each mock-up.
  - 2. Make corrections as necessary until Architect's approval is issued.
- H. Engineer/Architect will use accepted mock-ups as a comparison standard for the remaining Work.
- I. Where mock-up has been accepted by Engineer/Architect and is specified in product specification sections to be removed, protect mock-up throughout construction, remove mock-up and clear area when directed to do so by Engineer/Architect.

### **3.03 TOLERANCES**

- A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.
- B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from Engineer/Architect before proceeding.
- C. Adjust products to appropriate dimensions; position before securing products in place.

### **3.04 TESTING AND INSPECTION**

- A. See individual specification sections for testing and inspection required.
- B. Testing Agency Duties:
  - 1. Test samples of mixes submitted by Contractor.
  - 2. Provide qualified personnel at site. Cooperate with Engineer/Architect and Contractor in performance of services.
  - 3. Perform specified sampling and testing of products in accordance with specified standards.
  - 4. Ascertain compliance of materials and mixes with requirements of Contract Documents.
  - 5. Promptly notify Engineer/Architect and Contractor of observed irregularities or non-compliance of Work or products.
  - 6. Perform additional tests and inspections required by Engineer/Architect.
  - 7. Submit reports of all tests/inspections specified.
- C. Limits on Testing/Inspection Agency Authority:
  - 1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
  - 2. Agency may not approve or accept any portion of the Work.
  - 3. Agency may not assume any duties of Contractor.
  - 4. Agency has no authority to stop the Work.
- D. Contractor Responsibilities:
  - 1. Deliver to agency at designated location, adequate samples of materials proposed to be used that require testing, along with proposed mix designs.
  - 2. Cooperate with laboratory personnel, and provide access to the Work and to manufacturers' facilities.
  - 3. Provide incidental labor and facilities:
    - a. To provide access to Work to be tested/inspected.
    - b. To obtain and handle samples at the site or at source of Products to be tested/inspected.

- c. To facilitate tests/inspections.
- d. To provide storage and curing of test samples.
- 4. Notify Engineer/Architect and laboratory 24 hours prior to expected time for operations requiring testing/inspection services.
- 5. Employ services of an independent qualified testing laboratory and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
- 6. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
- E. Re-testing required because of non-compliance with specified requirements shall be performed by the same agency on instructions by Engineer/Architect.
- F. Re-testing required because of non-compliance with specified requirements shall be paid for by Contractor.

**3.05 MANUFACTURERS' FIELD SERVICES**

- A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, as applicable, and to initiate instructions when necessary.
- B. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

**3.06 DEFECT ASSESSMENT**

- A. Replace Work or portions of the Work not complying with specified requirements.
- B. If, in the opinion of Engineer/Architect, it is not practical to remove and replace the work, Engineer/Architect will direct an appropriate remedy or adjust payment.

**END OF SECTION**



**SECTION 014100  
REGULATORY REQUIREMENTS**

**PART 1 GENERAL**

**1.01 SUMMARY OF REFERENCE STANDARDS**

- A. Regulatory requirements applicable to this project that all work shall comply with are as follows:
- B. 28 CFR 35 - Nondiscrimination on the Basis of Disability in State and Local Government Services; Final Rule; Department of Justice; current edition.
- C. 28 CFR 36 - Nondiscrimination by Public Accommodations and in Commercial Facilities; Final Rule; Department of Justice; current edition.
- D. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines; current edition.
- E. 49 CFR 37 - Transportation Services for Individuals with Disabilities (ADA); current edition.
- F. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.
- G. 29 CFR 1910 - Occupational Safety and Health Standards; current edition.
- H. City of Biloxi Land Development Ordinance
- I. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.
- J. Building Code: ICC (IBC) - International Building Code 2018.
- K. Plumbing Code: ICC International Plumbing Code 2018.
- L. Mechanical Code: ICC International Mechanical Code 2018.
- M. Fuel Gas Code: ICC Fuel Gas Code 2018.
- N. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- O. Elevator Code: ASME A17.1-2016 - Safety Code for Elevators and Escalators.
- P. Erosion and Sedimentation Control Regulations: All MS DEQ Guidelines.

**1.02 RELATED REQUIREMENTS**

- A. Section 014000 - Quality Requirements.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION - NOT USED**

**END OF SECTION**



**SECTION 014533**  
**CODE-REQUIRED SPECIAL INSPECTIONS AND PROCEDURES**

**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Code-required special inspections.
- B. Testing services incidental to special inspections.
- C. Submittals.

**1.02 RELATED REQUIREMENTS**

- A. Section 013000 - Administrative Requirements: Submittal procedures.
- B. Section 014000 - Quality Requirements.

**1.03 ABBREVIATIONS AND ACRONYMS**

- A. AHJ: Authority having jurisdiction.
- B. IAS: International Accreditation Service, Inc.
- C. NIST: National Institute of Standards and Technology.

**1.04 DEFINITIONS**

- A. Code or Building Code: ICC (IBC), International Building Code, Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements and specifically, Chapter 17 - Special Inspections and Tests.
- B. Authority Having Jurisdiction (AHJ): Agency or individual officially empowered to enforce the building, fire and life safety code requirements of the permitting jurisdiction in which the Project is located.
- C. Special Inspection:
  - 1. Special inspections are inspections and testing of materials, installation, fabrication, erection or placement of components and connections mandated by the AHJ that also require special expertise to ensure compliance with the approved Contract Documents and the referenced standards.
  - 2. Special inspections are separate from and independent of tests and inspections conducted by Owner or Contractor for the purposes of quality assurance and contract administration.

**1.05 REFERENCE STANDARDS**

- A. ACI CODE-318 - Building Code Requirements for Structural Concrete and Commentary; 2019 (Reapproved 2022).
- B. AISC 360 - Specification for Structural Steel Buildings; 2022.
- C. ASTM C31/C31M - Standard Practice for Making and Curing Concrete Test Specimens in the Field; 2024.
- D. ASTM C172/C172M - Standard Practice for Sampling Freshly Mixed Concrete; 2017.
- E. ASTM D3740 - Standard Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction; 2023.
- F. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection; 2023.
- G. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2020, with Errata (2023).
- H. AWS D1.3/D1.3M - Structural Welding Code - Sheet Steel; 2018, with Errata (2022).
- I. AWS D1.4/D1.4M - Structural Welding Code - Steel Reinforcing Bars; 2018, with Amendment (2020).

- J. IAS AC89 - Accreditation Criteria for Testing Laboratories; 2021.
- K. IAS AC291 - Accreditation Criteria for Special Inspection Agencies AC291; 2019.
- L. ICC (IBC) - International Building Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- M. ICC (IBC)-2018 - International Building Code; 2018.

#### **1.06 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Special Inspection Agency Qualifications: Prior to the start of work, the Special Inspection Agency is required to:
  - 1. Submit agency name, address, and telephone number, names of full time registered Engineer and responsible officer.
  - 2. Submit copy of report of laboratory facilities inspection made by NIST Construction Materials Reference Laboratory during most recent inspection, with memorandum of remedies of any deficiencies reported by the inspection.
  - 3. Submit certification that Special Inspection Agency is acceptable to AHJ.
- C. Testing Agency Qualifications: Prior to the start of work, the Testing Agency is required to:
  - 1. Submit agency name, address, and telephone number, and names of full time registered Engineer and responsible officer.
  - 2. Submit copy of report of laboratory facilities inspection made by NIST Construction Materials Reference Laboratory during most recent inspection, with memorandum of remedies of any deficiencies reported by the inspection.
  - 3. Submit certification that Testing Agency is acceptable to AHJ.
- D. Special Inspection Reports: After each special inspection, Special Inspector is required to promptly submit at least two copies of report; one to Engineer/Architect and one to the AHJ.
  - 1. Include:
    - a. Date issued.
    - b. Project title and number.
    - c. Name of Special Inspector.
    - d. Date and time of special inspection.
    - e. Identification of product and specifications section.
    - f. Location in the Project.
    - g. Type of special inspection.
    - h. Date of special inspection.
    - i. Results of special inspection.
    - j. Compliance with Contract Documents.
- E. Test Reports: After each test or inspection, promptly submit at least two copies of report; one to Engineer/Architect and one to AHJ.
  - 1. Include:
    - a. Date issued.
    - b. Project title and number.
    - c. Name of inspector.
    - d. Date and time of sampling or inspection.
    - e. Identification of product and specifications section.
    - f. Location in the Project.
    - g. Type of test or inspection.
    - h. Date of test or inspection.
    - i. Results of test or inspection.
    - j. Compliance with Contract Documents.



- F. Certificates: When specified in individual special inspection requirements, Special Inspector shall submit certification by the manufacturer, fabricator, and installation subcontractor to Engineer/Architect and AHJ, in quantities specified for Product Data.
  - 1. Indicate material or product complies with or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
- G. Manufacturer's Field Reports: Submit reports to Engineer/Architect and AHJ.
  - 1. Submit for information for the limited purpose of assessing compliance with information given and the design concept expressed in Contract Documents.

### **1.07 SPECIAL INSPECTION AGENCY**

- A. Owner will employ services of a Special Inspection Agency to perform inspections and associated testing and sampling in accordance with ASTM E329 and required by the building code.
- B. Employment of agency in no way relieves Contractor of obligation to perform work in accordance with requirements of Contract Documents.

### **1.08 TESTING AND INSPECTION AGENCIES**

- A. Employment of agency in no way relieves Contractor of obligation to perform work in accordance with requirements of Contract Documents.

### **1.09 QUALITY ASSURANCE**

- A. Special Inspection Agency Qualifications:
  - 1. Independent firm specializing in performing testing and inspections of the type specified in this section.
  - 2. Accredited by IAS according to IAS AC291.
- B. Testing Agency Qualifications:
  - 1. Independent firm specializing in performing testing and inspections of the type specified in this section.
  - 2. Accredited by IAS according to IAS AC89.

## **PART 2 PRODUCTS - NOT USED**

## **PART 3 EXECUTION**

### **3.01 SCHEDULE OF SPECIAL INSPECTIONS, GENERAL**

- A. Frequency of Special Inspections: Special Inspections are indicated as continuous or periodic.
  - 1. Continuous Special Inspection: Special Inspection Agency is required to be present in the area where the work is being performed and observe the work at all times the work is in progress.
  - 2. Periodic Special Inspection: Special Inspection Agency is required to be present in the area where work is being performed and observe the work part-time or intermittently and at the completion of the work.

### **3.02 SPECIAL INSPECTIONS FOR STEEL CONSTRUCTION**

- A. Structural Steel: Comply with quality assurance inspection requirements of ICC (IBC)-2018.
- B. High-Strength Bolt, Nut and Washer Material:
  - 1. Verify identification markings comply with ASTM standards specified in the approved contract and to AISC 360, Section A3.3; periodic.
  - 2. Submit manufacturer's certificates of compliance; periodic.
- C. High-Strength Bolting Installation: Verify items listed below comply with AISC 360, Section M2.5.
  - 1. Snug tight joints; periodic.
- D. Structural Steel and Cold Formed Steel Deck Material:

1. Structural Steel: Verify identification markings comply with AISC 360, Section M3.5; periodic.
  2. Other Steel: Verify identification markings comply with ASTM standards specified in the approved Contract Documents; periodic.
  3. Submit manufacturer's certificates of compliance and test reports; periodic.
- E. Weld Filler Material:
1. Verify identification markings comply with AWS standards specified in the approved Contract Documents and to AISC 360, Section A3.5; periodic.
  2. Submit manufacturer's certificates of compliance; periodic.
- F. Welding:
1. Structural Steel and Cold Formed Steel Deck:
    - a. Complete and Partial Joint Penetration Groove Welds: Verify compliance with AWS D1.1/D1.1M; continuous.
    - b. Multipass Fillet Welds: Verify compliance with AWS D1.1/D1.1M; continuous.
    - c. Single Pass Fillet Welds Less than 5/16 inch (7.94 mm) Wide: Verify compliance with AWS D1.1/D1.1M; periodic.
    - d. Plug and Slot Welds: Verify compliance with AWS D1.1/D1.1M; continuous.
    - e. Single Pass Fillet Welds 5/16 inch (7.94 mm) or Greater: Verify compliance with AWS D1.1/D1.1M; continuous.
    - f. Floor and Roof Deck Welds: Verify compliance with AWS D1.3/D1.3M; continuous.
  2. Reinforcing Steel: Verify items listed below comply with AWS D1.4/D1.4M and ACI CODE-318, Section 3.5.2.
    - a. Verification of weldability; periodic.
    - b. Reinforcing steel resisting flexural and axial forces in intermediate and special moment frames as well as where it is referenced in older codes. Elements of special structural walls of concrete and shear reinforcement; continuous.
    - c. Shear reinforcement; continuous.
    - d. Other reinforcing steel; periodic.
- G. Steel Frame Joint Details: Verify compliance with approved Contract Documents.
1. Details, bracing and stiffening; periodic.
  2. Member locations; periodic.
  3. Application of joint details at each connection; periodic.

### 3.03 SPECIAL INSPECTIONS FOR CONCRETE CONSTRUCTION

- A. Reinforcing Steel, Including Prestressing of Tendons and Placement: Verify compliance with approved Contract Documents and ACI CODE-318, Sections 3.5 and 7.1 through 7.7; periodic.
- B. Reinforcing Steel Welding: Verify compliance with AWS D1.4/D1.4M and ACI CODE-318, Section 3.5.2; periodic.
- C. Design Mix: Verify plastic concrete complies with the design mix in approved Contract Documents and with ACI CODE-318, Chapter 4 and 5.2; periodic.
- D. Concrete Sampling Concurrent with Strength Test Sampling: Each time fresh concrete is sampled for strength tests, verify compliance with ASTM C172/C172M, ASTM C31/C31M, and ACI CODE-318, Sections 5.6 and 5.8 and record the following, continuous:
  1. Slump.
  2. Air content.
  3. Temperature of concrete.
- E. Specified Curing Temperature and Techniques: Verify compliance with approved Contract Documents and ACI CODE-318, Sections 5.11 through 5.13; periodic.
- F. Concrete Strength in Situ: Verify concrete strength complies with approved Contract Documents and ACI CODE-318, Section 6.2, for the following.

- G. Formwork Shape, Location and Dimensions: Verify compliance with approved Contract Documents and ACI CODE-318, Section 6.1.1; periodic.

### **3.04 SPECIAL INSPECTIONS FOR MASONRY CONSTRUCTION**

- A. Masonry Structures Subject to Special Inspection:
1. Empirically designed masonry, glass unit masonry and masonry veneer in structures designated as "essential facilities".
  2. Engineered masonry in structures classified as "low hazard..." and "substantial hazard to human life in the event of failure".
- B. Verify each item below complies with approved Contract Documents and the applicable articles of TMS 402/602.
1. Inspections and Approvals:
    - a. Verify compliance with the required inspection provisions of the approved Contract Documents; periodic.
    - b. Verify approval of submittals required by Contract Documents; periodic.
  2. Compressive Strength of Masonry: Verify compressive strength of masonry units prior to start of construction unless specifically exempted by code; periodic.
  3. Slump Flow and Visual Stability Index (VSI): Verify compliance as self consolidating grout arrives on site; continuous.
  4. Joints and Accessories: When masonry construction begins, verify:
    - a. Proportions of site prepared mortar; periodic.
    - b. Construction of mortar joints; periodic.
    - c. Location of reinforcement, connectors, prestressing tendons, anchorages, etc; periodic.
  5. Structural Elements, Joints, Anchors, Protection: During masonry construction, verify:
    - a. Size and location of structural elements; periodic.
    - b. Type, size and location of anchors, including anchorage of masonry to structural members, frames or other construction; periodic.
    - c. Size, grade and type of reinforcement, anchor bolts and prestressing tendons and anchorages; periodic.
    - d. Welding of reinforcing bars; continuous.
  6. Grouting Preparation: Prior to grouting, verify:
    - a. Grout space is clean; periodic.
    - b. Correct placement of reinforcing, connectors, prestressing tendons and anchorages; periodic.
    - c. Correctly proportioned site prepared grouts and prestressing grout for bonded tendons; periodic.
    - d. Correctly constructed mortar joints; periodic.
  7. Preparation of Grout Specimens, Mortar Specimens and Prisms: Observe preparation of specimens; periodic.

### **3.05 SPECIAL INSPECTIONS FOR SOILS**

- A. Materials and Placement: Verify each item below complies with approved construction documents and approved geotechnical report.
1. Design bearing capacity of material below shallow foundations; periodic.
  2. Design depth of excavations and suitability of material at bottom of excavations; periodic.
  3. Materials, densities, lift thicknesses; placement and compaction of backfill: continuous.
  4. Subgrade, prior to placement of compacted fill verify proper preparation; periodic.
- B. Testing: Classify and test excavated material; periodic.

### **3.06 SPECIAL INSPECTIONS FOR WIND RESISTANCE**

- A. Cold-Formed Steel Light Frame Construction:
1. Field welding; periodic.

2. Screw attachment, bolting, anchoring and other fastening of components within the main wind force-resisting system; periodic
- B. Wind Resisting Components:
1. Roof covering, roof deck, and floor framing connections; periodic.
  2. Exterior wall covering and wall connections to roof and floor diaphragms and framing; periodic.

### **3.07 OTHER SPECIAL INSPECTIONS**

- A. Provide for special inspection of work that, in the opinion of the AHJ, is unusual in nature.

### **3.08 SPECIAL INSPECTION AGENCY DUTIES AND RESPONSIBILITIES**

- A. Special Inspection Agency shall:
1. Provide qualified personnel at site. Cooperate with Engineer/Architect and Contractor in performance of services.
  2. Perform specified sampling and testing of products in accordance with specified reference standards.
  3. Ascertain compliance of materials and products with requirements of Contract Documents.
  4. Promptly notify Engineer/Architect and Contractor of observed irregularities or non-compliance of work or products.
  5. Perform additional tests and inspections required by Engineer/Architect.
  6. Submit reports of all tests or inspections specified.
- B. Limits on Special Inspection Agency Authority:
1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
  2. Agency may not approve or accept any portion of the work.
  3. Agency may not assume any duties of Contractor.
  4. Agency has no authority to stop the work.
- C. Re-testing required because of non-compliance with specified requirements shall be performed by the same agency on instructions by Engineer/Architect.
- D. Re-testing required because of non-compliance with specified requirements shall be paid for by Contractor.

### **3.09 TESTING AGENCY DUTIES AND RESPONSIBILITIES**

- A. Testing Agency Duties:
1. Test samples submitted by Contractor.
  2. Provide qualified personnel at site. Cooperate with Engineer/Architect and Contractor in performance of services.
  3. Perform specified sampling and testing of products in accordance with specified standards.
  4. Ascertain compliance of materials and mixes with requirements of Contract Documents.
  5. Promptly notify Engineer/Architect and Contractor of observed irregularities or non-compliance of work or products.
  6. Perform additional tests and inspections required by Engineer/Architect.
  7. Submit reports of all tests or inspections specified.
- B. Limits on Testing or Inspection Agency Authority:
1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
  2. Agency may not approve or accept any portion of the work.
  3. Agency may not assume any duties of Contractor.
  4. Agency has no authority to stop the work.
- C. On instructions by Engineer/Architect, perform re-testing required because of non-compliance with specified requirements, using the same agency.

- D. Contractor will pay for re-testing required because of non-compliance with specified requirements.

**3.10 CONTRACTOR DUTIES AND RESPONSIBILITIES**

- A. Contractor Responsibilities, General:
  - 1. Deliver to agency at designated location, adequate samples of materials for special inspections that require material verification.
  - 2. Cooperate with agency and laboratory personnel; provide access to approved documents at project site, to the work, to manufacturers' facilities, and to fabricators' facilities.
  - 3. Provide incidental labor and facilities:
    - a. To provide access to work to be tested or inspected.
    - b. To obtain and handle samples at the site or at source of Products to be tested or inspected.
    - c. To facilitate tests or inspections.
    - d. To provide storage and curing of test samples.
  - 4. Notify Engineer/Architect and laboratory 24 hours prior to expected time for operations requiring testing or inspection services.
  - 5. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
- B. Contractor Responsibilities, Wind Force-Resisting System and Wind Force-Resisting Component: Submit written statement of responsibility for each item listed in the Statement of Special Inspections to AHJ and Owner prior to starting work. Statement of responsibility shall acknowledge awareness of special construction requirements and other requirements listed.

**END OF SECTION**



**SECTION 015000  
TEMPORARY FACILITIES AND CONTROLS****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Temporary utilities.
- B. Temporary sanitary facilities.
- C. Temporary Controls: Barriers, enclosures, and fencing.
- D. Vehicular access and parking.
- E. Waste removal facilities and services.
- F. Project identification sign.
- G. Field offices.

**1.02 TEMPORARY UTILITIES**

- A. Provide and pay for every utility required to complete construction including but not limited to all electrical power, lighting, water, heating, cooling, sanitary, waste, and ventilation. The General Contractor will be required to continue to pay all costs associated with these temporary utilities until a Certificate of Occupancy has been issued from the Authority Having Jurisdiction to the Owner.
- B. Existing facilities may not be used.
- C. Use trigger-operated nozzles for water hoses, to avoid waste of water.

**1.03 TEMPORARY SANITARY FACILITIES**

- A. Provide and maintain required facilities and enclosures. Provide at time of project mobilization.
- B. Use of existing facilities is not permitted.
- C. Maintain daily in clean and sanitary condition.
- D. At end of construction, return facilities to same or better condition as originally found.

**1.04 BARRIERS**

- A. Provide barriers to prevent unauthorized entry to construction areas, to prevent access to areas that could be hazardous to workers or the public and to protect existing facilities and adjacent properties from damage from construction operations and demolition.
- B. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

**1.05 FENCING**

- A. Construction: Commercial grade chain link fence.
- B. Provide 6 foot (1.8 m) high fence around construction site; equip with vehicular and pedestrian gates with locks.

**1.06 EXTERIOR ENCLOSURES**

- A. Provide temporary insulated weather tight closure of exterior openings to accommodate acceptable working conditions and protection for Products, to allow for temporary heating and maintenance of required ambient temperatures identified in individual specification sections, and to prevent entry of unauthorized persons. Provide access doors with self-closing hardware and locks.

**1.07 INTERIOR ENCLOSURES**

- A. Provide temporary partitions as indicated to separate work areas from Owner-occupied areas, to prevent penetration of dust and moisture into Owner-occupied areas, and to prevent damage to existing materials and equipment.

- B. Construction: Framing and reinforced polyethylene sheet materials with closed joints and sealed edges at intersections with existing surfaces:

#### **1.08 SECURITY**

- A. Coordinate with Owner's security program.

#### **1.09 VEHICULAR ACCESS AND PARKING**

- A. Comply with regulations relating to use of streets and sidewalks, access to emergency facilities, and access for emergency vehicles.
- B. Coordinate access and haul routes with governing authorities and Owner.
- C. Provide and maintain access to fire hydrants, free of obstructions.
- D. Provide means of removing mud from vehicle wheels before entering streets.
- E. Existing on-site roads may be used for construction traffic.
- F. Provide temporary parking areas to accommodate construction personnel. When site space is not adequate, provide additional off-site parking.
- G. Do not interrupt, alter, or disrupt bus or parent standard drop off or pick up times, procedures, or operations. Coordinate with Owner.

#### **1.10 WASTE REMOVAL**

- A. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.
- B. Provide containers with lids. Remove trash from site periodically.
- C. If materials to be recycled or re-used on the project must be stored on-site, provide suitable non-combustible containers; locate containers holding flammable material outside the structure unless otherwise approved by the authorities having jurisdiction.
- D. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

#### **1.11 PROJECT IDENTIFICATION**

- A. Provide project identification sign of design and construction to be provided by engineer after award of bid. Sign shall be 4'x8' wood sign mounted on 4"x4" timber posts. Sign shall be full color and shall be removed upon completion of the project. Include all associated costs in bid.
- B. Erect on site at location approved by owner.
- C. No other signs are allowed without Owner permission except those required by law.

#### **1.12 FIELD OFFICES**

- A. Office: Weathertight, with lighting, electrical outlets, heating, cooling equipment, and equipped with sturdy furniture and drawing display table. Must be locked at the end of each work day.
- B. Locate offices a minimum distance of 30 feet (10 m) from existing structures.

#### **1.13 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS**

- A. Remove temporary utilities, equipment, facilities, materials, prior to Date of Substantial Completion inspection.
- B. Remove underground installations to a minimum depth of 2 feet (600 mm). Grade site as indicated.
- C. Clean and repair damage caused by installation or use of temporary work.
- D. Restore existing facilities used during construction to original condition.



**1.14 TEMPORARY STORAGE**

- A. General Contractor will be required to provide lockable temporary storage as required or necessary to complete the job. Existing facilities will not be allowed to be used for storage of any kind.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION - NOT USED**

**END OF SECTION**



**SECTION 015713  
TEMPORARY EROSION AND SEDIMENT CONTROL**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Prevention of erosion due to construction activities.
- B. Prevention of sedimentation of waterways, open drainage ways, and storm and sanitary sewers due to construction activities.
- C. Monitoring and inspection of erosion and sediment control devices.
- D. Restoration of areas eroded due to insufficient preventive measures.
- E. Compensation of Owner for fines levied by authorities having jurisdiction due to non-compliance by Contractor.

**1.02 REFERENCE STANDARDS**

- A. EPA (NPDES) - National Pollutant Discharge Elimination System (NPDES), Construction General Permit; Current Edition.
- B. Mississippi Department of Environmental Quality (MDEQ) Small Construction General Permit.
- C. Mississippi Standard Specifications for Road and Bridge Construction, 2004.

**1.03 PERFORMANCE REQUIREMENTS**

- A. Comply with requirements of EPA (NPDES) for erosion and sedimentation control, as specified by the NPDES, for Phases I and II, and in compliance with requirements of Construction General Permit (CGP), whether the project is required by law to comply or not.
- B. Comply with requirements of State of Mississippi Small Construction General Permit.
- C. Complete a Small Construction Notice of Intent (SCNOI) and all relative forms within the Small Construction General Permit. A copy of the Small Construction General Permit can be obtained from the MDEQ website.
- D. Follow an Storm Water Pollution Prevention Plan.
- E. Submit appropriate monitoring and inspection reports on a monthly basis.
- F. Maintain a copy of the Construction General Permit, Storm Water Pollution Prevention Plan, monitoring reports, and other relative information shall be maintained on the construction site and be made available upon request.
- G. Do not begin clearing, grading, or other work involving disturbance of ground surface cover until applicable permits have been obtained; furnish all documentation required to obtain applicable permits.
- H. Timing: Put preventive measures in place prior to disturbance of surface cover and before precipitation occurs.
- I. Storm Water Runoff: Control increased storm water runoff due to disturbance of surface cover due to construction activities for this project.
  - 1. Prevent runoff into storm and sanitary sewer systems, including open drainage channels, in excess of actual capacity or amount allowed by authorities having jurisdiction, whichever is less.
- J. Erosion On Site: Minimize wind, water, and vehicular erosion of soil on project site due to construction activities for this project.
  - 1. Control movement of sediment and soil from temporary stockpiles of soil.
  - 2. Prevent development of ruts due to equipment and vehicular traffic.
  - 3. If erosion occurs due to non-compliance with these requirements, restore eroded areas at no cost to Owner.

- K. Erosion Off Site: Prevent erosion of soil and deposition of sediment on other properties caused by water leaving the project site due to construction activities for this project.
  - 1. Prevent windblown soil from leaving the project site.
  - 2. Prevent tracking of mud onto public roads outside site.
  - 3. Prevent mud and sediment from flowing onto sidewalks and pavements.
  - 4. If erosion occurs due to non-compliance with these requirements, restore eroded areas at no cost to Owner.
- L. Sedimentation of Waterways On Site: Prevent sedimentation of waterways on the project site, including rivers, streams, lakes, ponds, open drainage ways, storm sewers, and sanitary sewers.
  - 1. If sedimentation occurs, install or correct preventive measures immediately at no cost to Owner; remove deposited sediments; comply with requirements of authorities having jurisdiction.
  - 2. If sediment basins are used as temporary preventive measures, pump dry and remove deposited sediment after each storm.
- M. Sedimentation of Waterways Off Site: Prevent sedimentation of waterways off the project site, including rivers, streams, lakes, ponds, open drainage ways, storm sewers, and sanitary sewers.
  - 1. If sedimentation occurs, install or correct preventive measures immediately at no cost to Owner; remove deposited sediments; comply with requirements of authorities having jurisdiction.
- N. Open Water: Prevent standing water that could become stagnant.
- O. Maintenance: Maintain temporary preventive measures until permanent measures have been established.

#### **1.04 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Inspection Reports: Submit report of each inspection; identify each preventive measure, indicate condition, and specify maintenance or repair required and accomplished. Reports shall be submitted on a monthly basis.

### **PART 2 PRODUCTS**

#### **2.01 MATERIALS**

- A. Mulch: Use one of the following:
  - 1. Straw or hay.
- B. Grass Seed For Temporary Cover: Select a species appropriate to climate, planting season, and intended purpose. If same area will later be planted with permanent vegetation, do not use species known to be excessively competitive or prone to volunteer in subsequent seasons.
- C. Silt Fence Fabric: Silt fence material shall be in accordance with Section 234.02 of the MDOT Specifications.
- D. Large Course Aggregate shall consist of No. 4 Railroad Ballast as approved by the Engineer.

### **PART 3 EXECUTION**

#### **3.01 GENERAL**

- A. Implementation of all stormwater management and pollution prevention items of construction will be accomplished prior to any other construction activities which disturb ANY existing ground surface within the project limits.

#### **3.02 EXAMINATION**

- A. Examine site and identify existing features that contribute to erosion resistance; maintain such existing features to greatest extent possible.

### **3.03 PREPARATION**

- A. Schedule work so that soil surfaces are left exposed for the minimum amount of time.

### **3.04 SCOPE OF PREVENTIVE MEASURES**

- A. In all cases, if permanent erosion resistant measures have been installed temporary preventive measures are not required.
- B. Construction Entrances: Construction entrances/exits shall be constructed of 6" large course aggregate (No. 4 Railroad Ballast) at locations and dimensions shown on the plans and details or as directed by the Engineer.
- C. Perimeter Controls: Made of silt fences. Place Perimeter Controls at locations shown on the drawings or as directed by the Engineer. Generally Perimeters shall be placed along downhill perimeter edge of disturbed areas, including soil stockpiles
- D. Storm Drain Inlet Protection: All storm drain structures and piping within the land disturbance area shall be protected by an appropriate Best Management Practice as detailed on the drawings or as directed by the Engineer.
- E. Soil Stockpiles: Protect using an appropriate Perimeter Control or as directed by the Engineer.
- F. Mulching: Use only for areas that may be subjected to erosion for less than 6 months.
- G. Temporary Seeding: Use where temporary vegetated cover is required.

### **3.05 MAINTENANCE**

- A. Inspect preventive measures weekly, within 24 hours after the end of any storm that produces 0.5 inches (13 mm) or more rainfall at the project site, and daily during prolonged rainfall.
- B. Repair deficiencies immediately.
- C. Clean out temporary sediment control structures weekly and relocate soil on site.
- D. Place sediment in appropriate locations on site; do not remove from site.

### **3.06 CLEAN UP**

- A. Remove temporary measures after permanent measures have been installed, unless permitted to remain by Engineer/Architect.
- B. Clean out temporary sediment control structures that are to remain as permanent measures.
- C. Where removal of temporary measures would leave exposed soil, shape surface to an acceptable grade and finish to match adjacent ground surfaces.

**END OF SECTION**



**SECTION 016000  
PRODUCT REQUIREMENTS****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. General product requirements.
- B. Transportation, handling, storage and protection.
- C. Product option requirements.
- D. Substitution limitations.
- E. Maintenance materials, including extra materials, spare parts, tools, and software.
- F. Non Asbestos containing materials certification.

**1.02 SUBMITTALS**

- A. Refer to Section 013000 Administrative Requirements for additional submittal requirements not indicated herein.
- B. Proposed Products List: Submit list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.
  - 1. Submit within 7 days after date of Agreement of Notice of intent to award, whichever is sooner..
  - 2. For products specified only by reference standards, list applicable reference standards.
- C. Product Data Submittals: Submit manufacturer's standard published data. **Where multiple choices occur on a submittal, it will be the Contractor's responsibility to clearly mark in contrasting color by means of underlining, highlighting, circling, ect... each copy to identify applicable products, models, options, and other data.** Unmarked copies will be rejected and sent back to the General Contractor. Supplement manufacturers' standard data to provide information specific to this Project.
- D. Shop Drawing Submittals: All shop drawings and details MUST be prepared specifically for this project; indicate all materials, all products, all connections, all dimensions, all utility and electrical characteristics, all utility connection requirements, and location of utility outlets for service for functional equipment and appliances. **Canned or Product/Company Typical drawings, unless they specifically apply to the project, will be rejected - No Exceptions.**
- E. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
  - 1. For selection of product finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.
  - 2. All submissions for the choosing of a products color must be physical samples indicating the products true and final color. Digital, web site links, and or printed samples will not be accepted and will be rejected - no expetions.

**PART 2 PRODUCTS****2.01 NEW PRODUCTS**

- A. Provide new products unless specifically required or permitted by Contract Documents.
- B. Use of products having any of the following characteristics is not permitted:
  - 1. Made using or containing CFC's or HCFC's.
  - 2. Containing lead, cadmium, or asbestos.

**2.02 PRODUCT OPTIONS / SUBSTITUTIONS**

- 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.
  - 1. Where more than one manufacturer is specified for a single use, the Drawings have been prepared for the manufacturer/product listed first; and building adjustments may be necessary to accommodate the others. The Contractor will be responsible for any changes in the building construction required due to product selection and shall make any such changes to the satisfaction of the Architect.
- C. If products are specified by naming one or more manufacturers with a provision for substitutions by "or approved equal" or "equal as approved," then the Bidder shall submit a request for substitution for any manufacturer not named **PRIOR TO BIDDING**. It must be approved by the Architect/Engineer through formal addendum in order for it to be accepted as a substitution.
- D. If products are specified by naming one or more manufacturers with a provision for substitutions by "or equal," then the General Contractor after bid award shall submit a request for substitution for any manufacturer not named. After review by the Architect/Engineer, if the substitution manufacturer or product is found not to be equal to those items specified, then the General Contractor will be required to provide those products specified or find an or equal product.

### **2.03 MAINTENANCE MATERIALS**

- A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.
- B. Deliver to Project site; obtain receipt prior to final payment.

## **PART 3 EXECUTION**

### **3.01 SUBSTITUTION LIMITATIONS**

- A. See Section 012500 - Substitution Procedures.
- B. Substitution Submittal Procedure:
  - 1. Submit substitution request at least 10 days prior to bid.
  - 2. The Architect/Engineer will notify all bidders via addendum of decision to accept a request.

### **3.02 TRANSPORTATION AND HANDLING**

- A. Package products for shipment in manner to prevent damage; for equipment, package to avoid loss of factory calibration.
- B. If special precautions are required, attach instructions prominently and legibly on outside of packaging.
- C. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.
- D. Transport and handle products in accordance with manufacturer's instructions.
- E. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.
- F. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.
- G. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage, and to minimize handling.
- H. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

### **3.03 STORAGE AND PROTECTION**

- A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication. See Section 017419.



- B. Store and protect products in accordance with manufacturers' instructions.
- C. Store with seals and labels intact and legible.
- D. Store sensitive products in weathertight, climate-controlled enclosures in an environment favorable to product.
- E. For exterior storage of fabricated products, place on sloped supports above ground.
- F. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.
- G. Comply with manufacturer's warranty conditions, if any.
- H. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
- I. Prevent contact with material that may cause corrosion, discoloration, or staining.
- J. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- K. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

**3.04 PRODUCT CERTIFICATION**

- A. Submit letter on company letterhead and signed by company executive stating and certifying that "This project (insert project name, description, and location) has been completed and that no asbestos containing materials were found at the project site that were not properly remedied and that no new materials were used or installed that contain asbestos." Final pay application will not be processed until certification is received.

**END OF SECTION**



**SECTION 017000  
EXECUTION AND CLOSEOUT REQUIREMENTS**

**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Examination, preparation, and general installation procedures.
- B. Requirements for alterations work, including selective demolition, except removal, disposal, and/or remediation of hazardous materials and toxic substances , \_\_\_\_\_.
- C. Pre-installation meetings.
- D. Cutting and patching.
- E. Cleaning and protection.
- F. Closeout procedures, including Contractor's Correction Punch List, except payment procedures.
- G. General requirements for maintenance service.

**1.02 RELATED REQUIREMENTS**

- A. Section 015000 - Temporary Facilities and Controls: Temporary exterior enclosures.
- B. Section 015000 - Temporary Facilities and Controls: Temporary interior partitions.
- C. Section 078400 - Firestopping.

**1.03 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Demolition Plan: Submit demolition plan as specified by OSHA and local authorities.
  - 1. Indicate extent of demolition, removal sequence, bracing and shoring, and location and construction of barricades and fences. Include design drawings and calculations for bracing and shoring.
  - 2. Identify demolition firm and submit qualifications.
  - 3. Include a summary of safety procedures.
- C. Cutting and Patching: Submit written request in advance of cutting or alteration that 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.
  - 4. Visual qualities of sight exposed elements.
  - 5. Work of Owner or separate Contractor.

**1.04 QUALIFICATIONS**

- A. For asbestos demolition work, employ a firm specializing in the type of work required.
  - 1. Minimum of 5 years of documented experience.
- B. For design of temporary shoring and bracing, employ a Professional Engineer experienced in design of this type of work and licensed in the State in which the Project is located.

**1.05 PROJECT CONDITIONS**

- A. Use of explosives is not permitted.
- B. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.
- C. 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 and over adjacent property.

1. Provide dust-proof barriers between construction areas and areas continuing to be occupied by Owner.
- D. Noise Control: Provide methods, means, and facilities to minimize noise produced by construction operations.
  1. Outdoors: Limit conduct of especially noisy exterior work to the hours of 8 am to 5 pm.
  2. Indoors: Limit conduct of especially noisy interior work to the hours of 6 pm to 7 am.

### **1.06 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. Notify affected utility companies and comply with their requirements.
- C. Verify that utility requirements and characteristics of new 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.
- D. Coordinate space requirements, supports, and installation of mechanical and electrical work that are indicated diagrammatically on drawings. Follow routing indicated 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.
- 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**

### **2.01 PATCHING MATERIALS**

- A. New Materials: As specified in product sections; match existing products and work for patching and extending work.
- B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.
- C. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 016000 - Product Requirements.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of 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. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misfabrication.
- E. Verify that utility services are available, of the correct characteristics, and in the correct locations.
- F. 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.

### **3.02 PREPARATION**

- A. Clean substrate surfaces prior to applying next material or substance.
- B. Seal cracks or openings of substrate 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.

### **3.03 PREINSTALLATION MEETINGS**

- A. When required in individual specification sections, convene a preinstallation meeting at the site prior to commencing work of the section. A preinstall meeting with the contractor, roofing vendor, and Architect/Engineer will be required.
- B. Require attendance of parties directly affecting, or affected by, work of the specific section.
- C. Notify Engineer/Architect four days in advance of meeting date.
- D. Prepare agenda and preside at meeting:
  - 1. Review conditions of examination, preparation and installation procedures.
  - 2. Review coordination with related work.
- E. Record minutes and distribute copies within two days after meeting to participants, with two copies to Engineer/Architect, Owner, participants, and those affected by decisions made.

### **3.04 GENERAL INSTALLATION REQUIREMENTS**

- A. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.
- B. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.
- C. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.
- D. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.
- E. Make neat transitions between different surfaces, maintaining texture and appearance.

### **3.05 ALTERATIONS**

- A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
  - 1. Verify that construction and utility arrangements are as indicated.
  - 2. Report discrepancies to Engineer/Architect before disturbing existing installation.
  - 3. Beginning of alterations work constitutes acceptance of existing conditions.
- B. Keep areas in which alterations are being conducted separated from other areas that are still occupied.
  - 1. Provide, erect, and maintain temporary dustproof partitions of construction specified in Section 015000 in locations indicated on drawings.
- C. Maintain weatherproof exterior building enclosure except for interruptions required for replacement or modifications; take care to prevent water and humidity damage.
  - 1. Where openings in exterior enclosure exist, provide construction to make exterior enclosure weatherproof.
  - 2. Insulate existing ducts or pipes that are exposed to outdoor ambient temperatures by alterations work.
- D. Remove existing work as indicated and as required to accomplish new work.
  - 1. Remove rotted wood, corroded metals, and deteriorated masonry and concrete; replace with new construction specified.
  - 2. Remove items indicated on drawings.
  - 3. Relocate items indicated on drawings.

4. Where new surface finishes are to be applied to existing work, perform removals, patch, and prepare existing surfaces as required to receive new finish; remove existing finish if necessary for successful application of new finish.
  5. Where new surface finishes are not specified or indicated, patch holes and damaged surfaces to match adjacent finished surfaces as closely as possible.
- E. Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications): Remove, relocate, and extend existing systems to accommodate new construction.
1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components; if necessary, modify installation to allow access or provide access panel.
  2. Where existing systems or equipment are not active and Contract Documents require reactivation, put back into operational condition; repair supply, distribution, and equipment as required.
  3. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
    - a. Disable existing systems only to make switchovers and connections; minimize duration of outages.
    - b. Provide temporary connections as required to maintain existing systems in service.
  4. Verify that abandoned services serve only abandoned facilities.
  5. Remove abandoned pipe, ducts, conduits, and equipment, including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification; patch holes left by removal using materials specified for new construction.
- F. Protect existing work to remain.
1. Prevent movement of structure; provide shoring and bracing if necessary.
  2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
  3. Repair adjacent construction and finishes damaged during removal work.
- G. Adapt existing work to fit new work: Make as neat and smooth transition as possible.
1. 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 Engineer/Architect.
  2. Where removal of partitions or walls results in adjacent spaces becoming one, rework floors, walls, and ceilings to a smooth plane without breaks, steps, or bulkheads.
  3. Where a change of plane of 1/4 inch (6 mm) or more occurs in existing work, submit recommendation for providing a smooth transition for Engineer/Architect review and request instructions.
- H. Patching: Where the existing surface is not indicated to be refinished, patch to match the surface finish that existed prior to cutting. Where the surface is indicated to be refinished, patch so that the substrate is ready for the new finish.
- I. Refinish existing surfaces as indicated:
1. Where rooms or spaces are indicated to be refinished, refinish all visible existing surfaces to remain to the specified condition for each material, with a neat transition to adjacent finishes.
  2. If mechanical or electrical work is exposed accidentally during the work, re-cover and refinish to match.
- J. Clean existing systems and equipment.
- K. Remove demolition debris and abandoned items from alterations areas and dispose of off-site; do not burn or bury.
- L. Do not begin new construction in alterations areas before demolition is complete.

- M. Comply with all other applicable requirements of this section.

### **3.06 CUTTING AND PATCHING**

- A. Whenever possible, execute the work by methods that avoid cutting or patching.
- B. See Alterations article above for additional requirements.
- C. Perform whatever cutting and patching is necessary to:
  - 1. Complete the work.
  - 2. Fit products together to integrate with other work.
  - 3. Provide openings for penetration of mechanical, electrical, and other services.
  - 4. Match work that has been cut to adjacent work.
  - 5. Repair areas adjacent to cuts to required condition.
  - 6. Repair new work damaged by subsequent work.
  - 7. Remove samples of installed work for testing when requested.
  - 8. Remove and replace defective and non-complying work.
- D. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.
- E. Employ skilled and experienced installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.
- F. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.
- G. Restore work with new products in accordance with requirements of Contract Documents.
- H. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- I. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material in accordance with Section 078400, to full thickness of the penetrated element.
- J. Patching:
  - 1. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
  - 2. Match color, texture, and appearance.
  - 3. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate prior to repairing finish.

### **3.07 PROGRESS CLEANING**

- A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.
- B. Collect and remove waste materials, debris, and trash/rubbish from site periodically and dispose off-site; do not burn or bury.

### **3.08 PROTECTION OF INSTALLED WORK**

- A. Protect installed work from damage by construction operations.
- B. Provide special protection where specified in individual specification sections.
- C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.
- D. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
- E. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.

- F. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.
- G. Remove protective coverings when no longer needed; reuse or recycle coverings if possible.

### **3.09 FINAL CLEANING**

- A. Execute final cleaning after Substantial Completion but before making final application for payment.
  - 1. Clean areas to be occupied by Owner prior to final completion before Owner occupancy.
- B. Use cleaning materials that are nonhazardous.
- C. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces,
- D. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.
- E. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.
- F. Clean filters of operating equipment.
- G. Clean debris from roofs, gutters, downspouts, scuppers, and overflow drains.
- H. Clean site; sweep paved areas, rake clean landscaped surfaces.
- I. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

### **3.10 CLOSEOUT PROCEDURES**

- A. Make submittals that are required by governing or other authorities.
  - 1. Provide copies to Engineer/Architect and Owner.
- B. Accompany Project Coordinator on preliminary inspection to determine items to be listed for completion or correction in the Contractor's Correction Punch List for Contractor's Notice of Substantial Completion.
- C. Notify Engineer/Architect when work is considered ready for Engineer/Architect's Substantial Completion inspection.
- D. Submit written certification containing Contractor's Correction Punch List, that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Engineer/Architect's Substantial Completion inspection.
- E. Conduct Substantial Completion inspection and create Final Correction Punch List containing Engineer/Architect's and Contractor's comprehensive list of items identified to be completed or corrected and submit to Engineer/Architect.
- F. Correct items of work listed in Final Correction Punch List and comply with requirements for access to Owner-occupied areas.
- G. Notify Engineer/Architect when work is considered finally complete and ready for Engineer/Architect's Substantial Completion final inspection.
- H. Complete items of work determined by Engineer/Architect listed in executed Certificate of Substantial Completion.

### **3.11 MAINTENANCE**

- A. Provide service and maintenance of components indicated in specification sections.
- B. Maintenance Period: As indicated in specification sections or, if not indicated, not less than 2 years from the Date of Substantial Completion or the length of the specified warranty,



whichever is longer.

- C. Maintenance service shall not be assigned or transferred to any agent or subcontractor without prior written consent of the Owner.

**END OF SECTION**



**SECTION 017800  
CLOSEOUT SUBMITTALS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Project record documents.
- B. Operation and maintenance data.
- C. Warranties and bonds.

**1.02 RELATED REQUIREMENTS**

- A. Section 007200 - General Conditions and 007300 - Supplementary Conditions: Performance bond and labor and material payment bonds, warranty, and correction of work.
- B. Section 013000 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.
- C. Section 017000 - Execution and Closeout Requirements: Contract closeout procedures.
- D. Individual Product Sections: Specific requirements for operation and maintenance data.
- E. Individual Product Sections: Warranties required for specific products or Work.

**1.03 SUBMITTALS**

- A. Project Record Documents: Submit documents to Engineer/Architect with claim for final Application for Payment.
- 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 one copy of completed documents 15 days prior to final inspection. This copy will be reviewed and returned after final inspection, with Engineer/Architect 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 10 days after acceptance.
  - 2. Make other submittals within 10 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 10 days after acceptance, listing the date of acceptance as the beginning of the warranty period.

**PART 3 EXECUTION**

**2.01 PROJECT RECORD DOCUMENTS**

- A. Maintain on site one set of the following record documents; record actual revisions to the Work:
  - 1. Drawings.
  - 2. Addenda.
  - 3. Change Orders and other modifications to the Contract.
- B. Ensure entries are complete and accurate, enabling future reference by Owner.
- C. Store record documents separate from documents used for construction.
- D. Record information concurrent with construction progress.
- E. Record Drawings: Legibly mark each item to record actual construction including:
  - 1. Field changes of dimension and detail.

2. Details not on original Contract drawings.

## **2.02 OPERATION AND MAINTENANCE DATA**

- A. Source Data: 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.
- D. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

## **2.03 OPERATION AND MAINTENANCE DATA FOR MATERIALS AND FINISHES**

- A. For Each Product, Applied Material, and Finish:
  1. Product data, with catalog number, size, composition, and color and texture designations.
  2. Information for re-ordering custom manufactured products.
- B. Instructions for Care and Maintenance: Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental cleaning agents and methods, and recommended schedule for cleaning and maintenance.
- C. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

## **2.04 WARRANTIES AND BONDS**

- A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within 10 days after completion of the applicable item of work. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Date of Substantial completion is determined.
- B. Verify that documents are in proper form, contain full information, and are notarized.
- C. Co-execute submittals when required.
- D. Retain warranties and bonds until time specified for submittal.

**END OF SECTION**

**SECTION 030516  
UNDERSLAB VAPOR BARRIER - STEGO****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Sheet vapor barrier under concrete slabs on grade.

**1.02 RELATED REQUIREMENTS**

- A. Section 033000 - Cast-in-Place Concrete: Preparation of subgrade, granular fill, placement of concrete.

**1.03 REFERENCE STANDARDS**

- A. ASTM E1643 - Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs; 2018a.
- B. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs; 2017 (Reapproved 2023).

**1.04 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Submit manufacturers' data on manufactured products.
- C. Samples: Submit samples of underslab vapor barrier to be used.
- D. Manufacturer's Installation Instructions: Indicate installation procedures and interface required with adjacent construction.

**PART 2 PRODUCTS****2.01 MATERIALS**

- A. Underslab Vapor Barrier:
  - 1. Water Vapor Permeance: Not more than 0.010 perms (0.6 ng/(s m<sup>2</sup> Pa)), maximum.
  - 2. Complying with ASTM E1745 Class A.
  - 3. Thickness: 15 mils (0.4 mm).
  - 4. Basis of Design:
    - a. Stego Industries LLC; Stego Wrap Vapor Barrier (15-mil): [www.stegoindustries.com/#sle](http://www.stegoindustries.com/#sle).
    - b. Tex-Trude; XTreme Vapor Barrier (15 mil): [www.textrude.com](http://www.textrude.com)
    - c. Raven Industries; Vaporblock VB15 (15 mil blue); [www.ravenind.com](http://www.ravenind.com).
    - d. Insulation Solutions; Viper II (15 mil blue); [insulationsolutions.com](http://insulationsolutions.com).
    - e. Husky / Poly-America; Yellow Guard Vapor Barrier (15 mil): [www.yellowguard.com](http://www.yellowguard.com)
    - f. Substitutions: See Section 016000 - Product Requirements.
- B. Accessory Products: Vapor barrier manufacturer's recommended tape, adhesive, mastic, etc., for sealing seams and penetrations in vapor barrier.
  - 1. Seam Tape:
    - a. Water Vapor Transmission Rate: ASTM E 96, 0.3 perms or lower
    - b. Stego Industries LLC; Stego Tape Or Equal.
  - 2. Vapor Proofing Mastic:
    - a. Water Vapor Transmission Rate: ASTM E 96, 0.3 perms or lower
    - b. Stego Industries LLC; Stego Mastic Or Equal.

**PART 3 EXECUTION****3.01 EXAMINATION**

- A. Verify that surface over which vapor barrier is to be installed is complete and ready before proceeding with installation of vapor barrier.

### **3.02 INSTALLATION**

- A. Install vapor barrier in accordance with manufacturer's instructions and ASTM E1643.
- B. Install vapor barrier under interior slabs on grade; lap sheet over footings and seal to foundation walls.
- C. Unroll vapor barrier with the longest dimension parallel with the direction of the pour.
- D. Lap joints minimum 6 inches (150 mm) and seal with manufacturer's approved tape.
- E. Seal joints, seams and penetrations watertight with manufacturer's recommended products and follow manufacturer's written instructions.
- F. No penetration of vapor barrier is allowed except for reinforcing steel and permanent utilities.
- G. Repair damaged vapor retarder before covering with other materials. Repair damaged areas by cutting patches of vapor retarder, overlapping damaged area 6 inches minimum and taping all four sides with tape.

**END OF SECTION**

**SECTION 031000  
CONCRETE FORMING AND ACCESSORIES**

**PART 1 - GENERAL**

**1.01 RELATED SECTIONS**

- A. Division 01 Sections
- B. Section 03 20 00 - Concrete Reinforcing.
- C. Section 03 30 00 – Cast-in-Place Concrete.

**1.02 REFERENCES**

- A. ACI 117 – Standard Specifications for Tolerances for Concrete Construction and Materials.
- B. ACI 301 – Standard Specifications for Structural Concrete.
- C. ACI 318 – Building Code Requirements for Structural Concrete.
- D. ACI 347 – Guide to Formwork for Concrete.
- E. ASTM D1751 – Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types).
- F. ASTM E1643 – Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.
- G. ASTM E1745 – Standard Specification for Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs.
- H. ASTM E1993 – Standard Specification for Bituminous Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs.
- I. ASTM F1249 – Standard Test Method for Water Vapor Transmission Rate Through Plastic Film and Sheeting Using a Modulated Infrared Sensor.

**1.03 SUBMITTALS**

- A. Submit locations of construction joints in framed construction for approval.
- B. Submit manufacturer's data for:
  - 1. Expansion/Isolation Joint Filler.
  - 2. Water stops.
- C. Submit formwork shop drawings signed and sealed by an engineer licensed in the Project state. Shop Drawings should include stripping and reshoring procedure with indication of time period required between placement of concrete and removal of formwork.

**1.04 DESIGN OF FORMWORK**

- A. Design of formwork, shoring, and reshoring and its removal is the Contractor's responsibility.
- B. Design of formwork, shoring, and reshoring shall conform to ACI 117, ACI 301, ACI 318, and ACI 347.
- C. Design formwork in a manner such that existing or new construction is not overloaded.
- D. Formwork shall be designed by an engineer licensed in the Project state.

**PART 2 - PRODUCTS**

**2.01 FORM MATERIALS**

- A. Form Material: Wood, plywood, metal, fiberglass or a combination of these, with sufficient strength to prevent distortion.
- B. Form Definitions
  - 1. Standard Forms: No form-facing material required. Standard forms are acceptable everywhere except for Architectural Concrete elements.

2. Architectural Concrete Forms: Form-facing material shall be plywood, tempered concrete-form-grade hardboard, metal (un-rusted) or plastic that will produce a smooth, uniform texture on the concrete. Do not use form-facing material with raised grain, torn edges, worn edges, patches, dents, or other defects that will impair the texture of the exposed concrete surfaces. Intent is that when the forms are removed, the exposed concrete surfaces will be free from all blemishes. Architectural concrete forms are required for all concrete elements indicated as Architectural Concrete.

## **2.02 FORMWORK ACCESSORIES**

- A. Formwork Accessories: Commercially manufactured products, including ties and hangers. Do not use nonfabricated wire form ties.

## **2.03 FORM RELEASE AGENT**

- A. Form release agent shall not bond with, stain, nor adversely affect concrete surfaces.

## **2.04 VAPOR RETARDER**

- A. Refer to Division 7 Section "Vapor Retarders".

## **2.05 EXPANSION / ISOLATION JOINT FILLER**

- A. Expansion/Isolation Joint Filler: ASTM D1751, asphalt impregnated pre-molded fiberboard, 1/4-inch thick by full thickness of slab or joint, unless indicated otherwise in the Structural Drawings.

## **2.06 CONSTRUCTION JOINTS**

- A. Slabs-On-Grade: Steel plate dowel (1/4-inch thick) such as manufactured by PNA Construction Technologies, Inc., Greenstreak Group, Inc., or approved equal.
  1. Plate Thickness: 1/4-inch thick for slabs up to 6 inches in thickness; 3/8-inch for slabs over 6 inches and up to 8 inches in thickness; 3/4-inch thick for slabs over 8 inches in thickness and up to 12 inches in thickness.

## **2.07 WATER STOPS**

- A. Water stops at construction joints and contraction joints indicated in the Structural Drawings shall be sized to suit the joints.

## **2.08 DOVETAIL ANCHORS**

- A. Dovetail Anchors: 22 gauge galvanized steel dovetail anchoring slots with filler strips and 16 gauge galvanized dovetail anchors, comparable to the Dur-O-Wal D/A 131 seismic dovetail anchor assembly (or approved equal), unless otherwise noted in Structural Drawings.

## **PART 3 – EXECUTION**

### **3.01 GENERAL**

- A. Erect formwork in accordance with ACI 301 and ACI 347.
- B. Finished work shall comply with tolerances of ACI 117.
- C. Provide 3/4-inch chamfer at all formed corners.

### **3.02 FOUNDATION ELEMENTS**

- A. Form foundation elements if soil or other conditions are such that earth trench forms are unsuitable.
- B. Sides of perimeter grade beams, foundation walls, and turned-down slabs shall be formed.
- C. Maintain minimum coverage of reinforcing steel as indicated in Structural Drawings.

### **3.03 VAPOR RETARDER**

- A. Where indicated on Structural Drawings, place vapor retarder over granular subbase and behind expansion / isolation joints at walls. Place electrical conduits and ducts in granular subbase.
- B. Refer to Division 7 Section "Vapor Retarders".



**3.04 FORM PREPARATION**

- A. Seal form joints to prevent leakage.
- B. Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt or other debris just before concrete is placed.
- C. Before reinforcement is placed, coat contact surfaces of form with form release agent in accordance with manufacturer's recommendations. Do not allow excess form release agent to accumulate in forms or come in contact with concrete surfaces against which fresh concrete will be placed.

**3.05 INSERTS AND EMBEDMENT ITEMS**

- A. Install and secure in position required inserts, embeds, hangers, sleeves, anchors, and nailers.
- B. Locate anchor bolts/rods in position in accordance with approved setting drawings and secure to prevent displacement during concrete placement.

**3.06 PROVISIONS FOR OTHER TRADES**

- A. Install openings in concrete formwork to accommodate work of other trades. Determine size and location of openings and recesses from trades requiring such items. Obtain approval from Structural Engineer for openings not shown in Structural Drawings.
- B. Accurately place and securely support items built into forms.

**3.07 CONSTRUCTION JOINTS**

- A. Slabs-On-Grade: Install steel plate dowels in accordance with manufacturer's recommendations. Place plate dowels at mid-depth of slab (+/-1/4-inch), unless noted otherwise in the Structural Drawings.
- B. Framed Construction:
  - 1. Install construction joints in accordance with ACI 318.
  - 2. Obtain Architect/Structural Engineer's prior approval for use and location of joints.
  - 3. Provide 1½-inch deep key-type construction joints at end of each placement for framed slabs, beams, walls, and footings. Bevel forms for easy removal.
  - 4. Remove loose particles and latency from surface prior to placing the next lift. Chip the surface to a depth sufficient to expose sound concrete.

**3.08 WATERSTOPS**

- A. Install PVC water stops in accordance with manufacturer's recommendations.

**3.09 DOVETAILS**

- A. Install continuous vertical dovetail anchoring slots with filler strips at intersections of concrete and masonry walls unless indicated otherwise on Drawings.

**3.10 FORMWORK REMOVAL**

- A. Remove formwork carefully in such manner and at such time as to ensure complete safety of structure. Do not remove formwork, shoring, or reshoring until members have acquired sufficient strength to support their weight and the load thereon safely.
- B. For conventionally reinforced framed slabs, formwork shall remain in place for a minimum of 5 days after concrete placement.

**3.11 FINISHES OF FORMED SURFACES**

- A. Standard Form Finish: Patch tie holes and defects. Chip or rub off fins exceeding 1/4 inch in height. Leave surface with the texture imparted by the forms.

**END OF SECTION**



**SECTION 032000  
CONCRETE REINFORCEMENT**

**PART 1 - GENERAL**

**1.01 RELATED SECTIONS**

- A. Division 1 Sections
- B. Section 03 10 00 – Concrete Forming and Accessories.
- C. Section 03 30 00 – Cast-in-Place Concrete.

**1.02 REFERENCES**

- A. ACI 117 – Standard Specifications for Tolerances for Concrete Construction and Materials.
- B. ACI 301 – Standard Specifications for Structural Concrete.
- C. ACI 315 – Details and Detailing of Concrete Reinforcement.
- D. ACI 318 – Building Code Requirements for Structural Concrete.
- E. ASTM A185 – Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete Reinforcement.
- F. ASTM A615 – Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
- G. ASTM A706 – Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.
- H. AWS D1.4 – Structural Weld Code - Reinforcing Steel.
- I. AWS D12.1 – Recommended Practices for Welding Reinforcing Steel Metal Inserts, and Connections in Reinforced Concrete Construction.
- J. CRSI – Manual of Standard Practice.

**1.03 SUBMITTALS**

- A. Shop Drawings:
  - 1. Notify Structural Engineer prior to detailing reinforcing steel shop drawings.
  - 2. Indicate size, spacing, location and quantities of reinforcing steel and wire fabric, bending and cutting schedules, splice lengths, stirrup spacing, supporting and spacing devices. Detail reinforcing steel in accordance with ACI 315 and CRSI Standards.
  - 3. Written description of reinforcement without adequate sections, elevations, and details is not acceptable.
  - 4. Reproduction of Structural Drawings for shop drawings is not permitted. Electronic drawing files will not be provided to the Contractor.
- B. Submit manufacturer's data for tension and compression splicers.

**1.04 STORAGE AND PROTECTING**

- A. Store reinforcing steel above ground so that it remains clean. Maintain steel surfaces free from materials and coatings that might impair bond.

**PART 2 - PRODUCTS**

**2.01 MATERIALS**

- A. Deformed Reinforcing Steel: ASTM A615, refer to Structural Drawings for grade (Grade 60 minimum).
- B. Welded Steel Wire Fabric: ASTM A185.

**2.02 DOWEL BAR ANCHORS (DBA)**

- A. Provide DBA anchors similar to Nelson Stud Welding. Deformed bars shall be USNRC approved. AWS D1.1 Structural Welding Code. ASTM A – 496 Steel Wire, Deformed for

Concrete Reinforcement.

### **2.03 ACCESSORY MATERIALS**

- A. Annealed Steel Tie Wire: 16.5 gauge minimum.
- B. Bar Supports: Plastic-tipped steel Class I bar supports conforming to CRSI Specifications. Concrete brick may be used to support reinforcement to obtain proper clearance from earth.

### **2.04 SPLICERS**

- A. Tension Splicers: Capable of developing 125% of the reinforcing steel ASTM specified minimum yield strength.
- B. Compression Splicers: Mechanical type such that the compression stress is transmitted by end bearing held in concentric contact.

## **PART 3 - EXECUTION**

### **3.01 FABRICATION**

- A. Fabricate reinforcing steel in accordance with ACI 318 and CRSI standards.
- B. Bend bars cold. Do not heat or flame cut bars. No field bending of bars partially embedded in concrete is permitted, unless specifically approved Structural Engineer and checked by Testing and Inspection Agency for cracks.
- C. Weld only as indicated. Perform welding in accordance with AWS D1.4 and AWS D12.1.
- D. Tag reinforcing steel for easy identification.

### **3.02 INSTALLATION**

- A. Before placing concrete, clean reinforcement of foreign particles and coatings.
- B. Place, support, and secure reinforcement against displacement in accordance with ACI 318 and CRSI standards. Do not deviate from alignment or measurement.
- C. Place concrete beam reinforcement support parallel to main reinforcement.
- D. Locate welded wire reinforcement in the top third of slabs. Overlap mesh one lap plus two inches at side and end joints.
- E. Furnish and install dowels or mechanical splices at intersections of walls, columns and piers to permit continuous reinforcement or development lengths at such intersections.
- F. Maintain cover and tolerances in accordance with ACI and CRSI Specifications, unless indicated otherwise on Structural Drawings.

### **3.03 DOWEL BAR ANCHORS (DBA)**

- A. Dowel bar anchors (DBA) shall be stud welded to embed plates and are NOT permitted to be fillet welded.

### **3.04 SPLICES**

- A. Do not splice reinforcement except as indicated on Structural Drawings.
- B. Tension couplers may be used and installed in accordance with manufacturer's recommendations.

### **3.05 DOWELS IN EXISTING CONCRETE**

- A. Install dowels and dowel adhesive in accordance with manufacturer's recommendations.
- B. Minimum embedment length into the existing concrete shall be 12 bar diameters, unless noted otherwise.

**END OF SECTION**

**SECTION 033000  
CAST-IN-PLACE CONCRETE**

**PART 1 - GENERAL**

**1.01 RELATED SECTIONS**

- A. Division 1 Sections
- B. Section 03 10 00 – Concrete Forming and Accessories.
- C. Section 03 20 00 – Concrete Reinforcement.
- D. Section 03 60 00 – Non-Shrink Grouting.

**1.02 REFERENCES**

- A. ACI 117 – Standard Specifications for Tolerances for Concrete Construction and Materials.
- B. ACI 214 – Recommended Practice for Evaluation of Strength Test Results of Concrete.
- C. ACI 301 – Specifications for Structural Concrete.
- D. ACI 302.1 – Guide for Concrete Floor and Slab Construction.
- E. ACI 304 – Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete.
- F. ACI 305 – Hot Weather Concreting.
- G. ACI 306 – Cold Weather Concreting.
- H. ACI 308 – Guide to Concrete Curing.
- I. ACI 309 – Recommended Practice for Consolidation of Concrete.
- J. ACI 318 – Building Code Requirements for Reinforced Concrete.
- K. ASTM C31 – Standard Practice for Making and Curing Concrete Test Specimens in the Field.
- L. ASTM C33 – Standard Specification for Concrete Aggregates.
- M. ASTM C39 – Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
- N. ASTM C94 – Standard Specification for Ready-Mixed Concrete.
- O. ASTM C138 – Standard Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete.
- P. ASTM C143 – Standard Test Method for Slump of Hydraulic-Cement Concrete.
- Q. ASTM C150 – Standard Specification for Portland Cement.
- R. ASTM C172 – Standard Practice for Sampling Freshly Mixed Concrete.
- S. ASTM C173 – Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
- T. ASTM C230 – Standard Specification for Flow Table for Use in Tests of Hydraulic Cement.
- U. ASTM C260 – Standard Specification for Air-Entraining Admixtures for Concrete.
- V. ASTM C309 – Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
- W. ASTM C494 – Standard Specification for Chemical Admixtures for Concrete.
- X. ASTM C618 – Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
- Y. ASTM E1155 – Standard Test Method for Determining FF Floor Flatness and FL Floor Levelness Numbers.

**1.03 SUBMITTALS**

- A. Submit three copies of the concrete mix designs. Include the following:
  - 1. Documentation of mix design proportions complying with ACI 318, Chapter 5.
  - 2. Type and quantities of materials including admixtures
  - 3. Slump
  - 4. Air content
  - 5. Water/cement ratio
  - 6. Fresh unit weight
  - 7. Aggregates sieve analysis
  - 8. Design compressive strength
  - 9. Location of placement in structure
  - 10. Method of placement
  - 11. Method of curing
  - 12. Seven-day and 28-day compressive strengths
  - 13. Mix design submittals not conforming to the above will be rejected.
- B. Polished Concrete: The concrete mix design for slabs receiving a polished finish shall be reviewed and approved by the polished concrete contractor.

**1.04 QUALITY ASSURANCE**

- A. The ready-mixed concrete plant shall be certified for conformance with the requirements of the National Ready Mix Concrete Association.

**PART 2 - PRODUCTS****2.01 CONCRETE MIX DESIGN**

- A. Normal Weight Concrete for foundations:
  - 1. Compressive Strength, when tested in accordance with ASTM C39/C39M at 28 days: 4,000 pounds per square inch minimum. Refer to Structural Drawings for concrete compressive strength requirements.
  - 2. Fly Ash Content: Maximum 15 percent of cementitious materials by weight.
  - 3. Cement Content: Minimum 520 lb per cubic yard.
  - 4. Water-Cement Ratio: Maximum 50 percent by weight.
  - 5. Total Air Content for foundation concrete: 4 percent, determined in accordance with ASTM C173/C173M.
  - 6. Maximum Slump: 4 inches +/- 1".
  - 7. Maximum Aggregate Size: 1.5 inch.
- B. Normal Weight Concrete for flatwork:
  - 1. Compressive Strength, when tested in accordance with ASTM C39/C39M at 28 days: Refer to Structural Drawings for concrete compressive strength requirements.
  - 2. Fly Ash Content: Not allowable.
  - 3. Cement Content: Minimum 520 lb per cubic yard.
  - 4. Water-Cement Ratio: Maximum 42 percent by weight.
  - 5. Total Air Content for flatwork concrete: Do not allow air content of troweled finished floors to exceed 3 percent.
  - 6. Maximum Slump: 4 inches +/- 1".
  - 7. Maximum Aggregate Size: 5/8 inch.

**2.02 MATERIALS**

- A. Materials designated by specific manufacturer's trade names are approved, subject to compliance with the quality and performance indicated by the manufacturer. Instructions and recommendations, published by the manufacturer of such materials are included in and are a part of these Specifications.

**2.03 CEMENT**

- A. Cement: Type I Portland cement complying with ASTM C150, unless noted otherwise. Use one brand only.

**2.04 AGGREGATE**

- A. Fine Aggregate: Fine aggregate complying with ASTM C33.
- B. Coarse Aggregate: Gravel or crushed stone complying with ASTM C33 for normal weight concrete. Size coarse aggregate in accordance with ACI 318.
- C. Polished Concrete Aggregate: Aggregate shall be a limestone aggregate and not a river rock.

**2.05 WATER**

- A. Water: Potable water free of deleterious substances complying with ACI 318.

**2.06 AIR ENTRAINING AGENT****2.07 WATER REDUCER**

- A. Water Reducer: Water reducing agent complying with ASTM C494.

**2.08 MID-RANGE/HIGH-RANGE WATER REDUCER**

- A. Mid-range/High-range Water Reducer: Mid-range and high-range water reducers (plasticizers) complying with ASTM C494.

**2.09 CHLORIDE**

- A. Chlorides: Chlorides of any form shall not be used in concrete.

**2.10 CURING COMPOUND**

- A. Curing Compound: A water-based, "odorless," acrylic curing compound with a minimum solid content of 20 percent may be used at the Contractor's option complying with ASTM C309.

**2.11 FLY ASH**

- A. Fly Ash: Class F fly ash with a loss on ignition of less than five percent or Class C fly ash with a loss on ignition of less than one percent complying with ASTM C618. Fly Ash type F or C, 20 percent maximum

**2.12 ACCELERATORS**

- A. Accelerators: Non-chloride accelerators complying with ASTM C494.

**2.13 RETARDERS**

- A. Retarders: Retarders complying with ASTM C494.

**PART 3 - EXECUTION****3.01 GENERAL**

- A. Prepare place of deposit, mix, convey, and place in accordance with ACI 301 and ACI 304.
- B. Wet forms before placing concrete.
- C. Deposit concrete as near as practical to final position.
- D. Do no flowing of concrete with vibrators.
- E. Place slabs in accordance with ACI 302.
- F. Place and finish concrete members to comply with tolerances in ACI 117.
- G. Do not use aluminum equipment in placing and finishing concrete.

**3.02 SLABS-ON-GRADE**

- A. Place concrete for slabs-on-grade on properly prepared granular subbase with vapor barrier.
- B. Place thickened slabs for partitions integral with floor slabs.

**3.03 MID-RANGE / HIGH-RANGE WATER REDUCERS**

- A. Mid-range or high-range water reducers are to be added at dosage recommended by the manufacturer. The slump of the concrete shall be one to four inches at the time the water reducers are added. Do not permit fresh concrete containing superplasticizers to come in contact with fresh concrete not containing superplasticizers.

**3.04 ADDITION OF WATER AT JOB SITE**

- A. Water may be added at the jobsite if neither the maximum permissible water/cement ratio nor the maximum slump is exceeded. All concrete delivery trucks will have actual batch weight tickets available that clearly indicate the quantity of water that may be added at the jobsite that will not exceed the maximum water/cement ratio.

**3.05 TIME LIMIT**

- A. Deposit concrete within one and one-half hours after batching.

**3.06 VIBRATION**

- A. Consolidate concrete in accordance with ACI 301 and ACI 309.

**3.07 CURING**

- A. Begin curing procedures immediately following the commencement of the finishing operation.
- B. Cure concrete in accordance with ACI 308. Keep the concrete surface moist.
- C. If an acrylic curing compound is used, apply in accordance with manufacturer's recommendations to surfaces of concrete not protected for five days by formwork. Do not use curing compound in areas to receive material that does not adhere to concrete cured with a curing compound unless the curing compound is water-soluble.

**3.08 WEATHER PROVISIONS**

- A. Perform cold weather concreting in accordance with ACI 306.
- B. Perform hot weather concreting in accordance with ACI 305.
- C. Protect concrete from drying and excessive temperature for the first seven days.
- D. Protect fresh concrete from wind.

**3.09 CONTRACTION JOINTS**

- A. Obtain Architect/Structural Engineer's approval for location of contraction joints. Do not use contraction joints in framed floors or composite slabs, unless noted in Structural Drawings.
- B. Provide contraction joints in slabs-on-grade to form a regular grid with a maximum spacing as noted in the Structural Drawings. The long dimension of the grid shall not exceed 1.5 times the short dimension of the grid. Contraction joints shall be hand tooled.
- C. Provide contraction joints in concrete walls at approximately 30'-0" centers, or as noted in the Structural Drawings; coordinate location with Architect. Contraction joints shall be formed as a V-groove on both faces of the wall, 3/4-inch minimum depth.

**3.10 CUTTING CONCRETE**

- A. Obtain Architect/Structural Engineer's written approval prior to cutting concrete for installation of other work.

**3.11 PATCHWORK AND REPAIRS**

- A. Notify Architect/Structural Engineer of any defective areas in concrete to be patched or repaired. Repair and patch defective areas with non-shrink grout. Cut out defective areas over 2 inches in diameter to solid concrete but not less than a depth of one inch. Make edges of cuts perpendicular to the concrete surface.



### **3.12 CONCRETE FINISHES**

- A. Finish Concrete in accordance with ACI 301.
- B. All slabs, including roof slabs, shall be troweled finish, unless noted otherwise.
- C. Finish slabs to the following flatness and levelness tolerances:
  - 1. FF25/FL20 minimum overall for composite of all measured values and FF17/FL12 minimum for any individual floor section.
  - 2. Slabs to receive wood flooring: FF45/FL30 minimum overall for composite of all measured values and FF30/FL20 minimum for any individual floor section.
  - 3. Architect/Structural Engineer will identify which sections of slabs are to be tested for flatness and levelness.
    - a. FL values are applicable only if testing is performed within 72 hours of concrete placement, before tensioning of tendons, and before removal of formwork.
    - b. FF values are applicable to all types of slab construction and are not subject to any time constraints.

**END OF SECTION**



**SECTION 036200  
NON-SHRINK GROUTING**

**SECTION II – NON-SHRINK GROUTING**

**PART 1 - GENERAL**

**PART 2 - PRODUCTS**

**2.01 GROUT**

- A. Grout: Flowable, non-shrink, non-metallic in accordance with CRD-C-621 and ASTM C1107.
- B. Compressive Strength: 5,000 psi minimum at 28 days.

**2.02 WATER**

- A. Water: Clean, potable water.

**PART 3 - EXECUTION**

**3.01 HANDLING**

- A. Store and protect from moisture and contamination.

**3.02 PREPARATION**

- A. Remove foreign materials including mud and dirt from areas to be grouted.
- B. Use forms to contain grout. Forms shall be a minimum 1½ inch larger on all sides than the item grouted.

**3.03 MIXING**

- A. Mix grout to its fluid, self-leveling consistency in accordance with manufacturer's recommendations. Mix grout in a paddle-type mortar mixer; do not mix by hand.
- B. Do not re-temper grout. Do not exceed manufacturer's maximum limit on water content or use at a consistency that produces free bleeding.

**3.04 PLACEMENT**

- A. Consolidate to provide grout uniformity. Do not vibrate grout.

**3.05 PROTECTION**

- A. Protect grout and areas to be grouted from excessive heat and cold in accordance with manufacturer's Specifications. Protect grout from excessive drying shrinkage resulting from wind or direct sunlight. Protect areas grouted from excessive vibrations.

**END OF SECTION**



**SECTION 061000  
ROUGH CARPENTRY**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Preservative treated wood materials.
- B. Communications and electrical room mounting boards.
- C. Concealed wood blocking, nailers, and supports.
- D. Miscellaneous wood nailers, furring, and grounds.

**1.02 RELATED REQUIREMENTS**

**1.03 REFERENCE STANDARDS**

- A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.
- B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023.
- C. AWPA U1 - Use Category System: User Specification for Treated Wood; 2018.
- D. PS 1 - Structural Plywood; 2023.
- E. PS 2 - Performance Standard for Wood Structural Panels; 2018.
- F. PS 20 - American Softwood Lumber Standard; 2021.
- G. SPIB (GR) - Grading Rules; 2014.

**1.04 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide technical data on wood preservative materials and application instructions.

**1.05 DELIVERY, STORAGE, AND HANDLING**

- A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation. Provide for air circulation around stacks and under coverings.
- B. Fire Retardant Treated Wood: Prevent exposure to precipitation during shipping, storage, and installation.

**PART 2 PRODUCTS**

**2.01 GENERAL REQUIREMENTS**

- A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
  - 1. Southern Yellow Pine or Douglas Fir of following species and grades:
    - a. Structural Light Framing: Stress Group 1500 F, #2 Dense KD Grade.
    - b. Non-structural framing: Stress Group 1500 F.
  - 2. Grading Agency: Grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee at [www.alsc.org](http://www.alsc.org), and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.
- B. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.

**2.02 DIMENSION LUMBER**

- A. Grading Agency: Southern Pine Inspection Bureau, Inc; SPIB (GR).

### 2.03 CONSTRUCTION PANELS

- A. Communications and Electrical Room Mounting Boards: PS 1 A-D plywood, or medium density fiberboard; 3/4 inch (19 mm) thick; flame spread index of 25 or less, smoke developed index of 450 or less, when tested in accordance with ASTM E84.

### 2.04 ACCESSORIES

- A. Fasteners and Anchors:
  - 1. Provide fasteners of size and type indicated that comply with requirements specified for material and manufacture.
  - 2. Metal and Finish: Hot-dipped galvanized steel complying with ASTM A153/A153M for high humidity and preservative-treated wood locations, unfinished steel elsewhere.
  - 3. Nails, Wire, Brads, and Staples: FS FF-N-105.
  - 4. Power-Driven Fasteners: CABO NER-272.
  - 5. Bolts: Steel bolts complying with ASTM A 307, Grade A with ASTM A 563 hex nuts and, where indicated, flat washers.
  - 6. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.
    - a. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.

### 2.05 FACTORY WOOD TREATMENT

- A. Treated Lumber and Plywood: Comply with requirements of AWWA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.
  - 1. Fire-Retardant Treated Wood: Mark each piece of wood with producer's stamp indicating compliance with specified requirements.
  - 2. Preservative-Treated Wood: Provide lumber and plywood marked or stamped by an ALSC-accredited testing agency, certifying level and type of treatment in accordance with AWWA standards.
- B. Preservative Treatment:
  - 1. Preservative Pressure Treatment of Lumber Above Grade: AWWA U1, Use Category UC3B, Commodity Specification A using waterborne preservative.
    - a. Kiln dry lumber after treatment to maximum moisture content of 19 percent.
    - b. Treat lumber exposed to weather.
    - c. Treat lumber in contact with roofing, flashing, or waterproofing.
    - d. Treat lumber in contact with masonry or concrete.
    - e. Treat lumber less than 18 inches (450 mm) above grade.
    - f. Treat lumber in other locations as indicated on the drawings.
  - 2. Preservative Pressure Treatment of Plywood/Sheathing Above Grade: AWWA U1, Use Category UC2 and UC3B, Commodity Specification F using waterborne preservative to 0.25 lb/cu ft retention (to 4.0 kg/cu m retention).
    - a. Kiln dry plywood after treatment to maximum moisture content of 19 percent.
    - b. Treat plywood in contact with roofing, flashing, or waterproofing.
    - c. Treat plywood in contact with masonry or concrete.
    - d. Treat plywood less than 18 inches (450 mm) above grade.
    - e. Treat plywood in other locations as indicated on the drawings.

**PART 3 EXECUTION****3.01 INSTALLATION - GENERAL**

- A. Fit carpentry work to other work; scribe and cope as required for accurate fit. Correlate location of furring, nailers, blocking and similar supports to allow proper attachment of other work.
- B. Select material sizes to minimize waste.
- C. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.
- D. Where treated wood is used on interior, provide temporary ventilation during and immediately after installation sufficient to remove indoor air contaminants.
- E. Discard units of material with defects which might impair quality of work, and units which are too small to use in fabricating work with minimum joints or optimum joint arrangement.
- F. Provide all framing and support members, not indicated or specified, as necessary to properly carry out all work shown and inferred by Drawings and Specifications.
- G. Spiking, nailing and bolting shall be done in an approved manner; spikes, nails, and bolts shall be of the proper size, and care shall be used so as not to split the members. Members shall be drilled accurately for bolting; and for nailing where necessary to avoid splitting. Suitable washers shall be provided under bolt head, and nuts and bolts shall be drawn up tight.
- H. Provide framing to support all edges of covering material.
- I. Securely attach carpentry work as indicated and according to applicable codes and recognized standards.
- J. Use fasteners of appropriate type and length. Pre-drill members when necessary to avoid splitting wood.

**3.02 BLOCKING, NAILERS, AND SUPPORTS**

- A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.
- B. Attach to substrates as required to support applied loading. Countersink bolts and nuts flush with surfaces, unless otherwise shown. Build into masonry during installation of masonry work.
- C. In framed assemblies that have concealed spaces, provide solid wood fireblocking as required by applicable local code, to close concealed draft openings between floors and between top story and roof/attic space; other material acceptable to authorities having jurisdiction may be used in lieu of solid wood blocking.
- D. In metal stud walls, provide continuous blocking around door and window openings for anchorage of frames, securely attached to stud framing.
- E. In walls, provide blocking attached to studs as backing and support for wall-mounted items, unless item can be securely fastened to two or more studs or other method of support is explicitly indicated.
- F. Provide the following specific nonstructural framing and blocking:
  - 1. Cabinets and shelf supports.
  - 2. Wall brackets.
  - 3. Handrails.
  - 4. Grab bars.
  - 5. Towel and bath accessories.
  - 6. Wall-mounted door stops.

**3.03 PLYWOOD**

- A. Comply with applicable recommendations contained in Form No. E 304 APA Design/Construction Guide - Residential & Commercial for types of plywood products and

applications indicated.

- B. Apply sheathing with long dimension (face grain) perpendicular to framing. Apply with side edges 1/4 inch apart and end edges 1/8 inch apart. All end edges of sheathing shall bear on a support. Stagger end joints of roof sheathing.
- C. For wood framing nail to supports with 6d common nails spaced 6 inches on center along edges and 12 inches on center at intermediate supports.
- D. Use 11 gauge galvanized roofing nails 1-3/4" long with 7/16" heads for wood framing. Fasteners shall be installed at 6" o.c. on panel edges, at 12" o.c. along intermediate supports, and 3/8" minimum from panel edge.

### **3.04 ROOF-RELATED CARPENTRY**

- A. Coordinate installation of roofing carpentry with deck construction, framing of roof openings, and roofing assembly installation.

### **3.05 INSTALLATION OF CONSTRUCTION PANELS**

- A. Communications and Electrical Room Mounting Boards: Secure with screws to studs with edges over firm bearing; space fasteners at maximum 24 inches (610 mm) on center on all edges and into studs in field of board.
  - 1. At fire-rated walls, install board over wall board indicated as part of the fire-rated assembly.
  - 2. Where boards are indicated as full floor-to-ceiling height, install with long edge of board parallel to studs.
  - 3. Install adjacent boards without gaps.

### **3.06 CLEANING**

- A. Waste Disposal: See Section 017419 - Construction Waste Management and Disposal.
  - 1. Comply with applicable regulations.
  - 2. Do not burn scrap on project site.
  - 3. Do not burn scraps that have been pressure treated.
  - 4. Do not send materials treated with pentachlorophenol, CCA, or ACA to co-generation facilities or "waste-to-energy" facilities.
- B. Do not leave wood, shavings, sawdust, etc. on the ground or buried in fill.
- C. Prevent sawdust and wood shavings from entering the storm drainage system.

**END OF SECTION**



**SECTION 064100  
ARCHITECTURAL WOOD CASEWORK**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Specially fabricated cabinet units.
- B. Hardware.
- C. Architectural Shelving
- D. Accessories

**1.02 RELATED REQUIREMENTS**

- A. Section 061000 - Rough Carpentry: Support framing, grounds, and concealed blocking.
- B. Section 088000 - Glazing: Glass for casework.

**1.03 REFERENCE STANDARDS**

- A. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards, 2nd Edition; 2014, with Errata (2016).
- B. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards; 2021, with Errata.
- C. NEMA LD 3 - High-Pressure Decorative Laminates; 2005.

**1.04 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Shop Drawings: Provide dimensioned plans showing location of each item, provide dimensioned elevations and large scale details, indicate materials, component profiles, fastening methods, jointing details, and accessories.
  - 1. Scale of Drawings: 1-1/2 inch to 1 foot (125 mm to 1 m), minimum.
  - 2. Provide information as required by AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS).
  - 3. Include certification program certificates.
- C. Product Data: Provide data for hardware accessories.
- D. Samples: Submit actual samples of architectural cabinet construction, minimum 12 inches (300 mm) square, illustrating proposed cabinet, countertop, and shelf unit substrate and finish.
- E. Samples: Submit actual sample items of proposed pulls, hinges, shelf standards, and locksets, demonstrating hardware design, quality, and finish.
- F. Samples: Submit actual sample items of proposed solid surface window sills, laminate wall panels, and quartz stair wall cap.

**1.05 QUALITY ASSURANCE**

- A. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.
  - 1. Company with at least one project in the past 5 years with value of woodwork within 20 percent of cost of woodwork for this Project.
  - 2. Accredited participant in the specified certification program prior to the commencement of fabrication and throughout the duration of the project.
  - 3. Single Source Responsibility: Provide and install this work from single fabricator.

**1.06 MOCK-UPS**

- A. Provide mock-up of typical base cabinet, wall cabinet, and countertop, including hardware, finishes, and accessories.
- B. Locate where directed.
- C. Mock-up may remain as part of the Work if mock-up is acceptable.

**1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Protect units from moisture damage.

**1.08 FIELD CONDITIONS**

- A. Do not deliver architectural wood casework until building is fully enclosed, wet work is complete, and HVAC system is operating. During and after installation of custom cabinets, maintain temperature and humidity conditions in building spaces at same levels planned for occupancy.

**PART 2 PRODUCTS****2.01 CABINETS**

- A. Quality Standard: Custom Grade, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.
- B. Plastic Laminate Faced Cabinets: Custom grade.
- C. Cabinets:
  - 1. Cabinet Finish and Design is as scheduled on Drawings.
  - 2. Finish - Exposed Exterior Surfaces: Decorative laminate.
  - 3. Finish - Exposed Interior Surfaces (I.E. Open Shelving): Decorative laminate.
  - 4. Finish - Concealed Surfaces (I.E. Cabinet Box Interiors): Thermoset Decorative Panels Melamine.
  - 5. Finish - Drawer Sides, Backs and Bottoms: Thermoset Decorative Panels Melamine.
  - 6. Finish - Interior Shelving: Thermoset Decorative Panels Melamine.
  - 7. Door and Drawer Front Edge Profiles: Square edge with thin applied band.
  - 8. Door and Drawer Front Retention Profiles: Fixed panel.
  - 9. Casework Construction Type: Type A - Frameless.
  - 10. Interface Style for Cabinet and Door: Style 1 - Overlay; flush overlay.

**2.02 LAMINATE MATERIALS**

- A. Manufacturers:
  - 1. Formica Corporation: [www.formica.com](http://www.formica.com).
  - 2. Wilsonart; Full line of standard laminates: [www.wilsonart.com](http://www.wilsonart.com).
  - 3. Or Equal.
  - 4. Substitutions: See Section 016000 - Product Requirements.
- B. Thermally Fused Laminate (TFL): Melamine resin, NEMA LD 3, Type VGL laminate panels.
  - 1. Manufacturers:
    - a. Wilsonart; Standard Solids: [www.wilsonart.com](http://www.wilsonart.com).
    - b. Or Equal.
- C. High Pressure Decorative Laminate (HPDL): NEMA LD 3, types as recommended for specific applications.
- D. Provide specific types as follows:
  - 1. Horizontal Surfaces: HGS, 0.048 inch (1.22 mm) nominal thickness, color as selected, finish as selected.
  - 2. Vertical Surfaces: VGS, 0.028 inch (0.71 mm) nominal thickness, color as selected, finish as selected.
  - 3. Post-Formed Horizontal Surfaces: HGP, 0.039 inch (1.0 mm) nominal thickness, color as selected, finish as selected.
  - 4. Laminate Backer: BKL, 0.020 inch (0.51 mm) nominal thickness, undecorated; for application to concealed backside of panels faced with high pressure decorative laminate.

**2.03 ACCESSORIES**

- A. Adhesive: Type recommended by fabricator to suit application. Do not use adhesives that contain urea formaldehyde.
- B. Fasteners: Size and type to suit application.
- C. Bolts, Nuts, Washers, Lags, Pins, and Screws: Of size and type to suit application; galvanized or chrome-plated finish in concealed locations and stainless steel or chrome-plated finish in exposed locations.

**2.04 HARDWARE**

- A. General: Provide cabinet hardware and accessory materials associated with architectural wood casework.
- B. Hardware: BHMA A156.9, types as indicated for quality grade specified.
- C. Drawer and Door Pulls: "U" shaped wire pull, steel with satin finish, 4 inch centers ("U" shaped wire pull, steel with satin finish, 100 mm centers).
- D. Drawer Slides:
  - 1. Type: Full extension with overtravel.
  - 2. Static Load Capacity: Commercial grade.
  - 3. Mounting: Side mounted.
  - 4. Stops: Integral type.
  - 5. Features: Provide self closing/stay closed type.
  - 6. Manufacturers:
    - a. Hettich America, LP; Ball Bearing Slides: [www.hettichamerica.com](http://www.hettichamerica.com).
    - b. Knappe & Vogt Manufacturing Company; Ball Bearing Slides: [www.knapeandvogt.com](http://www.knapeandvogt.com).
    - c. Equal As Approved.
    - d. Substitutions: See Section 016000 - Product Requirements.
- E. Hinges: European style concealed self-closing type, BHMA No. A156.9, B01602, steel with satin finish.
  - 1. Manufacturers:
    - a. Hettich America, LP; \_\_\_\_\_: [www.hettich.com/#sle](http://www.hettich.com/#sle).
    - b. Julius Blum, Inc: [www.blum.com](http://www.blum.com).
    - c. Equal as Approved.
    - d. Substitutions: See Section 016000 - Product Requirements.

**2.05 FABRICATION**

- A. Assembly: Shop assemble cabinets for delivery to site in units easily handled and to permit passage through building openings. Complete fabrication in shop to the maximum extent possible.
- B. Edging: Fit shelves, doors, and exposed edges with specified edging. Do not use more than one piece for any single length.
- C. Fitting: When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide matching trim for scribing and site cutting.
- D. Plastic Laminate: Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners. Slightly bevel arises. Locate counter butt joints minimum 2 feet from sink cut-outs. (Locate counter butt joints minimum 600 mm from sink cut-outs.)
- E. Provide cutouts for plumbing fixtures, inserts, outlet boxes, fixtures and fittings, and grommets. Verify locations of cutouts from on-site dimensions. Shop cut openings to maximum extent possible. Seal cut edges with a coat of varnish.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify adequacy of backing and support framing.
- B. Verify location and sizes of utility rough-in associated with work of this section.

#### **3.02 INSTALLATION**

- A. **EXPOSED FASTENERS FOR HANGING CABINET UNITS WILL NOT BE ACCEPTED.**
- B. Set and secure custom cabinets in place, assuring that they are rigid, plumb, and level.
- C. Use fixture attachments in concealed locations for wall mounted components.
- D. Use concealed joint fasteners to align and secure adjoining cabinet units.
- E. Carefully scribe casework abutting other components, with maximum gaps of 1/32 inch (0.79 mm). Do not use additional overlay trim for this purpose.
- F. Secure counter bases to floor using appropriate angles and anchorages.
- G. Secure base cabinets to adjoining units and to back wall where walls are available.
- H. Fasten wall cabinets through back, near top and bottom, at ends and not more than 16 inches on center.
- I. Anchor countertops securely by screwing through corner blocks of base cabinets or other supports into underside of countertop. Caulk space between back splash and wall with sealant. Sealant color to be chosen by Architect.
- J. Countersink anchorage devices at exposed locations. Conceal with solid wood plugs of species to match surrounding wood; finish flush with surrounding surfaces.
- K. Installation shall include wood furring, blocking, shims and hanging strips unless concealed within other construction before woodwork installation.
- L. Laminate Wall Panels: Anchor paneling to supporting substrate with concealed panel hanger Z clips only. Do NOT use face fastening.

#### **3.03 ADJUSTING**

- A. Adjust installed work to allow doors and drawers to fit openings properly and fully aligned.
- B. Adjust moving or operating parts to function smoothly and correctly.

#### **3.04 CLEANING**

- A. Clean casework, counters, shelves, hardware, fittings, and fixtures.

**END OF SECTION**

**SECTION 068316  
FIBERGLASS REINFORCED PANELING****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Glass fiber reinforced plastic panels (FRP).
- B. Trim.

**1.02 REFERENCE STANDARDS**

- A. ASTM D256 - Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics; 2023, with Editorial Revision.
- B. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2021.
- C. ASTM D5319 - Standard Specification for Glass-Fiber Reinforced Polyester Wall and Ceiling Panels; 2022.
- D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023.
- E. FDA Food Code - Chapter 6 - Physical Facilities; Current Edition.

**1.03 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.
- C. Samples: Submit two samples 12 by 12 inch (\_\_\_\_by\_\_\_\_ mm) in size illustrating material and surface design of panels.
  - 1. Submit complete with specified applied finish.
  - 2. For selected patterns show complete pattern repeat.
  - 3. Exposed Molding and Trim: Provide samples of each type, finish, and color.
- D. Shop Drawings: Submit elevations of each wall showing location of paneling and trim members with respect to all discontinuities in the wall elevation.
- E. Manufacturers Material Safety Data Sheets (MSDS) for adhesives, sealants and other pertinent materials prior to their delivery to the site

**1.04 DELIVERY, STORAGE, AND HANDLING**

- A. Store panels flat, indoors, on a clean, dry surface. Remove packaging and allow panels to acclimate to room temperature for 48 hours prior to installation.

**1.05 WARRANTY**

- A. Furnish one year guarantee against defects in material and workmanship.

**PART 2 PRODUCTS****2.01 MANUFACTURERS**

- A. Fiberglass Reinforced Plastic Panels:
  - 1. Marlite, Inc; \_\_\_\_\_: [www.marlite.com/#sle](http://www.marlite.com/#sle).
  - 2. Or Equal
  - 3. Substitutions: See Section 01 6000 - Product Requirements.

**2.02 PANEL SYSTEMS**

- A. Wall Panels FRP: Location as indicated in the drawings
  - 1. Panel Size: 4 by 8 feet (1.2 by 2.4 m).
  - 2. Panel Thickness: 0.09 inch (2.3 mm).

3. Surface Design: Standard FRP.
4. Color: White.
5. Attachment Method: Adhesive only, with trim and sealant in joints.

### **2.03 MATERIALS**

- A. Panels: Fiberglass reinforced plastic (FRP), complying with ASTM D5319.
  1. Surface Burning Characteristics: Maximum flame spread index of 25 and smoke developed index of 450; when system tested in accordance with ASTM E84.
  2. Resistant to rot, corrosion, staining, denting, peeling, and splintering.
  3. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
  4. Scratch Resistance: Barcol hardness score greater than 35, when tested in accordance with ASTM D2583.
  5. Water Absorption - 0.72% per ASTM D 570.
  6. Flexural Strength - 1.0 x 10<sup>4</sup> psi per ASTM D 790. (7.0 kilogram-force/square millimeter)
  7. Izod Impact Strength of 72 ft. lbs./in ASTM D 256
  8. Surface Characteristics and Cleanability: Provide products that are smooth, durable, and easily cleanable, in compliance with FDA Food Code, Chapter 6 - Physical Facilities.
- B. Back Surface: Smooth. Imperfections which do not affect functional properties are not cause for rejection.
- C. Trim: Vinyl; color coordinating with panel.
- D. Adhesive: Type recommended by panel manufacturer.
- E. Sealant: Type recommended by panel manufacturer; white.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify existing conditions and substrate flatness before starting work.
- B. Verify that substrate conditions are ready to receive the work of this section.

#### **3.02 INSTALLATION - WALLS**

- A. Install panels in accordance with manufacturer's instructions.
- B. Cut and drill panels with carbide tipped saw blades, drill bits, or snips.
- C. Apply adhesive to the back side of the panel using trowel as recommended by adhesive manufacturer.
- D. Apply panels to wall with seams plumb and pattern aligned with adjoining panels.
- E. Install panels with manufacturer's recommended gap for panel field and corner joints.
- F. Place trim on panel before fastening edges, as required.
- G. Fill channels in trim with sealant before attaching to panel.
- H. Install trim with adhesive and screws or nails, as required.
- I. Seal gaps at floor, ceiling, and between panels with applicable sealant to prevent moisture intrusion.
- J. Remove excess sealant after paneling is installed and prior to curing.

**END OF SECTION**

**SECTION 072100  
THERMAL INSULATION**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Batt insulation in exterior wall construction.

**1.02 REFERENCE STANDARDS**

- A. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; 2023.
- B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023.
- C. ASTM E2357 - Standard Test Method for Determining Air Leakage Rate of Air Barrier Assemblies; 2023a.

**1.03 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data on product characteristics, performance criteria, and product limitations.
- C. Manufacturer's Installation Instructions: Include information on special environmental conditions required for installation and installation techniques.

**1.04 FIELD CONDITIONS**

- A. Do not install insulation adhesives when temperature or weather conditions are detrimental to successful installation.

**1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Store insulation indoors.
- B. Keep insulation clean and dry at all times. Do not allow insulation materials to become wet or soiled.
- C. Comply with Manufacturer's recommendations for handling, storage and protection.

**PART 2 PRODUCTS**

**2.01 APPLICATIONS**

- A. Miscellaneous Exterior Wall Insulation as called for in the drawings: Batt insulation with no vapor retarder.

**2.02 MINERAL FIBER BLANKET INSULATION MATERIALS**

- A. Flexible Glass Fiber Blanket Thermal Insulation: Preformed insulation, complying with ASTM C665; friction fit.
  - 1. Flame Spread Index: 25 or less, when tested in accordance with ASTM E84.
  - 2. Smoke Developed Index: 50 or less, when tested in accordance with ASTM E84.
  - 3. Combustibility: Non-combustible, when tested in accordance with ASTM E136.
  - 4. Formaldehyde Content: Zero.
  - 5. Thickness: 6 inch (\_\_\_ mm) min or as indicated on drawings or width of framing minimum if not indicated.
  - 6. Products:
    - a. Owens Corning Corporation; EcoTouch PINK FIBERGLAS Insulation: [www.ocbuildingspec.com/#sle](http://www.ocbuildingspec.com/#sle).
    - b. Or Equal.
  - 7. Substitutions: See Section 016000 - Product Requirements.

**2.03 ACCESSORIES**

- A. Nails or Staples: Steel wire; electroplated or galvanized; type and size to suit application.

- B. Insulation Retainage Mesh Netting:
  - 1. Option 1:
    - a. Equal to J&R 1"x2" Mesh Insulation Netting
    - b. Width: 4 feet (NT-1250) or 8 feet (NT-1125)
    - c. Roll Product: Length 125 feet (NT-1125) or 250 feet (NT-1250)
  - 2. Option 2:
    - a. 20-Gauge Galvanized Steel Poultry Netting with 2 inch hexagonal mesh weave.
  - 3. Application: Must be used at all insulation installation locations where the batt insulation is not held in place on both sides by a rigid substrate or finish material.
- C. Mechanical Fasteners and Insulation clips: In accordance with insulation manufacturer's written recommendations.
- D. Adhesive: Type recommended by insulation manufacturer for application.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify that substrate, adjacent materials, and insulation materials are dry and that substrates are ready to receive insulation.
- B. Verify substrate surfaces are flat, free of honeycomb, fins, irregularities, or materials or substances that may impede adhesive bond.

#### **3.02 BATT INSTALLATION**

- A. Install insulation in accordance with manufacturer's instructions.
- B. Install in wall spaces without gaps or voids. Do not compress insulation.
- C. Interior Ceilings: Lay on top of ceiling panel and suspension system. Fit tightly together. Do not install on top of or within 3 inches of recessed light fixtures unless fixture are approved for such use.
- D. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.
- E. Fit insulation tightly in cavities and tightly to exterior side of mechanical and electrical services within the plane of the insulation.
- F. Install Batts at all cracks around doors and openings.
- G. Retain insulation batts in place with wire mesh secured to framing members where applied in heights over 8 feet.
- H. Tape seal butt ends, lapped flanges, and tears or cuts in membrane.

#### **3.03 PROTECTION**

- A. Do not permit installed insulation to be damaged prior to its concealment.

**END OF SECTION**



**SECTION 078400  
FIRESTOPPING****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Firestopping systems.
- B. Firestopping of joints and penetrations in fire-resistance-rated and smoke-resistant assemblies, whether indicated on drawings or not, and other openings indicated.

**1.02 REFERENCE STANDARDS**

- A. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2022.
- B. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems; 2023a.
- C. ASTM E1966 - Standard Test Method for Fire-Resistive Joint Systems; 2015 (Reapproved 2019).
- D. ASTM E2174 - Standard Practice for On-Site Inspection of Installed Firestop Systems; 2020a.
- E. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015, with Editorial Revision (2021).
- F. ITS (DIR) - Directory of Listed Products; Current Edition.
- G. FM (AG) - FM Approval Guide; Current Edition.
- H. SCAQMD 1168 - Adhesive and Sealant Applications; 1989, with Amendment (2022).
- I. UL 2079 - Standard for Tests for Fire Resistance of Building Joint Systems; Current Edition, Including All Revisions.
- J. UL (DIR) - Online Certifications Directory; Current Edition.
- K. UL (FRD) - Fire Resistance Directory; Current Edition.

**1.03 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Schedule of Firestopping: List each type of penetration, fire rating of the penetrated assembly, and firestopping test or design number.
- C. Product Data: Provide data on product characteristics, performance ratings, and limitations.
- D. Sustainable Design Submittal: Submit VOC content documentation for nonpreformed materials.
- E. Manufacturer's Installation Instructions: Indicate preparation and installation instructions.
- F. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- G. Manufacturer's qualification statement.
- H. Installer's qualification statement.

**1.04 QUALITY ASSURANCE**

- A. Fire Testing: Provide firestopping assemblies of designs that provide the scheduled fire ratings when tested in accordance with methods indicated.
  - 1. Listing in UL (FRD), FM (AG), or ITS (DIR) will be considered as constituting an acceptable test report.
  - 2. Valid evaluation report published by ICC Evaluation Service, Inc. (ICC-ES) at [www.icc-es.org](http://www.icc-es.org) will be considered as constituting an acceptable test report.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

- C. Installer Qualifications: Company specializing in performing the work of this section and:
  - 1. Verification of minimum three years documented experience installing work of this type.

## **1.05 FIELD CONDITIONS**

- A. Comply with firestopping manufacturer's recommendations for temperature and conditions during and after installation; maintain minimum temperature before, during, and for three days after installation of materials.

## **PART 2 PRODUCTS**

### **2.01 MATERIALS**

- A. Firestopping Materials: Any materials meeting requirements.
- B. Volatile Organic Compound (VOC) Content: Provide products having VOC content lower than that required by SCAQMD 1168.
- C. Mold and Mildew Resistance: Provide firestopping materials with mold and mildew resistance rating of zero(0) in accordance with ASTM G21.
- D. Primers, Sleeves, Forms, Insulation, Packing, Stuffing, and Accessories: Provide type of materials as required for tested firestopping assembly.
- E. Fire Ratings: Refer to drawings for required systems and ratings.

### **2.02 FIRESTOPPING ASSEMBLY REQUIREMENTS**

- A. Floor-to-Floor (FF), Floor-to-Wall (FW), Head-of-Wall (HW), and Wall-to-Wall (WW) Joints, Except Perimeter, Where Both Are Fire-Rated: Use system that has been tested according to ASTM E1966 or UL 2079 to have fire resistance F Rating equal to required fire rating of the assembly in which the joint occurs.
  - 1. Movement: Provide systems that have been tested to show movement capability as indicated.
  - 2. Air Leakage: Provide systems that have been tested to show L Rating as indicated.
  - 3. Watertightness: Provide systems that have been tested to show W Rating as indicated.
  - 4. Listing by FM (AG), ITS (DIR), UL (DIR), or UL (FRD) in their certification directories will be considered evidence of successful testing.
- B. Through Penetration Firestopping: Use system that has been tested according to ASTM E814 to have fire resistance F Rating equal to required fire rating of penetrated assembly.

### **2.03 FIRESTOPPING FOR FLOOR-TO-FLOOR, FLOOR-TO-WALL, HEAD-OF-WALL, AND WALL-TO-WALL JOINTS**

- A. Gypsum Board Walls:
  - 1. Wall-to-Wall Joints That Have Movement Capabilities (Dynamic-D):
    - a. 2 Hour Construction: UL System WW-D-0067; Hilti CP 606 Flexible Firestop Sealant.
    - b. 1 Hour Construction: UL System WW-D-0067; Hilti CP 606 Flexible Firestop Sealant.

### **2.04 FIRESTOPPING PENETRATIONS THROUGH CONCRETE AND CONCRETE MASONRY CONSTRUCTION**

- A. Blank Openings:
  - 1. In Floors or Walls:
    - a. 2 Hour Construction: UL System C-AJ-0090; Hilti FS-ONE MAX Intumescent Firestop Sealant.
- B. Penetrations Through Floors or Walls By:
  - 1. Multiple Penetrations in Large Openings:
    - a. 2 Hour Construction: UL System C-AJ-8143; Hilti FS-ONE MAX Intumescent Firestop Sealant.
  - 2. Uninsulated Non-Metallic Pipe, Conduit, and Tubing:

- a. 2 Hour Construction: UL System C-AJ-2167; Hilti FS-ONE MAX Intumescent Firestop Sealant.
- 3. Electrical Cables Not In Conduit:
  - a. 2 Hour Construction: UL System C-AJ-3216; Hilti CFS-PL Firestop Plug.
- 4. Cable Trays with Electrical Cables:
  - a. 2 Hour Construction: UL System C-AJ-4094; Hilti CFS-BL Firestop Block.
- 5. Insulated Pipes:
  - a. 2 Hour Construction: UL System C-AJ-5091; Hilti FS-ONE IMAX Intumescent Firestop Sealant.
- C. Penetrations Through Walls By:
  - 1. Uninsulated Metallic Pipe, Conduit, and Tubing:
  - 2. Electrical Cables Not In Conduit:
    - a. 2 Hour Construction: UL System C-AJ-3095; Hilti FS-ONE MAX Intumescent Firestop Sealant.
  - 3. Insulated Pipes:
    - a. 2 Hour Construction: UL System C-AJ-5090; Hilti FS-ONE MAX Intumescent Firestop Sealant.

## **2.05 FIRESTOPPING PENETRATIONS THROUGH GYPSUM BOARD WALLS**

- A. Blank Openings:
  - 1. 2 Hour Construction: UL System W-L-3334; Hilti CP 653 Speed Sleeve.

## **2.06 FIRESTOPPING SYSTEMS**

- A. Firestopping: Any material meeting requirements.
  - 1. Fire Ratings: See drawings for required systems and ratings.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify openings are ready to receive the work of this section.

### **3.02 PREPARATION**

- A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other materials that could adversely affect bond of firestopping material.
- B. Remove incompatible materials that could adversely affect bond.

### **3.03 INSTALLATION**

- A. Install materials in manner described in fire test report and in accordance with manufacturer's instructions, completely closing openings.

### **3.04 FIELD QUALITY CONTROL**

- A. Repair or replace penetration firestopping and joints at locations where inspection results indicate firestopping or joints do not meet specified requirements.

### **3.05 CLEANING**

- A. Clean adjacent surfaces of firestopping materials.

### **3.06 PROTECTION**

- A. Protect adjacent surfaces from damage by material installation.

**END OF SECTION**



**SECTION 079200  
JOINT SEALANTS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Each form and type of joint sealants.
- B. Applications for joint sealers.
- C. Self-leveling pourable joint sealants.
- D. Joint backings and accessories.

**1.02 RELATED REQUIREMENTS**

- A. Section 079100 - Preformed Joint Seals: Precompressed foam, gaskets, and strip seals.

**1.03 REFERENCE STANDARDS**

- A. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.
- B. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016 (Reapproved 2023).
- C. ASTM C1248 - Standard Test Method for Staining of Porous Substrate by Joint Sealants; 2022.
- D. SCAQMD 1168 - Adhesive and Sealant Applications; 1989, with Amendment (2022).

**1.04 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Submit manufacturer's technical datasheets for each product to be used; include the following:
  - 1. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.
  - 2. List of backing materials approved for use with the specific product.
  - 3. Substrates that product is known to satisfactorily adhere to and with which it is compatible.
  - 4. Substrates the product should not be used on.
  - 5. Substrates for which use of primer is required.
- C. Product Data for Accessory Products: Submit manufacturer's technical data sheet for each product to be used, including physical characteristics, installation instructions, and recommended tools.
- D. Color Cards for Selection: Where sealant color is not specified, submit manufacturer's color cards showing standard colors available for selection.
- E. Samples for Verification: Where custom sealant color is specified, obtain directions from Engineer/Architect and submit at least two physical samples for verification of color of each required sealant.
- F. Preinstallation Field Adhesion Test Reports: Submit filled out Preinstallation Field Adhesion Test Reports log within 10 days after completion of tests; include bagged test samples and photographic records.

**1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- B. Installer Qualifications: Company specializing in performing the work of this section and with at least three years of documented experience.
- C. Field Adhesion Test Procedures:
  - 1. Allow sealants to fully cure as recommended by manufacturer before testing.
  - 2. Have a copy of the test method document available during tests.

3. Record the type of failure that occurred, other information required by test method, and the information required on the Field Quality Control Log.
4. If any combination of sealant type and substrate does not show evidence of minimum adhesion or shows cohesion failure before minimum adhesion, report results to Engineer/Architect.

## **PART 2 PRODUCTS**

### **2.01 MANUFACTURERS**

- A. Nonsag Sealants:
  1. Bostik Inc; <>: [www.bostik-us.com/#sle](http://www.bostik-us.com/#sle).
  2. Dow Chemical Company; <>: [consumer.dow.com/en-us/industry/ind-building-construction.html/#sle](http://consumer.dow.com/en-us/industry/ind-building-construction.html/#sle).
  3. Hilti, Inc; <>: [www.us.hilti.com/#sle](http://www.us.hilti.com/#sle).
  4. Momentive Performance Materials, Inc (formerly GE Silicones); <>: [www.momentive.com/#sle](http://www.momentive.com/#sle).
  5. Sika Corporation; <>: [www.usa-sika.com/#sle](http://www.usa-sika.com/#sle).
  6. Or Equal.
  7. Substitutions: See Section 016000 - Product Requirements.
- B. Self-Leveling Sealants:
  1. Adhesives Technology Corporation; <>: [www.atcepoxy.com/#sle](http://www.atcepoxy.com/#sle).
  2. Bostik Inc; <>: [www.bostik-us.com/#sle](http://www.bostik-us.com/#sle).
  3. Dow Chemical Company; <>: [consumer.dow.com/en-us/industry/ind-building-construction.html/#sle](http://consumer.dow.com/en-us/industry/ind-building-construction.html/#sle).
  4. Sika Corporation; <>: [www.usa-sika.com/#sle](http://www.usa-sika.com/#sle).
  5. Or Equal.
  6. Substitutions: See Section 016000 - Product Requirements.

### **2.02 JOINT SEALANT APPLICATIONS**

- A. Scope:
  - a. Joints between door, window, and other frames and adjacent construction.
  - b. Other joints indicated below.
- B. Exterior Joints: Use nonsag non-staining silicone sealant, unless otherwise indicated.
- C. Interior Joints: Use nonsag polyurethane sealant, unless otherwise indicated.
  1. Wall and Ceiling Joints in Wet Areas: Nonsag polyurethane sealant for continuous liquid immersion.
  2. Floor Joints in Wet Areas: Nonsag polyurethane non-traffic-grade sealant suitable for continuous liquid immersion.
  3. Joints between Tile in Wet Areas and Floors, Walls, and Ceilings: Mildew-resistant silicone sealant; white.
  4. Other Floor Joints: Non-sag polyurethane non-traffic-grade sealant.
- D. Interior wet areas Include but are not limited to: Bathrooms, restrooms, and kitchens; fixtures in wet areas include plumbing fixtures, countertops, cabinets, and other similar items.

### **2.03 JOINT SEALANTS - GENERAL**

- A. Sealants and Primers: Provide products having lower volatile organic compound (VOC) content than indicated in SCAQMD 1168.
- B. Colors: As indicated on the drawings or as selected from Manufacturer's standard colors.
- C. Select materials for compatibility and select elasticity and hardness based on Manufacturer's recommendations for application intended.

## 2.04 JOINT SEALANTS

- A. Nonstaining Silicone Sealant: ASTM C920, Grade NS, Uses M and A; not expected to withstand continuous water immersion or traffic.
  - 1. Movement Capability: Plus and minus 50 percent, minimum.
  - 2. Nonstaining to Porous Stone: Nonstaining to light-colored natural stone when tested in accordance with ASTM C1248.
  - 3. Dirt Pick-Up: Reduced dirt pick-up compared to other silicone sealants.
  - 4. Color: To be selected by Engineer/Architect from manufacturer's full range.
- B. Type 2 Interior Wet Areas -Mildew-Resistant Silicone Sealant: ASTM C920, Grade NS, Uses M and A; single component Type S, mildew resistant; not expected to withstand continuous water immersion or traffic.
  - 1. Color: White.
  - 2. Products:
    - a. Sika Corporation; Sikasil GP: [www.usa.sika.com/#sle](http://www.usa.sika.com/#sle).
    - b. Or Equal.
    - c. Substitutions: See Section 016000 - Product Requirements.
- C. Noncuring Butyl Sealant: Solvent-based, single component, nonsag, nonskinning, nonhardening, nonbleeding; nonvapor permeable; intended for fully concealed applications.
- D. Type 5 Exterior Concealed Joints between two assembled rigid surfaces in compression: Polyisobutylene sealant tape conforming to AAMA 804.1.
- E. Type 6 Acoustical Sealant: Nonskinning, nonhardening, permanently flexible sealant specifically designed for sealing gypsum wallboard.
- F. Type 7 Foam Sealants: Equal to Styrofoam Brand Sill Seal Foam Gasket; provide in width required for Metal Stud Sizes.

## 2.05 SELF-LEVELING JOINT SEALANTS

### 2.06 ACCESSORIES

- A. Backer Rod: Cylindrical cellular foam rod, polyethylene-jacketed polyurethane foam, butyl rubber foam, neoprene foam, or other flexible, permanent, durable non abrasive material with surface that sealant will not adhere to, compatible with specific sealant used, and recommended by backing and sealant manufacturers for specific application.
- B. Backing Tape: Self-adhesive polyethylene tape with surface that sealant will not adhere to and recommended by tape and sealant manufacturers for specific application.
- C. Joint Cleaner: Noncorrosive and nonstaining type, type recommended by sealant manufacturer; compatible with joint forming materials.
- D. Primers: Type recommended by sealant manufacturer to suit application; nonstaining.
- E. Fiber Expansion Joint Material: Preformed cellular fiber complying with ASTM D1751.

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Verify that joints are ready to receive work.
- B. Verify that backing materials are compatible with sealants.
- C. Verify that backer rods are of the correct size.
- D. Preinstallation Adhesion Testing: Install a sample for each test location indicated in the test plan.
  - 1. Test each sample as specified in PART 1 under QUALITY ASSURANCE article.
  - 2. Notify Engineer/Architect of date and time that tests will be performed, at least seven days in advance.

3. Record each test on Preinstallation Adhesion Test Log as indicated.
4. If any sample fails, review products and installation procedures, consult manufacturer, or take other measures that are necessary to ensure adhesion; retest in a different location; if unable to obtain satisfactory adhesion, report to Engineer/Architect.
5. After completion of tests, remove remaining sample material and prepare joints for new sealant installation.

### **3.02 PREPARATION**

- A. Remove loose materials and foreign matter that could impair adhesion of sealant.
- B. Clean joints, and prime as necessary, in accordance with manufacturer's instructions.
- C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.
- D. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.

### **3.03 INSTALLATION**

- A. Install this work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.
- B. Provide joint sealant installations complying with ASTM C1193.
- C. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer, except where specific dimensions are indicated.
- D. Install bond breaker backing tape where backer rod cannot be used.
- E. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces. Clean adjacent surfaces to eliminate evidence of spillage.
- F. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.
- G. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.
- H. Dure sealants and caulking compounds in compliance with Manufacturer's instructions and recommendations to obtain high early bond strength, internal cohesive strength and surface durability.
- I. Concrete Floor Joint Filler: After full cure, shave joint filler flush with top of concrete slab.

### **3.04 FIELD QUALITY CONTROL**

- A. Perform field quality control inspection/testing as specified in PART 1 under QUALITY ASSURANCE article.
- B. Remove and replace failed portions of sealants using same materials and procedures as indicated for original installation.

**END OF SECTION**



**SECTION 081113  
HOLLOW METAL DOORS AND FRAMES****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Hollow metal frames for wood doors.
- B. Fire-rated hollow metal doors and frames.
- C. Thermally insulated hollow metal doors with frames.
- D. Hurricane-resistant hollow metal doors and frames.

**1.02 RELATED REQUIREMENTS**

- A. Section 087100 - Door Hardware.
- B. Section 088000 - Glazing: Glass for doors and borrowed lites.
- C. Section 099123 - Interior Painting: Field painting.

**1.03 REFERENCE STANDARDS**

- A. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.
- B. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors; 2022.
- C. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100); 2023.
- D. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures; Most Recent Edition Cited by Referring Code or Reference Standard.
- E. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2019a.
- F. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014 (Reapproved 2021).
- G. BHMA A156.115 - Hardware Preparation in Steel Doors and Frames; 2016.
- H. FBC TAS 201 - Impact Test Procedures; Testing Application Standard; 1994.
- I. FBC TAS 202 - Criteria for Testing Impact and Non-Impact Resistant Building Envelope Components Using Uniform Static Air Pressure; Testing Application Standard; 1994.
- J. FBC TAS 203 - Criteria for Testing Products Subject To Cyclic Wind Pressure Loading; Testing Application Standard; 1994.
- K. FLA (PAD) - Florida Building Code Online - Product Approval Directory; Current Edition.
- L. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.
- M. ITS (DIR) - Directory of Listed Products; Current Edition.
- N. Miami (APD) - Approved Products Directory; Miami-Dade County; Current Edition.
- O. NAAMM HMMA 830 - Hardware Selection for Hollow Metal Doors and Frames; 2002.
- P. NAAMM HMMA 831 - Hardware Locations for Hollow Metal Doors and Frames; 2011.
- Q. NAAMM HMMA 840 - Guide Specifications For Receipt, Storage and Installation of Hollow Metal Doors and Frames; 2017.
- R. NAAMM HMMA 860 - Guide Specifications for Hollow Metal Doors and Frames; 2018.
- S. NAAMM HMMA 861 - Guide Specifications for Commercial Hollow Metal Doors and Frames; 2014.
- T. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2022.

- U. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; 2022.
- V. SDI 117 - Manufacturing Tolerances for Standard Steel Doors and Frames; 2023.
- W. UL (DIR) - Online Certifications Directory; Current Edition.
- X. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

#### **1.04 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes; and one copy of referenced standards/guidelines.
- C. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and identifying location of different finishes, if any. Provide schedule of doors and frames using same reference numbers for openings as those on drawings.
- D. Installation Instructions: Manufacturer's published instructions, including any special installation instructions relating to this project.
- E. Manufacturer's Certificate: Certification that products meet or exceed specified requirements for small and large missile impact requirements for exterior doors and frames.

#### **1.05 QUALITY ASSURANCE**

- A. Maintain at project site copies of reference standards relating to installation of products specified.
- B. Provide hollow metal frames complying with ANSI A250.8 (SDI-100) Recommended Specifications for Standard Steel Doors and Frames.
- C. Provide each type of door and frame unit from a single manufacturer specializing in manufacturing of that type of work.

#### **1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Comply with ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
- B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion and adverse effects on factory applied painted finish.
- C. Inspect hollow metal doors and frames upon delivery for damage. Minor damage may be repaired, if repair work is equal in all respects to new work and acceptable to Architect; otherwise, remove and replace damaged items as directed.
- D. Store doors and frames under a covered protected area, placed on wood sills at least 4 inches off of ground surface.

### **PART 2 PRODUCTS**

#### **2.01 MANUFACTURERS**

- A. Hollow Metal Doors and Frames:
  - 1. Ceco Door, an Assa Abloy Group company: [www.assaabloydss.com](http://www.assaabloydss.com).
  - 2. Republic Doors: [www.republicdoor.com](http://www.republicdoor.com).
  - 3. Steelcraft, an Allegion brand: [www.allegion.com/us](http://www.allegion.com/us).
  - 4. Curries Company.
  - 5. Adams Rite
  - 6. Substitutions: See Section 016000 - Product Requirements.

#### **2.02 PERFORMANCE REQUIREMENTS**

- A. Materials:

1. Hot-Rolled Steel Sheets and Strip: Commercial quality carbon steel, complying with ASTM A569 and ASTM A568.
  2. Cold-Rolled Steel Sheets: Commercial quality carbon steel, complying with ASTM A366 and ASTM A568.
  3. Inserts, Anchors Bolts and Fasteners: Manufacturer's standard units, except hot-dip galvanize items to be built into exterior walls, complying with ASTM A153 Class C or D as applicable.
- B. Requirements for All Doors and Frames:
1. Accessibility: Comply with ICC A117.1 and ADA Standards.
  2. Exterior Door Top Closures: Flush end closure channel, with top and door faces aligned.
    - a. Reinforce top and bottom of doors with a continuous steel channel extending the full width of the door and welded to the face sheet. Doors with an inverted channel to include a steel closure channel, screw attached and welded in place with the web of the channel flush with the face sheets of the door. Plastic or composite channel fillers are not acceptable
  3. Door Edge Profile: Hinged edge square, and lock edge beveled.
  4. Typical Door Face Sheets: Flush.
  5. Glazed Lights: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings. Style: Manufacturer's standard.
  6. Hardware Preparations, Selections and Locations: Comply with NAAMM HMMA 830 and NAAMM HMMA 831 or BHMA A156.115 and ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
    - a. Prepare doors and frames to receive mortised and concealed finish hardware in accordance with final Finish Hardware Schedule and templates provided by hardware supplier. Comply with applicable requirements of ANSI A115 series specifications for door and frame preparation for hardware.
    - b. Reinforce doors and frames to receive surface-applied hardware. Drilling and tapping for surface-applied finish hardware may be done at project site.
    - c. Locate finish hardware as shown on final shop drawings or, if not shown, in accordance with "Recommended Locations for Builder's Hardware", published by Door and Hardware Institute.
  7. Zinc Coating for Typical Interior and/or Exterior Locations: Provide metal components zinc-coated (galvanized) and/or zinc-iron alloy-coated (galvannealed) by the hot-dip process in accordance with ASTM A653/A653M, with manufacturer's standard coating thickness, unless noted otherwise for specific hollow metal doors and frames.
    - a. Based on SDI Standards: Provide at least A40/ZF120 (galvannealed) when necessary, coating not required for typical interior door applications, and at least A60/ZF180 (galvannealed) for corrosive and exterior locations.
- C. Vertical Edges: Vertical edges to have the face sheets joined by a continuous weld extending the full height of the door. Welds are to be ground, filled and dressed smooth. Beveled Lock Edge, 1/8 inch in 2 inches (3 mm in 50 mm). Plastic or composite channel fillers are not acceptable.
- D. Top/Bottom Edges: Reinforce top and bottom of doors with a continuous steel channel extending the full width of the door and welded to the face sheet. Doors with an inverted channel to include a steel closure channel, screw attached and welded in place with the web of the channel flush with the face sheets of the door. Plastic or composite channel fillers are not acceptable.
- E. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

**2.03 HOLLOW METAL DOORS**

- A. Door Finish: Factory primed and field finished. Must be sprayed with two (2) final coats.
- B. Interior Doors, Non-Fire Rated:
  - 1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
    - a. Level 2 - Heavy-duty.
    - b. Physical Performance Level B 500 000 cycles; in accordance with ANSI/SDI A250.4.
    - c. Model 2 - Seamless.
    - d. Door Face Metal Thickness: 18 gage, 0.042 inch (1.0 mm), minimum.
    - e. Zinc Coating: A60/ZF180 galvanized coating; ASTM A653/A653M.
      - 1) Provide at doors in wet areas and/or as called for in the schedule.
  - 2. Door Thickness: 1-3/4 inches (44.5 mm), nominal.
- C. Fire-Rated Doors:
  - 1. Fire Rating: As indicated on Door Schedule, tested in accordance with UL 10C and NFPA 252 ("positive pressure fire tests").
    - a. Temperature-Rise Rating (TRR) Across Door Thickness: In accordance with local building code and authorities having jurisdiction.
    - b. Provide units listed and labeled by UL (DIR) or ITS (DIR).
    - c. Attach fire rating label to each fire rated unit.
  - 2. Door Core Material: Manufacturers standard core material/construction in compliance with requirements.
  - 3. Door Thickness: 1-3/4 inches (44.5 mm), nominal.
- D. Type <> ,Hurricane Resistant Doors:
  - 1. Comply with Florida Building Code (FBC) test protocols for High Velocity Hurricane Zone (HVHZ) FBC TAS 201, FBC TAS 202 and FBC TAS 203.
  - 2. Design and size door and frame components to withstand the specified load requirements without damage or permanent set, when tested in accordance with ASTM E330/E330M.
    - a. Design Wind Loads: Comply with requirements of ASCE 7.
    - b. Wind-Borne Debris Resistance: Door and frame components shall have FLA (PAD) approval or Miami (APD) approval for Large and Small Missile impact and pressure cycling at design wind loads.
  - 3. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
    - a. Level 3 - Extra Heavy-duty.
    - b. Physical Performance Level A, 1,000,000 cycles; in accordance with ANSI/SDI A250.4.
    - c. Model 1 - Full Flush.
    - d. Door Face Metal Thickness: 16 gauge, 0.053 inch (1.3 mm), minimum.
    - e. Zinc Coating: A60/ZF180 galvanized coating; ASTM A653/A653M.
  - 4. Core Material: Polystyrene.
  - 5. Door Thermal Resistance: R-Value of 6.0 minimum, for installed thickness of polystyrene.
  - 6. Door Thickness: 1-3/4 inches (44.5 mm), nominal.

**2.04 HOLLOW METAL FRAMES**

- A. Comply with standards and/or custom guidelines as indicated for corresponding door in accordance with applicable door frame requirements.
- B. Frame Finish: Factory primed and field finished. Must be sprayed with two (2) final coats.
- C. General:
  - 1. Provide floor anchors at each jamb and mullion in addition to required wall anchors.
- D. Exterior Door Frames: Fully welded and mitered corners with concealed fastenings.
  - 1. Galvanizing: Components hot-dipped zinc-iron alloy-coated (galvanized) in accordance with ASTM A653/A653M, with A60/ZF180 coating.

2. Frame Metal Thickness: 14 gage, 0.067 inch (1.7 mm), minimum.
  3. Weatherstripping: Separate, see Section 087100.
  4. Wind-Borne Debris Resistance: Door and frame components shall have Miami (APD) approval for Large and Small Missile impact and pressure cycling at design wind loads.
- E. Interior Door Frames, Non-Fire Rated: Full profile/continuously welded type.
1. Frame Metal Thickness: 16 gage, 0.053 inch (1.3 mm), minimum.
  2. Galvanizing: Components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A653/A653M, with A60/ZF180 coating.
    - a. Provide at doors in wet areas and/or as called for in the schedule.
- F. Door Frames, Fire-Rated: Full profile/continuously welded type.
1. Fire Rating: Same as door, labeled.
  2. Frame Metal Thickness: 16 gage, 0.053 inch (1.3 mm), minimum.
- G. Hurricane-Resistant Door Frames: With same hurricane resistance as door; face welded or full profile/continuously welded construction, ground smooth, fully prepared and reinforced for hardware installation.
1. Frame Metal Thickness: 14 gage, 0.067 inch (1.7 mm), minimum.

## 2.05 ACCESSORIES

- A. Glazing: As specified in Section 088000, factory installed.
- B. Silencers: Resilient rubber or vinyl, fitted into drilled hole; 3 on strike side of single door, 3 on center mullion of pairs, and 2 on head of pairs without center mullions.

## 2.06 FABRICATION

- A. General
1. Fabricate steel door and frame units to be rigid, neat in appearance and free from defects, warp or buckle. Wherever practicable, fit and assemble units in manufacturer's plant. Clearly identify work that cannot be permanently factory-assembled before shipment, to assure proper assembly at project site.
  2. Fabricate exposed faces of doors and panels, including stiles and rails of non-flush units, from only cold-rolled steel.
  3. Fabricate frames, concealed stiffeners, reinforcement, edge channels, louvers, and moldings from either cold-rolled or hot-rolled steel (at fabricator's option).
  4. Fabricate doors indicated to be galvanized from galvanized sheet steel. Close top and bottom edges as integral part of door construction or by addition of inverted galvanized steel channels.
  5. Exposed Fasteners: Unless otherwise indicated, provide countersunk flat Phillips heads for exposed screws and bolts.

## 2.07 FINISHES

- A. Shop Paint: Clean treat and paint exposed surfaces of steel door and frame units. Clean steel surfaces of mill scale, rust, oil, grease, dirt, and other foreign matter before applying paint. Provide shop coat of prime paint of even consistency to provide a uniform finish surface ready to receive final coats. Prior to application of any hardware components apply finish coat of paint.
1. Finish coats of paint on doors shall be shop applied.
  2. Finish coat on frames may be field applied.

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that opening sizes and tolerances are acceptable.
- C. Verify that finished walls are in plane to ensure proper door alignment.

### **3.02 PREPARATION**

- A. Coat inside of frames to be installed in masonry or to be grouted, with bituminous coating, prior to installation.

### **3.03 INSTALLATION**

- A. Install doors and frames in accordance with manufacturer's instructions and related requirements of specified door and frame standards or custom guidelines indicated.
- B. Install frames prior to construction of enclosing walls and ceilings.
- C. Install fire rated units in accordance with NFPA 80.
- D. Coordinate frame anchor placement with wall construction. Locate 3 wall anchors, of type suitable for construction type, per jamb at hinge and strike levels. Locate floor anchor at each jamb and mullion.
- E. Grout frames in masonry construction, using hand trowel methods; brace frames so that pressure of grout before setting will not deform frames.
- F. Install door hardware as specified in Section 087100.
- G. Coordinate installation of electrical connections to electrical hardware items.
- H. Touch up damaged factory finishes.

### **3.04 TOLERANCES**

- A. Clearances Between Door and Frame: Comply with related requirements of specified frame standards or custom guidelines indicated in accordance with SDI 117 or NAAMM HMMA 861.
- B. Maximum Diagonal Distortion: 1/16 inch (1.6 mm) measured with straight edge, corner to corner.

### **3.05 ADJUSTING**

- A. Adjust for smooth and balanced door movement.

### **3.06 SCHEDULE**

- A. Refer to Door and Frame Schedule on the drawings.

**END OF SECTION**

**SECTION 081416  
FLUSH WOOD DOORS****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Pre-finished solid core wood doors; flush configuration with veneer faces; non-rated.

**1.02 REFERENCE STANDARDS**

- A. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2022.
- B. WDMA I.S. 1A - Interior Architectural Wood Flush Doors; 2021, with Errata (2022).

**1.03 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Indicate door core materials and construction; veneer species, type and characteristics.
- C. Shop Drawings: Show doors and frames, elevations, sizes, types, swings, undercuts, beveling, extent of blocking for hardware, factory machining, factory finishing, cutouts for glazing and other details.
- D. Samples: Submit two samples of door veneer, 12 by 12 inch (\_\_\_\_ by \_\_\_\_ mm) in size illustrating wood grain, stain color, and sheen.
- E. Manufacturer's Installation Instructions: Indicate special installation instructions.
- F. Warranty, executed in Owner's name.

**1.04 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. Installed Fire Rated Door and Transom Panel Assembly: Conform to NFPA 80 for fire-rating as scheduled. Provide label of an approved nationally recognized independent testing laboratory on each door.

**1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Package, deliver and store doors in accordance with specified quality standard.
- B. Accept doors on site in manufacturer's packaging. Inspect for damage.
- C. Protect doors with resilient packaging [ <> ]. Do not store in damp or wet areas; or in areas where sunlight might bleach veneer.

**1.06 WARRANTY**

- A. See Section 017800 - Closeout Submittals for additional warranty requirements.
- B. Interior Doors: Provide manufacturer's warranty for 2 years.
- C. Include coverage for delamination of veneer, warping beyond specified installation tolerances, and defective materials.

**PART 2 PRODUCTS****2.01 MANUFACTURERS**

- A. Wood Veneer Faced Doors:
  1. Eggers Industries: [www.eggersindustries.com](http://www.eggersindustries.com).
  2. Graham Wood Doors: [www.grahamdoors.com](http://www.grahamdoors.com).
  3. Marshfield DoorSystems, Inc: [www.marshfielddoors.com](http://www.marshfielddoors.com).
  4. VT Industries, Inc; \_\_\_\_: [www.vtindustries.com/#sle](http://www.vtindustries.com/#sle).
  5. Algoma Hardwoods; [www.algomahardwoods.com](http://www.algomahardwoods.com).
  6. Substitutions: See Section 016000 - Product Requirements.

**2.02 DOORS**

- A. Doors: See drawings for locations and additional requirements.
  - 1. Quality Standard: Custom Grade, Standard Duty performance, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.
  - 2. Wood Veneer Faced Doors: 5-ply unless otherwise indicated.
- B. Interior Doors: 1-3/4 inches (44 mm) thick unless otherwise indicated; flush construction.
  - 1. Provide solid core doors at all locations.

**2.03 DOOR AND PANEL CORES**

- A. Non-Rated Solid Core and 20 Minute Rated Doors: Type particleboard core (PC), plies and faces as indicated. ANSI A208.1, Grade LD-2, made with binder containing no urea-formaldehyde resin.

**2.04 DOOR FACINGS**

- A. Veneer Facing for Transparent Finish: White birch, HPVA Grade AA, rotary cut, with book match between leaves of veneer, center balance match of spliced veneer leaves assembled on door or panel face.
  - 1. "Pair Match" each pair of doors; "Set Match" pairs of doors within 10 feet (3 m) of each other when doors are closed.

**2.05 ACCESSORIES**

- A. Glazing Stops: Wood, of same species as door facing, mitered corners; prepared for countersink style screws for non rated doors. Aluminum channel shaped for rated doors.

**2.06 DOOR CONSTRUCTION**

- A. Fabricate doors in accordance with door quality standard specified.
- B. For fire rated doors comply with requirements of NFPA 80.
- C. Factory cut and trim openings. Trim openings for non fire rated doors with manufacturer's stock solid wood moldings to match door finish.
- D. Factory cut openings for grilles as scheduled or indicated in Mechanical Drawings and Division 23.
- E. Cores Constructed with stiles and rails:
  - 1. Provide solid blocks at lock edge and top of door for closer for hardware reinforcement.
  - 2. Provide solid blocking for other throughbolted hardware.
- F. Factory machine doors for hardware other than surface-mounted hardware, in accordance with hardware requirements and dimensions.
- G. Factory fit doors for frame opening dimensions identified on shop drawings, with edge clearances in accordance with specified quality standard.
- H. Provide edge clearances in accordance with the quality standard specified.

**2.07 FINISHES - WOOD VENEER DOORS**

- A. Finish work in accordance with WDMA I.S. 1A for Grade specified and as follows:
  - 1. Transparent:
    - a. System - TR-6, Catalyzed Polyurethane.
    - b. Stain: match existing
    - c. Sheen: match existing.
- B. Factory finish doors in accordance with approved sample.
  - 1. If on site sanding or removal of seal of top and bottom edge occurs, re-seal top and bottom edges with sealer to match door facing
- C. Seal door top edge and bottom edge with color sealer to match door facing. Finish all faces of door.



- D. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.

## **2.08 ACCESSORIES**

- A. Glazing Stops: Wood, of same species as door facing, butted corners; prepared for countersink style tamper proof screws.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify existing conditions before starting work.
- B. Verify that opening sizes and tolerances are acceptable.
- C. Installer must examine door frames and verify that frames are correct type and have been installed as required for proper hanging of corresponding doors.
- D. Do not install doors in frame openings that are not plumb or are out-of-tolerance for size or alignment.

### **3.02 INSTALLATION**

- A. Condition doors to average prevailing humidity in installation area prior to hanging doors. Building shall be fully enclosed and have permanent climate control system operating.
- B. Install doors in accordance with manufacturer's instructions and specified quality standard.
- C. Factory-Finished Doors: Do not field cut or trim; if fit or clearance is not correct, replace door.
- D. Use machine tools to cut or drill for hardware.
- E. Coordinate installation of doors with installation of frames and hardware.
- F. Coordinate installation of glazing.
- G. Install door louvers plumb and level.

### **3.03 TOLERANCES**

- A. Comply with specified quality standard for fit and clearance tolerances.
- B. Comply with specified quality standard for telegraphing, warp, and squareness.

### **3.04 ADJUSTING**

- A. Adjust doors for smooth and balanced door movement.
- B. Adjust closers for full closure.
- C. Rehang and replace doors which do not swing or operate freely and properly.

### **3.05 PROTECTION**

- A. Protect installed wood doors from damage or deterioration until acceptance of work at Substantial Completion.

**END OF SECTION**



**SECTION 083100  
ACCESS DOORS AND PANELS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Ceiling-mounted access units.

**1.02 REFERENCE STANDARDS**

**1.03 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide sizes, types, finishes, hardware, scheduled locations, and details of adjoining work.
- C. Shop Drawings: Indicate exact position of each access door and/or panel unit.
- D. Manufacturer's Installation Instructions: Indicate installation requirements.

**1.04 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years documented experience.

**1.05 DELIVERY, STORAGE AND HANDLING**

- A. Package and ship per manufacturer's recommendations.
- B. Store per manufacturer's instructions.
  - 1. Store in dry area out of direct sunlight.

**1.06 WARRANTY**

- A. Provide manufacturer's written warranty.
- B. Warrant materials and fabrication against defects after completion and final acceptance of Work.
  - 1. Repair defects, or replace with new materials, faulty materials or fabrication developed during the warranty period at no expense to Owner.

**PART 2 PRODUCTS**

**2.01 CEILING-MOUNTED UNITS**

- A. Manufacturers:
  - 1. Nystrom, Inc; Architectural Access Door: [www.nystrom.com/#sle](http://www.nystrom.com/#sle).
  - 2. Substitutions: See Section 016000 - Product Requirements.
- B. Ceiling-Mounted Units: Factory-fabricated door and frame, fully assembled units with corner joints welded, filled and ground flush; square and without rack or warp; coordinate requirements with type of installation assembly being used for each unit.
  - 1. Material: Cold Rolled Steel.
  - 2. Style: Recessed door panel for infill with wall/ceiling finish.
    - a. Gypsum Board Mounting Criteria: Use drywall bead type frame.
  - 3. Door Style: 16 gauge cold rolled steel.
  - 4. Frames: 16 gage, 0.0598 inch (1.52 mm), minimum cold rolled steel.
  - 5. Primed and Factory Finish: Polyester powder coat; white powder coat.
  - 6. Door/Panel Size: 24x24.
  - 7. Hardware:
    - a. Hinges for Non-Fire-Rated Units: Concealed Continuous Piano Hinge.
    - b. Handle: No handle.

- c. Latch/Lock: Key operated cam latch, two keys for each unit.

## **2.02 FABRICATION**

- A. Manufacture each access panel assembly as an integral unit ready for installation.
- B. Welded construction: Furnish with a sufficient quantity of 1/4 inch mounting holes to secure access panels to types of supports indicated.
- C. Recessed panel: Form face of panel to provide specified recess for application of finish material. Reinforce panel as required to prevent buckling.
- D. Furnish number of latches required to hold door in flush, smooth plane when closed.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that rough openings are correctly sized and located.

### **3.02 PREPARATION**

- A. Clean surfaces thoroughly prior to proceeding with this work.
- B. Prepare surfaces using methods recommended by manufacturer for applicable substrates in accordance with project conditions.

### **3.03 INSTALLATION**

- A. Install units in accordance with manufacturer's instructions.
- B. Install frames plumb and level in openings, and secure units rigidly in place.
- C. Position units to provide convenient access to concealed equipment when necessary.

### **3.04 ADJUSTING AND CLEANING**

- A. Adjust panel after installation for proper operation.
- B. Remove and replace panels or frames that are warped, bowed, or damaged.

**END OF SECTION**

**SECTION 083613  
SECTIONAL DOORS****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Overhead sectional doors, electrically operated.
- B. Operating hardware and supports.
- C. Electrical controls.

**1.02 REFERENCE STANDARDS**

- A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2019a.
- B. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2021a.
- C. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014 (Reapproved 2021).
- D. DASMA 102 - American National Standard Specifications for Sectional Doors; 2018.
- E. NEMA ICS 2 - Industrial Control and Systems Controllers, Contactors and Overload Relays Rated 600 Volts; 2008 (Reaffirmed 2020).
- F. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2020.
- G. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- H. UL 325 - Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems; Current Edition, Including All Revisions.

**1.03 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate opening dimensions and required tolerances, connection details, anchorage spacing, hardware locations, and installation details.
- C. Manufacturer's Installation Instructions: Include any special procedures required by project conditions.
- D. Manufacturer's Qualification Statement.
- E. Installer's Qualification Statement.
- F. Operation Data: Include normal operation, troubleshooting, and adjusting.
- G. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

**1.04 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum \_\_\_\_\_ years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of type specified and with at least five years documented experience.

**1.05 WARRANTY**

- A. See Section 017800 - Closeout Submittals for warranty requirements.
- B. System warranty for 10 years against delamination of polystyrene foam from steel face.
- C. Correct defective Work within a five year period after Date of Substantial Completion.

**PART 2 PRODUCTS****2.01 MANUFACTURERS**

- A. Basis of Design: Sectional Overhead Steel Door. Series 426 manufactured by Overhead Door Corporation.
- B. Other Acceptable Manufacturers - Sectional Doors:
  - 1. Substitutions: See Section 016000 - Product Requirements.

**2.02 STEEL DOORS**

- A. Steel Doors: \_\_\_\_\_; follow the roof pitch operating style with track and hardware; complying with DASMA 102, Commercial application.
  - 1. Performance: Withstand positive and negative wind loads as calculated in accordance with applicable code without damage or permanent set, when tested in accordance with ASTM E330/E330M, using 10 second duration of maximum load.
    - a. Design Pressure of plus 50.0/minus 56.0lb/sq ft.
  - 2. Door Nominal Thickness: 2 inches (51 mm) thick.
  - 3. Exterior Finish: Factory finished with polyester baked enamel; White.
  - 4. Interior Finish: Factory finished with standard factory finish; White.
  - 5. Glazed Lights: four glazed lights per panel, one row; set in place with resilient glazing channel.
  - 6. Manual Operation: Pull rope.
  - 7. Electric Operation: Electric control station.
- B. Door Panels: Steel construction; outer steel sheet of 24 gauge, 0.0239 inch (0.61 mm) minimum thickness, Ribbed Exterior Surface profile; inner steel sheet of 20 gauge, 0.0359 inch (0.91 mm) minimum thickness, Ribbed profile; core reinforcement sheet steel roll formed to channel shape, rabbeted weather joints at meeting rails; expanded polystyrene (EPS) insulation.
- C. Glazing: Provide glazing treated and of thickness as required by the door performance rating requirements.

**2.03 COMPONENTS**

- A. Track: Galvanized steel angles, thickness as required by manufacturer and wind loads. Continuous one piece per side; galvanized steel mounting brackets.
- B. Sill Weatherstripping: Resilient hollow rubber strip, one piece; fitted to bottom of door panel, full length contact.
- C. Jamb Weatherstripping: Roll formed steel section full height of jamb, fitted with resilient weatherstripping, placed in moderate contact with door panels.
- D. Head Weatherstripping: EPDM rubber seal, one piece full length.
- E. Panel Joint Weatherstripping: Neoprene foam seal, one piece full length.
- F. Lock: Inside side mounted, adjustable keeper, spring activated latch bar with feature to retain in locked or retracted position; interior handle.

**2.04 MATERIALS**

- A. Sheet Steel: Hot-dipped galvanized steel sheet, ASTM A653/A653M, with G60/Z180 coating, plain surface.
- B. Insulation: Expanded polystyrene (EPS), bonded to facing.

**2.05 ELECTRIC OPERATION**

- A. Electric Operators:
  - 1. Mounting: Side mounted on cross head shaft.
  - 2. Motor Enclosure:

3. Motor Rating: 1hp hp (\_\_\_\_ W); continuous duty.
  4. Motor Voltage: 208 volts, single phase, 60 Hz.
  5. Motor Controller: NEMA ICS 2, full voltage, reversing magnetic motor starter.
  6. Controller Enclosure: NEMA 250, Type 1.
  7. Opening Speed: 12 inches per second (300 mm/s).
  8. Brake:
    - a. DC Disc type with selectable Progressive Braking for smooth stopping.
  9. Manual override in case of power failure.
  10. Refer to Section 260583 for electrical connections.
- B. Release:
1. Release shall be a pull and hold type mechanism with single cable operation and an integrated interlock switch on hoist units.
  2. Release shall consist of a manual disconnect door arm on trolley units.
- C. Hoist: Chain hoist consists of chain pocket wheel, chain guard and smooth hand chain on hoist units.
- D. Wiring Terminations: Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated; enclose terminal lugs in terminal box sized to comply with NFPA 70.
- E. Control Station: Provide standard three button (Open-Close-Stop) momentary-contact control device for each operator complying with UL 325.
1. Push-button operated control stations with open, close, and stop buttons.
  2. 24 volt circuit.
  3. Surface mounted, at interior door jamb.
  4. Entrapment Protection Devices: Provide sensing devices and safety mechanisms complying with UL 325.
    - a. Primary Device: Provide electric sensing edge, wireless sensing, NEMA 1 photo eye sensors, or NEMA 4X photo eye sensors as required with momentary-contact control device.
- F. Safety Edge: Located at bottom of sectional door panel, full width; electro-mechanical sensitized type, wired to stop and reverse door direction upon striking object; hollow neoprene covered to provide weatherstrip seal.
- G. Provide radio control antenna detector.
- H. Control Accessories:
1. Hand Held Transmitter: Digital control, and resettable.
    - a. Six count.
- I. Special Operation:
1. Radio Control Operation
  2. Commerical Light Package (Red - Green)
  3. Auxiliary Output Module for up, down, and mid-stop limit status via several auxiliary sets of dry contacts that are microprocessor controlled. ADA compliant outputs that activate when door is moving up, down, or both directions and can be configured using the on board keypad.

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. Install door unit assembly in accordance with manufacturer's instructions.
- B. Anchor assembly to wall construction and building framing without distortion or stress.
- C. Securely brace door tracks suspended from structure. Secure tracks to structural members only.
- D. Fit and align door assembly including hardware.

- E. Coordinate installation of electrical service. Complete power and control wiring from disconnect to unit components.

**3.02 ADJUSTING**

- A. Adjust door assembly for smooth operation and full contact with weatherstripping.

**3.03 CLEANING**

- A. Clean doors and frames and glazing.
- B. Remove temporary labels and visible markings.

**3.04 PROTECTION**

- A. Protect installed products from damage until Date of Substantial Completion.
- B. Do not permit construction traffic through overhead door openings after adjustment and cleaning.

**END OF SECTION**



**SECTION 087100  
DOOR HARDWARE****PART 1 GENERAL****1.01 SUMMARY:**

- A. Section Includes: Finish Hardware for door openings, except as otherwise specified herein.
  - 1. Door hardware for steel (hollow metal) doors.
  - 2. Door hardware for aluminum doors.
  - 3. Door hardware for wood doors.
  - 4. Door hardware for other doors indicated.
  - 5. Keyed cylinders as indicated.
- B. References: Comply with applicable requirements of the following standards. Where these standards conflict with other specific requirements, the most restrictive shall govern.
  - 1. Builders Hardware Manufacturing Association (BHMA)
  - 2. NFPA 101 Life Safety Code
  - 3. NFPA 80 -Fire Doors and Windows
  - 4. ANSI-A156.xx- Various Performance Standards for Finish Hardware
  - 5. UL10C – Positive Pressure Fire Test of Door Assemblies
  - 6. ANSI-A117.1 – Accessible and Usable Buildings and Facilities
  - 7. DHI /ANSI A115.IG – Installation Guide for Doors and Hardware
  - 8. ICC – International Building Code
- C. Intent of Hardware Groups
  - 1. Should items of hardware not definitely specified be required for completion of the Work, furnish such items of type and quality comparable to adjacent hardware and appropriate for service required.
  - 2. Where items of hardware aren't definitely or correctly specified, are required for completion of the Work, a written statement of such omission, error, or other discrepancy to be submitted to Architect, prior to date specified for receipt of bids for clarification by addendum; or, furnish such items in the type and quality established by this specification, and appropriate to the service intended.
- D. Allowances
  - 1. Refer to Division 1 for allowance amount and procedures.
- E. Alternates
  - 1. Refer to Division 1 for Alternates and procedures.

**1.02 SUBSTITUTIONS:**

- A. Comply with Division 1.

**1.03 SUBMITTALS:**

- A. Comply with Division 1.
- B. Special Submittal Requirements: Combine submittals of this Section with Sections listed below to ensure the "design intent" of the system/assembly is understood and can be reviewed together.
- C. Product Data: Manufacturer's specifications and technical data including the following:
  - 1. Detailed specification of construction and fabrication.
  - 2. Manufacturer's installation instructions.
  - 3. Wiring diagrams for each electric product specified. Coordinate voltage with electrical before submitting.
  - 4. Submit 6 copies of catalog cuts with hardware schedule.
  - 5. Provide 9001-Quality Management and 14001-Environmental Management for products listed in Materials Section 2.2

- D. Shop Drawings - Hardware Schedule: Submit 6 complete reproducible copy of detailed hardware schedule in a vertical format.
  - 1. List groups and suffixes in proper sequence.
  - 2. Completely describe door and list architectural door number.
  - 3. Manufacturer, product name, and catalog number.
  - 4. Function, type, and style.
  - 5. Size and finish of each item.
  - 6. Mounting heights.
  - 7. Explanation of abbreviations and symbols used within schedule.
  - 8. Detailed wiring diagrams, specially developed for each opening, indicating all electric hardware, security equipment and access control equipment, and door and frame rough-ins required for specific opening.
- E. Templates: Submit templates and "reviewed Hardware Schedule" to door and frame supplier and others as applicable to enable proper and accurate sizing and locations of cutouts and reinforcing.
  - 1. Templates, wiring diagrams and "reviewed Hardware Schedule" of electrical terms to electrical for coordination and verification of voltages and locations.
- F. Samples: (If requested by the Architect)
  - 1. 1 sample of Lever and Rose/Escutcheon design, (pair).
  - 2. 3 samples of metal finishes
- G. Contract Closeout Submittals: Comply with Division 1 including specific requirements indicated.
  - 1. Operating and maintenance manuals: Submit 3 sets containing the following.
    - a. Complete information in care, maintenance, and adjustment, and data on repair and replacement parts, and information on preservation of finishes.
    - b. Catalog pages for each product.
    - c. Name, address, and phone number of local representative for each manufacturer.
    - d. Parts list for each product.
  - 2. Copy of final hardware schedule, edited to reflect, "As installed".
  - 3. Copy of final keying schedule
  - 4. As installed "Wiring Diagrams" for each piece of hardware connected to power, both low voltage and 110 volts.
  - 5. One set of special tools required for maintenance and adjustment of hardware, including changing of cylinders.

#### 1.04 QUALITY ASSURANCE

- A. Comply with Division 1.
  - 1. Statement of qualification for distributor and installers.
  - 2. Statement of compliance with regulatory requirements and single source responsibility.
  - 3. Distributor's Qualifications: Firm with 3 years experience in the distribution of commercial hardware.
    - a. Distributor to employ full time Architectural Hardware Consultants (AHC) for the purpose of scheduling and coordinating hardware and establishing keying schedule.
    - b. Hardware Schedule shall be prepared and signed by an AHC.
  - 4. Installer's Qualifications: Firm with 3 years experienced in installation of similar hardware to that required for this Project, including specific requirements indicated.
  - 5. Regulatory Label Requirements: Provide testing agency label or stamp on hardware for labeled openings.
    - a. Provide UL listed hardware for labeled and 20 minute openings in conformance with requirements for class of opening scheduled.
    - b. Underwriters Laboratories requirements have precedence over this specification where conflict exists.

6. Single Source Responsibility: Except where specified in hardware schedule, furnish products of only one manufacturer for each type of hardware.
- B. Review Project for extent of finish hardware required to complete the Work. Where there is a conflict between these Specifications and the existing hardware, notify the Architect in writing and furnish hardware in compliance with the Specification unless otherwise directed in writing by the Architect.

#### **1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Packing and Shipping: Comply with Division 1.
  1. Deliver products in original unopened packaging with legible manufacturer's identification.
  2. Package hardware to prevent damage during transit and storage.
  3. Mark hardware to correspond with "reviewed hardware schedule".
  4. Deliver hardware to door and frame manufacturer upon request.
- B. Storage and Protection: Comply with manufacturer's recommendations.

#### **1.06 PROJECT CONDITIONS:**

- A. Coordinate hardware with other work. Furnish hardware items of proper design for use on doors and frames of the thickness, profile, swing, security and similar requirements indicated, as necessary for the proper installation and function, regardless of omissions or conflicts in the information on the Contract Documents.
- B. Review Shop Drawings for doors and entrances to confirm that adequate provisions will be made for the proper installation of hardware.

#### **1.07 WARRANTY:**

- A. Refer to Conditions of the Contract
- B. Manufacturer's Warranty:
  1. Closers: Ten years
  2. Exit Devices: Five Years
  3. Locksets & Cylinders: Three years
  4. All other Hardware: Two years.

#### **1.08 OWNER'S INSTRUCTION:**

- A. Instruct Owner's personnel in operation and maintenance of hardware units.

#### **1.09 MAINTENANCE:**

- A. Extra Service Materials: Deliver to Owner extra materials from same production run as products installed. Package products with protective covering and identify with descriptive labels. Comply with Division 1 Closeout Submittals Section.
  1. Special Tools: Provide special wrenches and tools applicable to each different or special hardware component.
  2. Maintenance Tools: Provide maintenance tools and accessories supplied by hardware component manufacturer.
  3. Delivery, Storage and Protection: Comply with Owner's requirements for delivery, storage and protection of extra service materials.
- B. Maintenance Service: Submit for Owner's consideration maintenance service agreement for electronic products installed.

### **PART 2 PRODUCTS**

#### **2.01 MANUFACTURERS:**

- A. The following manufacturers are approved subject to compliance with requirements of the Contract Documents. Approval of manufacturers other than those listed shall be in accordance with Division 1.

<u>Item:</u>	<u>Manufacturer:</u>	<u>Approved Equal:</u>
Hinges	Stanley	Bommer, McKinney
Continuous Hinges	Stanley	Select, ABH
Mortise Locksets	Best	As Approved
Cylinders	Best	As Approved
Exit Devices	Sargent	Von Duprin 98/99
Closers	Stanley D-4550	LCN 4040XP, Sargent 351
Protection Plates	Trimco	Burns, Rockwood
Door Stops (Wall/Floor)	Trimco	Burns, Rockwood
Flush Bolts	Trimco	ABH, Burns
Coordinator & Brackets	Trimco	ABH, Burns
Threshold & Gasketing	National Guard	Reese, K.N. Crowder
Fire Rated Door Hardware	ASSA ABLOY	As Approved

**2.02 MATERIALS:**

- A. Hinges: Shall be Five Knuckle Ball bearing hinges
1. Template screw hole locations
  2. Bearings are to be fully hardened.
  3. Bearing shell is to be consistent shape with barrel.
  4. Minimum of 2 permanently lubricated non-detachable bearings on standard weight hinge and 4 permanently lubricated bearing on heavy weight hinges.
  5. Equip with easily seated, non-rising pins.
  6. Non Removable Pin screws shall be slotted stainless steel screws.
  7. Hinges shall be full polished, front, back and barrel.
  8. Hinge pin is to be fully plated.
  9. Bearing assembly is to be installed after plating.
  10. Sufficient size to allow 180-degree swing of door
  11. Furnish five knuckles with flush ball bearings
  12. Provide hinge type as listed in schedule.
  13. Furnish 3 hinges per leaf to 7 foot 6 inch height. Add one for each additional 30 inches in height or fraction thereof.
  14. Tested and approved by BHMA for all applicable ANSI Standards for type, size, function and finish
  15. UL10C listed for Fire rated doors.
- B. Geared Continuous Hinges:
1. Tested and approved by BHMA for ANSI A156.26-1996 Grade 1
  2. Anti-spinning through fastener
  3. UL10C listed for 3 hour Fire rating
  4. Non-handed
  5. Lifetime warranty
  6. Provide Fire Pins for 3-hour fire ratings
  7. Sufficient size to permit door to swing 180 degrees
- C. Fire Rated Door Entry Trim:
1. Manufacturer: ASSA ABLOY or approved equal
  2. Series: D3676 Standard Series
  3. Lever Profile: 3080(E)-01
  4. Cylinder: Mortise Cylinder 4036-01
  5. Finish: 630 (US32D Satin Stainless Steel)
- D. Mortise Type Locks and Latches:
1. Tested and approved by BHMA for ANSI A156.13, Series 1000, Operational Grade 1, Extra-Heavy Duty, Security Grade 2 and be UL10C.

2. Furnish UL or recognized independent laboratory certified mechanical operational testing to 4 million cycles minimum.
  3. Provide 9001-Quality Management and 14001-Environmental Management.
  4. Fit ANSI A115.1 door preparation
  5. Functions and design as indicated in the hardware groups
  6. Solid, one-piece, 3/4-inch (19mm) throw, anti-friction latchbolt made of self-lubricating stainless steel
  7. Deadbolt functions shall have 1 inch (25mm) throw bolt made of hardened stainless steel
  8. Latchbolt and Deadbolt are to extend into the case a minimum of 3/8 inch (9.5mm) when fully extended
  9. Auxiliary deadlatch to be made of one piece stainless steel, permanently lubricated
  10. Provide sufficient curved strike lip to protect door trim
  11. Lever handles must be of forged or cast brass, bronze or stainless steel construction and conform to ANSI A117.1. Levers that contain a hollow cavity are not acceptable
  12. Lock shall have self-aligning, thru-bolted trim
  13. Levers to operate a roller bearing spindle hub mechanism
  14. Mortise cylinders of lock shall have a concealed internal setscrew for securing the cylinder to the lockset. The internal setscrew will be accessible only by removing the core, with the control key, from the cylinder body.
  15. Spindle to be designed to prevent forced entry from attacking of lever
  16. Provide locksets with 7-pin removable and interchangeable core cylinders
  17. Each lever to have independent spring mechanism controlling it
  18. Core face must be the same finish as the lockset.
- E. Cylindrical Type Locks and Latchsets:
1. Tested and approved by BHMA for ANSI A156.2, Series 4000, Operational Grade 1, Extra-Heavy Duty, and be UL10C listed.
  2. Provide 9001-Quality Management and 14001-Environmental Management.
  3. Fit modified ANSI A115.2 door preparation.
  4. Locksets and cores to be of the same manufacturer to maintain complete lockset warranty
  5. Locksets to have anti-rotational studs that are thru-bolted
  6. Keyed lever shall not have exposed "keeper" hole
  7. Each lever to have independent spring mechanism controlling it
  8. 2-3/4 inch (70 mm) backset
  9. 9/16 inch (14 mm) throw latchbolt
  10. Provide sufficient curved strike lip to protect door trim
  11. Outside lever sleeve to be seamless, of one-piece construction made of a hardened steel alloy
  12. Keyed lever to be removable only after core is removed, by authorized control key
  13. Provide locksets with 7-pin removable and interchangeable core cylinders
  14. Hub, side plate, shrouded rose, locking pin to be a one-piece casting with a shrouded locking lug.
  15. Locksets outside locked lever must withstand minimum 1400 inch pounds of torque. In excess of that, a replaceable part will shear. Key from outside and inside lever will still operate lockset.
  16. Core face must be the same finish as the lockset.
  17. Functions and design as indicated in the hardware groups.
- F. Exit Devices:
1. Fire Rated Doors:
    - a. Manufacturer: ASSA ABLOY or approved equal
    - b. Series: D3676 (1-1/2 hour rated assemblies)
    - c. Finish: 630 (US32D Satin Stainless Steel)

2. All Other Doors:
  - a. Exit devices to meet or exceed BHMA for ANSI 156.3, Grade 1.
  - b. Exit devices to be tested and certified by UL or by a recognized independent laboratory for mechanical operational testing to 10 million cycles minimum with inspection confirming Grade 1 Loaded Forces have been maintained.
  - c. Exit devices chassis to be investment cast steel, zinc dichromate.
  - d. Exit devices to have stainless steel deadlocking  $\frac{3}{4}$ " through latch bolt.
  - e. Exit devices to be equipped with sound dampening on touchbar.
  - f. Non-fire rated exit devices to have cylinder dogging.
  - g. Non-fire rated exit devices to have  $\frac{1}{4}$ " minimum turn hex key dogging.
  - h. Touchpad to be "T" style constructed of architectural metal with matching metal end caps.
  - i. Touchbar assembly on wide style exit devices to have a  $\frac{1}{4}$ " clearance to allow for vision frames.
  - j. All exposed exit device components to be of architectural metals and "true" architectural finishes.
  - k. Provide strikes as required by application.
  - l. Fire exit hardware to conform to UL10C and UBC 7-2. UL tested for Accident Hazard.
  - m. Exit device to be heavy investment cast stainless steel. The strike is to be black powder coated finish.
  - n. Exit devices to have field reversible handing.
  - o. Provide heavy duty vandal resistant lever trim with heavy duty investment cast stainless steel components and extra strength shock absorbing overload springs. Lever shall not require resetting. Lever design to match locksets and latchsets.
  - p. Provide 9001-Quality Management and 14001-Environmental Management.
  - q. Vertical Latch Assemblies to have gravity operation, no springs.
- G. Cylinders:
  1. Provide the necessary cylinder housings, collars, rings & springs as recommended by the manufacturer for proper installation.
  2. Provide the proper cylinder cams or tail piece as required to operate all locksets and other keyed hardware items listed in the hardware sets.
  3. Coordinate and provide as required for related sections.
- H. Door Closers:
  1. Fire Rated Door:
    - a. Manufacturer: ASSA ABLOY
    - b. Series: D-DC-351P9-689 Regular Duty Parallel Arm
  2. All Other Doors:
    - a. Tested and approved by BHMA for ANSI 156.4, Grade 1
    - b. UL10C certified
    - c. Provide 9001-Quality Management and 14001-Environmental Management.
    - d. Closer shall have extra-duty arms and knuckles
    - e. Conform to ANSI 117.1
    - f. Maximum  $2 \frac{7}{16}$  inch case projection with non-ferrous cover
    - g. Separate adjusting valves for closing and latching speed, and backcheck
    - h. Provide adapter plates, shim spacers and blade stop spacers as required by frame and door conditions
    - i. Full rack and pinion type closer with  $1\frac{1}{2}$ " minimum bore
    - j. Mount closers on non-public side of door, unless otherwise noted in specification
    - k. Closers shall be non-handed, non-sized and multi-sized.
- I. Door Stops: Provide a dome floor or wall stop for every opening as listed in the hardware sets.
  1. Wall stop and floor stop shall be wrought bronze, brass or stainless steel.

2. Provide fastener suitable for wall construction.
  3. Coordinate reinforcement of walls where wall stop is specified.
  4. Provide dome stops where wall stops are not practical. Provide spacers or carpet riser for floor conditions encountered
- J. Over Head Stops: Provide a Surface mounted or concealed overhead when a floor or wall stop cannot be used or when listed in the hardware set.
1. Concealed overhead stops shall be heavy duty bronze or stainless steel.
  2. Surface overhead stops shall be heavy duty bronze or stainless steel.
- K. Push Plates: Provide with four beveled edges ANSI J301, .050 thickness, size as indicated in hardware set. Furnish oval-head countersunk screws to match finish.
- L. Pulls with plates: Provide with four beveled edges ANSI J301, .050 thickness Plates with ANSI J401 Pull as listed in hardware set. Provide proper fasteners for door construction.
- M. Kickplates: Provide with four beveled edges ANSI J102, 10 inches high by width less 2 inches on single doors and 1 inch on pairs of doors. Furnish oval-head countersunk screws to match finish.
- N. Seals: All seals shall be finished to match adjacent frame color. Seals shall be furnished as listed in schedule. Material shall be UL listed for labeled openings.
- O. Weatherstripping: Provide at head and jambs only those units where resilient or flexible seal strip is easily replaceable. Where bar-type weatherstrip is used with parallel arm mounted closers install weatherstrip first.
1. Weatherstrip shall be resilient seal of (Neoprene, Polyurethane, Vinyl, Pile, Nylon Brush, Silicone)
  2. UL10C Positive Pressure rated seal set when required.
- P. Door Bottoms/Sweeps: Surface mounted or concealed door bottom where listed in the hardware sets.
1. Door seal shall be resilient seal of (Neoprene, Polyurethane, Nylon Brush, Silicone)
  2. UL10C Positive Pressure rated seal set when required.
- Q. Thresholds: Latching Panic Thresholds shall be aluminum beveled type with maximum height of ½" for conformance with ADA requirements. Furnish as specified and per details. Provide fasteners and screws suitable for floor conditions.
- R. Silencers: Furnish silencers on all interior frames, 3 for single doors, 2 for pairs. Omit where any type of seals occur.

**2.03 FINISH:**

- A. Designations used in Schedule of Finish Hardware - 3.05, and elsewhere to indicate hardware finishes are those listed in ANSI/BHMA A156.18 including coordination with traditional U.S. finishes shown by certain manufacturers for their products
- B. Powder coat door closers to match other hardware, unless otherwise noted.
- C. Aluminum items shall be finished to match predominant adjacent material. Seals to coordinate with frame color.

**2.04 KEYS AND KEYING:**

- A. Key Supplier has to be within a 50 mile radius of the job site.
- B. Provide keyed brass construction cores and keys during the construction period. Construction control and operating keys and core shall not be part of the Owner's permanent keying system or furnished in the same keyway (or key section) as the Owner's permanent keying system.
- C. Cylinders, removable and interchangeable core system: Best CORMAX™ Patented 7-pin.
- D. Permanent keys and cores: Stamped with the applicable key mark for identification. These visual key control marks or codes will not include the actual key cuts. Permanent keys will also

be stamped "Do Not Duplicate."

- E. Transmit Grand Masterkeys, Masterkeys and other Security keys to Owner by Registered Mail, return receipt requested.
- F. Furnish keys in the following quantities:
  - 1. 1 each Grand Masterkeys
  - 2. 4 each Masterkeys
  - 3. 2 each Change keys each keyed core
  - 4. 4 each Construction masterkeys
  - 5. 1 each Control keys
- G. The General Contractor will install permanent cores and return the construction cores to the Hardware Supplier. Construction cores and keys remain the property of the Hardware Supplier.
- H. Keying Schedule: Arrange for a keying meeting, and programming meeting with Architect Owner and hardware supplier, and other involved parties to ensure locksets and locking hardware, are functionally correct and keying and programming complies with project requirements. Furnish 3 typed copies of keying and programming schedule to Architect.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verification of conditions: Examine doors, frames, related items and conditions under which Work is to be performed and identify conditions detrimental to proper and or timely completion.
  - 1. Do not proceed until unsatisfactory conditions have been corrected.

#### **3.02 HARDWARE LOCATIONS:**

- A. Mount hardware units at heights indicated in the following publications except as specifically indicated or required to comply with the governing regulations.
  - 1. Recommended Locations for Builder's Hardware for Standard Steel Doors and Frames, by the Door and Hardware Institute (DHI).
  - 2. Recommended locations for Architectural Hardware for flush wood doors (DHI).
  - 3. WDMA Industry Standard I.S.-1A-04, Industry Standard for Architectural wood flush doors.

#### **3.03 INSTALLATION:**

- A. Install each hardware item per manufacturer's instructions and recommendations. Do not install surface mounted items until finishes have been completed on the substrate. Set units level, plumb and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.
- B. Conform to local governing agency security ordinance.
- C. Install Conforming to ICC/ANSI A117.1 Accessible and Usable Building and Facilities.
  - 1. Adjust door closer sweep periods so that from the open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches from the latch, measured to the landing side of the door.
- D. Installed hardware using the manufacturers fasteners provided. Drill and tap all screw holes located in metallic materials. Do not use "Riv-Nuts" or similar products.

#### **3.04 FIELD QUALITY CONTROL AND FINAL ADJUSTMENT**

- A. Contractor/Installers, Field Services: After installation is complete, contractor shall inspect the completed door openings on site to verify installation of hardware is complete and properly adjusted, in accordance with both the Contract Documents and final shop drawings.
  - 1. Check and adjust closers to ensure proper operation.
  - 2. Check latchset, lockset, and exit devices are properly installed and adjusted to ensure proper operation.
    - a. Verify levers are free from binding.
    - b. Ensure latchbolts and dead bolts are engaged into strike and hardware is functioning.



3. Report findings, in writing, to architect indicating that all hardware is installed and functioning properly. Include recommendations outlining corrective actions for improperly functioning hardware if required.

### 3.05 HARDWARE SCHEDULE

- A. **TYPE 1:** Exterior Double Door with Exit Device - Door(s) 101C, 101D, 108A, 108B, 112A, 112B, 112C
- 2 ea - continuous geared hinges
  - 2 ea - exit device, entrance function
  - 2 ea - closer
  - 1 ea - weatherstripping set
  - 1 ea - door sweep
  - 1 ea - aluminum threshold
  - 1 ea - silencer set

*Note: Balance of hardware to be provided by ASF Supplier. Coordinate with ASF Supplier.*

- B. **TYPE 2:** Exterior Single Door with Exit Device - Door(s) 103A
1. 3 ea - hinges
  2. 1 ea - exit device, entrance function
  3. 1 ea - closer
  4. 1 ea - kick plate
  5. 1 ea - weatherstripping set
  6. 1 ea - door sweep
  7. 1 ea - aluminum threshold

- C. **TYPE 3:** Interior Double Door - Door(s) 112D
- 2 ea - continuous geared hinges
  - 2 ea - push bard
  - 2 ea - pull plate
  - 2 ea - closer
  - 1 ea - aluminum threshold - 8" Wide Plate
  - 1 ea - silencer set

*Note: Balance of hardware to be provided by ASF Supplier. Coordinate with ASF Supplier.*

- D. **TYPE 4:** Interior Single Door - Door(s) 101A, 101B, 109A, 110A, 110B, 111A, 113A, 114A, 115A, 116A, 117A, 118A, 119A
- 3 ea - hinges
  - 1 ea - leverset, classroom security function
  - 1 ea - closer
  - 1 ea - wall stop (provide a floor stop at millwork locations)
  - 1 ea - kick plate
  - 1 ea - silencer set

*Note: Some doors in this set are fire rated. Coordinate with Opening Schedule in the drawings and provide appropriate hardware as required to meet the rating.*

- E. **TYPE 5:** Interior Single Door - Door(s) 105A, 120A, 121A, 123A, 124A
- 3 ea - hinges
  - 1 ea - leverset, storeroom function

- 1 ea - closer
- 1 ea - wall stop
- 1 ea - kick plate
- 1 ea - silencer set

*Note: Some doors in this set are fire rated. Coordinate with Opening Schedule in the drawings and provide appropriate hardware as required to meet the rating.*

F. **TYPE 6:** Interior Single Door - Door(s) 111B, 113B, 114B, 115B, 116B, 117B, 118B, 119B

- 3 ea - hinges
- 1 ea - leverset, storeroom function
- 1 ea - wall stop
- 1 ea - kick plate
- 1 ea - silencer set

G. **TYPE 7:** Interior Single Door - Door(s) 102A, 103C

- 3 ea - hinges
- 1 ea - leverset, classroom function
- 1 ea - wall stop
- 1 ea - kick plate
- 1 ea - silencer set

H. **TYPE 8:** Interior Single Door - Door(s) 103.1A, 106A, 107A

- 3 ea - hinges
- 1 ea - leverset, privacy
- 1 ea - closer
- 1 ea - wall stop
- 1 ea - kick plate
- 1 ea - silencer set

*Note: Some doors in this set are fire rated. Coordinate with Opening Schedule in the drawings and provide appropriate hardware as required to meet the rating.*

I. **TYPE 9:** Interior Single Door - Door(s) 104A

- 3 ea - hinges
- 1 ea - leverset, office/entrance function
- 1 ea - wall stop
- 1 ea - kick plate
- 1 ea - silencer set

**END OF SECTION**

**SECTION 088000  
GLAZING****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Insulating glass units.
- B. Glazing units.
- C. Laminated glass interlayers.
- D. Glazing compounds.

**1.02 REFERENCE STANDARDS**

- A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials; Current Edition.
- B. ANSI Z97.1 - American National Standard for Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test; 2015 (Reaffirmed 2020).
- C. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures; Most Recent Edition Cited by Referring Code or Reference Standard.
- D. ASTM C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers; 2005 (Reapproved 2019).
- E. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.
- F. ASTM C1036 - Standard Specification for Flat Glass; 2021.
- G. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2018.
- H. ASTM C1172 - Standard Specification for Laminated Architectural Flat Glass; 2019.
- I. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016 (Reapproved 2023).
- J. ASTM C1376 - Standard Specification for Pyrolytic and Vacuum Deposition Coatings on Flat Glass; 2021a.
- K. ASTM E1300 - Standard Practice for Determining Load Resistance of Glass in Buildings; 2016.
- L. ASTM E1996 - Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Windborne Debris in Hurricanes; 2023.
- M. ASTM E2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation; 2019.
- N. GANA (SM) - GANA Sealant Manual; 2008.
- O. NFRC 100 - Procedure for Determining Fenestration Product U-factors; 2023.
- P. NFRC 200 - Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence; 2023.
- Q. NFRC 300 - Test Method for Determining the Solar Optical Properties of Glazing Materials and Systems; 2023.

**1.03 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data on Insulating Glass Unit and Glazing Unit Glazing Types: Provide structural, physical and environmental characteristics, size limitations, special handling and installation requirements.
- C. Product Data on Glazing Compounds and Accessories: Provide chemical, functional, and environmental characteristics, limitations, special application requirements, and identify available colors.

- D. Samples: Submit 1 sample 12 by 12 inch (\_\_\_ by \_\_\_ mm) in size of glass units.
- E. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

#### **1.04 PERFORMANCE REQUIREMENTS**

- A. General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.
- B. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.
  - 1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

#### **1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years documented experience.
- C. Safety Glazing Labeling: Where safety glazing labeling is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.
- D. Source Limitations for Glass: Obtain tinted float glass laminated glass insulating glass from single source from single manufacturer for each glass type.
- E. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.

#### **1.06 FIELD CONDITIONS**

- A. Do not install glazing when ambient temperature is less than 40 degrees F (4 degrees C).
- B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.
- C. 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.

#### **1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Protect glazing materials according to manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.
- B. Comply with insulating-glass manufacturer's written recommendations for venting and sealing units to avoid hermetic seal ruptures due to altitude change.

#### **1.08 WARRANTY**

- A. See Section 017800 - Closeout Submittals for additional warranty requirements.
- B. Insulating Glass Units: Provide a ten (10) year manufacturer warranty to include coverage for seal failure, interpane dusting or misting, including providing products to replace failed units.
- C. Laminated Glass: Provide a ten (10) year manufacturer warranty to include coverage for delamination, including providing products to replace failed units.

**PART 2 PRODUCTS****2.01 MANUFACTURERS**

- A. Float Glass Manufacturers:
  - 1. Vitro Architectural Glass (formerly PPG Glass): [www.vitroglazings.com/#sle](http://www.vitroglazings.com/#sle).
  - 2. Substitutions: See Section 016000 - Product Requirements.
- B. Laminated Glass Manufacturers:
  - 1. Vitro Architectural Glass (formerly PPG Glass): [www.vitroglazings.com/#sle](http://www.vitroglazings.com/#sle).
  - 2. Substitutions: See Section 016000 - Product Requirements.

**2.02 PERFORMANCE REQUIREMENTS - EXTERIOR GLAZING ASSEMBLIES**

- A. Provide type and thickness of exterior glazing assemblies to support assembly dead loads, and to withstand live loads caused by positive and negative wind pressure acting normal to plane of glass.
  - 1. Design Pressure: Calculated in accordance with ASCE 7.
  - 2. Comply with ASTM E1300 for design load resistance of glass type, thickness, dimensions, and maximum lateral deflection of supported glass.
  - 3. Provide glass edge support system sufficiently stiff to limit the lateral deflection of supported glass edges to less than 1/175 of their lengths under specified design load.
  - 4. Glass thicknesses listed are minimum.
- B. Weather-Resistive Barrier Seals: Provide completed assemblies that maintain continuity of building enclosure water-resistive barrier, vapor retarder, and/or air barrier.
  - 1. In conjunction with weather barrier related materials described in other sections, as follows:
    - a. 071300 - Sheet Waterproofing
  - 2. To utilize inner pane of multiple pane insulating glass units for continuity of vapor retarder and/or air barrier seal.
  - 3. To maintain a continuous vapor retarder and/or air barrier throughout glazed assembly from glass pane to heel bead of glazing sealant.
- C. Thermal and Optical Performance: Provide exterior glazing products with performance properties as indicated. Performance properties are in accordance with manufacturer's published data as determined with the following procedures and/or test methods:
  - 1. Center of Glass U-Value: Comply with NFRC 100 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 6.3 computer program.
  - 2. Center of Glass Solar Heat Gain Coefficient (SHGC): Comply with NFRC 200 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 6.3 computer program.
  - 3. Solar Optical Properties: Comply with NFRC 300 test method.

**2.03 GLASS MATERIALS**

- A. Float Glass: Provide float glass based glazing unless otherwise indicated.
  - 1. Kind FT - Fully Tempered Type: Complies with ASTM C1048.
  - 2. Impact Resistant Safety Glass: Complies with ANSI Z97.1 - Class A, or 16 CFR 1201 - Category II criteria.
  - 3. Tinted Type: ASTM C1036, Class 2 - Tinted, Quality - Q3, with color and performance characteristics as indicated.
  - 4. Thicknesses: As indicated; provide greater thickness as required for exterior glazing wind load design.
- B. Laminated Glass: Float glass laminated in accordance with ASTM C1172.
  - 1. Laminated Safety Glass: Complies with ANSI Z97.1 - Class A or 16 CFR 1201 - Category II impact test requirements.
  - 2. Polyvinyl Butyral (PVB) Interlayer: 0.090 inch (2.286 mm) thick, minimum.

**2.04 INSULATING GLASS UNITS**

- A. Manufacturers:
  - 1. Vitro Architectural Glass (formerly PPG Glass): [www.vitroglazings.com/#sle](http://www.vitroglazings.com/#sle).
  - 2. Substitutions: See Section 016000 - Product Requirements.
- B. Insulating Glass Units: Types as indicated.
  - 1. Durability: Certified by an independent testing agency to comply with ASTM E2190.
  - 2. Coated Glass: Comply with requirements of ASTM C1376 for pyrolytic (hard-coat) or magnetic sputter vapor deposition (soft-coat) type coatings on flat glass; coated vision glass, Kind CV; coated overhead glass, Kind CO; or coated spandrel glass, Kind CS.
  - 3. Metal-Edge Spacers: Aluminum, bent and soldered corners.
  - 4. Spacer Color: Black.
  - 5. Edge Seal:
    - a. Dual-Sealed System: Provide polyisobutylene sealant as primary seal applied between spacer and glass panes, and polysulfide sealant as secondary seal applied around perimeter.
  - 6. Color: Black.
  - 7. Purge interpane space with dry air, hermetically sealed.
- C. Type IG-1 - Insulating Glass Units: Vision glass, double glazed.
  - 1. Applications: Exterior glazing unless otherwise indicated.
  - 2. Space between lites filled with argon.
  - 3. Outboard Lite: Fully tempered float glass, 1/2 inch (\_\_\_\_ mm) thick, minimum.
    - a. Tint: Gray.
    - b. Interlayer: Polyvinyl butyral (PVB), thickness as required to meet performance criteria.
    - c. Coating: Low-E (passive type), on #2 surface.
  - 4. Metal edge spacer.
  - 5. Inboard Lite: Fully tempered float glass, 1/4 inch (6.4 mm) thick, minimum.
    - a. Tint: Clear.
  - 6. Total Thickness: 1-1/4" inch (\_\_\_\_ mm).
  - 7. Thermal Transmittance (U-Value), Summer - Center of Glass: .20, nominal.
  - 8. Visible Light Transmittance (VLT): 46 percent, nominal.
  - 9. Shading Coefficient: .26, nominal.
  - 10. Solar Heat Gain Coefficient (SHGC): .23, nominal.
  - 11. Visible Light Reflectance, Outside: 8 percent, nominal.
  - 12. Glazing Method: Dry glazing method, gasket glazing.

**2.05 GLAZING UNITS**

- A. Type G-2 - Monolithic Interior Vision Glazing:
  - 1. Applications: Interior glazing unless otherwise indicated.
  - 2. Glass Type: Fully tempered float glass.
  - 3. Tint: Clear.
  - 4. Thickness: 1/4 inch (6.4 mm), nominal.
- B. Type G-6 - Hurricane Impact Resistance Glazing: Laminated glass, 2-Ply.
  - 1. Applications: Exterior door lites or as indicated on drawings.
  - 2. Tint: Gray.
  - 3. Thickness: 9/16 inch (\_\_\_\_ mm).
  - 4. Outside Lite: Tempered glass.
  - 5. Interlayer: Polyvinyl butyral (PVB), thickness as required to meet performance criteria.
  - 6. Inside Lite: Tempered glass.
  - 7. Performance Criteria:

- a. Hurricane Impact Resistance: Comply with ASTM E1996 windborne debris requirements for "Enhanced Protection" within Wind Zone 1.
8. Visible Light Transmittance (VLT): 41 percent, nominal.
9. Shading Coefficient: .44, nominal.
10. Solar Heat Gain Coefficient (SHGC): .38, nominal.
11. Visible Light Reflectance, Outside: 9 percent, nominal.
12. Glazing Method: Dry glazing method, tape and tape.

## 2.06 LAMINATED GLASS INTERLAYERS

- A. Hurricane-Resistant Polyvinyl Butyral (PVB) Interlayer for Laminated Glazing:
  1. Functionality: Post-breakage hurricane resistance.
  2. Applications:
  3. Color: Clear.
  4. Thickness: 0.090 inch, 90 mil, nominal (2.28 mm, nominal).

## 2.07 GLAZING COMPOUNDS

- A. Type GC-2 - Butyl Sealant: Single component; ASTM C920 Grade NS, Class 12-1/2, Uses M and A, Shore A hardness of 10 to 20; black color.
- B. Type GC-3 - Polysulfide Sealant: Two component; chemical curing, nonsagging type; ASTM C920 Type M, Grade NS, Class 25, Uses M, A, and G; with cured Shore A hardness range of 15 to 25; color as selected.

## 2.08 ACCESSORIES

- A. Setting Blocks: Silicone, with 80 to 90 Shore A durometer hardness; ASTM C864 Option II. Length of 0.1 inch for each square foot (25 mm for each square meter) of glazing or minimum 4 inch (100 mm) by width of glazing rabbet space minus 1/16 inch (1.5 mm) by height to suit glazing method and pane weight and area.
- B. Glazing Tape, Back Bedding Mastic Type: Preformed, butyl-based, 100 percent solids compound with integral resilient spacer rod applicable to application indicated; 5 to 30 cured Shore A durometer hardness; coiled on release paper; black color.
- C. Glazing Splines: Resilient silicone extruded shape to suit glazing channel retaining slot; ASTM C864 Option II; color black.

## PART 3 EXECUTION

### 3.01 VERIFICATION OF CONDITIONS

- A. Verify that openings for glazing are correctly sized and within tolerances, including those for size, squareness, and offsets at corners.
- B. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and support framing is ready to receive glazing system.
- C. Verify that sealing between joints of glass framing members has been completed effectively.
- D. Proceed with glazing system installation only after unsatisfactory conditions have been corrected.

### 3.02 PREPARATION

- A. Clean contact surfaces with appropriate solvent and wipe dry within maximum of 24 hours before glazing. Remove coatings that are not tightly bonded to substrates.
- B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.
- C. Prime surfaces scheduled to receive sealant where required for proper sealant adhesion.

**3.03 INSTALLATION, GENERAL**

- A. Install glazing sealants in accordance with ASTM C1193, GANA (SM), and manufacturer's instructions.

**3.04 INSTALLATION - DRY GLAZING METHOD (GASKET GLAZING)**

- A. Application - Exterior and/or Interior Glazed: Set glazing infills from either the exterior or the interior of the building.
- B. Place setting blocks at 1/4 points with edge block no more than 6 inch (152 mm) from corners.
- C. Rest glazing on setting blocks and push against fixed stop with sufficient pressure on gasket to attain full contact.
- D. Install removable stops without displacing glazing gasket; exert pressure for full continuous contact.

**3.05 INSTALLATION - DRY GLAZING METHOD (TAPE AND GASKET SPLINE GLAZING)**

- A. Application - Exterior Glazed: Set glazing infills from the exterior of the building.
- B. Cut glazing tape to length; install on glazing pane. Seal corners by butting tape and sealing junctions with butyl sealant.
- C. Place setting blocks at 1/4 points with edge block no more than 6 inch (152 mm) from corners.
- D. Rest glazing on setting blocks and push against fixed stop with sufficient pressure to attain full contact.
- E. Install removable stops without displacing glazing spline. Exert pressure for full continuous contact.
- F. Carefully trim protruding tape with knife.

**3.06 INSTALLATION - DRY GLAZING METHOD (TAPE AND TAPE)**

- A. Application - Interior Glazed: Set glazing infills from the interior of the building.
- B. Cut glazing tape to length and set against permanent stops, projecting 1/16 inch (1.6 mm) above sight line.
- C. Place setting blocks at 1/4 points with edge block no more than 6 inch (152 mm) from corners.
- D. Rest glazing on setting blocks and push against tape for full contact at perimeter of pane or unit.
- E. Place glazing tape on free perimeter of glazing in same manner described above.
- F. Install removable stop without displacement of tape. Exert pressure on tape for full continuous contact.
- G. Carefully trim protruding tape with knife.

**3.07 CLEANING**

- A. Remove excess glazing materials from finish surfaces immediately after application using solvents or cleaners recommended by manufacturers.
- B. Remove nonpermanent labels immediately after glazing installation is complete.
- C. Clean glass and adjacent surfaces after sealants are fully cured.
- D. Clean glass on both exposed surfaces not more than 4 days prior to Date of Substantial Completion in accordance with glass manufacturer's written recommendations.

**3.08 PROTECTION**

- A. After installation, mark pane with an 'X' by using removable plastic tape or paste; do not mark heat absorbing or reflective glass units.



- B. Remove and replace glass that is damaged during construction period prior to Date of Substantial Completion.

**END OF SECTION**



**SECTION 088813  
FIRE-RATED GLAZING****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Fire-rated glazing units.
- B. Glazing compounds.

**1.02 REFERENCE STANDARDS**

- A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials; Current Edition.
- B. ASTM C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers; 2005 (Reapproved 2019).
- C. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.
- D. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2018.
- E. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016 (Reapproved 2023).
- F. ASTM E1300 - Standard Practice for Determining Load Resistance of Glass in Buildings; 2016.
- G. GANA (SM) - GANA Sealant Manual; 2008.
- H. ICC (IBC) - International Building Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- I. ITS (DIR) - Directory of Listed Products; Current Edition.
- J. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; 2022.
- K. NFPA 257 - Standard on Fire Test for Window and Glass Block Assemblies; 2022.
- L. NFRC 100 - Procedure for Determining Fenestration Product U-factors; 2023.
- M. NFRC 200 - Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence; 2023.
- N. NFRC 300 - Test Method for Determining the Solar Optical Properties of Glazing Materials and Systems; 2023.
- O. UL (DIR) - Online Certifications Directory; Current Edition.
- P. UL 9 - Standard for Fire Tests of Window Assemblies; Current Edition, Including All Revisions.
- Q. UL 10B - Standard for Fire Tests of Door Assemblies; Current Edition, Including All Revisions.
- R. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

**1.03 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data on Glazing Unit Glazing Types: Provide structural, physical, and environmental characteristics, size limitations, special handling and installation requirements.
- C. Product Data on Glazing Compounds and Accessories: Provide chemical, functional, and environmental characteristics, limitations, special application requirements, and identify available colors.
- D. Samples: Two samples 12 by 12 inch (\_\_\_ by \_\_\_ mm) in size of glass units.

**1.04 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

- B. Installer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience.

### 1.05 FIELD CONDITIONS

- A. Ambient Conditions: Do not install glazing when ambient temperature is less than 40 degrees F (4 degrees C).
- B. Maintain minimum ambient temperature before, during, and 24 hours after installation of glazing compounds.

### 1.06 WARRANTY

- A. See Section 017800 - Closeout Submittals for additional warranty requirements.
- B. Manufacturer Warranty for Insulating Glass Units: Provide \_\_\_\_ manufacturer warranty coverage for seal failure, interpane dusting or misting, including providing products to replace failed units, and commencing on the Date of Substantial Completion. Complete forms in Owner's name and register with manufacturer.
- C. Manufacturer Warranty for Laminated Glass: Provide 5-year manufacturer warranty coverage for delamination, including providing products to replace failed units, and commencing on the Date of Substantial Completion. Complete forms in Owner's name and register with manufacturer.

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS

### 2.02 PERFORMANCE REQUIREMENTS

- A. Provide type and thickness of exterior glazing assemblies to support assembly dead loads and withstand live loads caused by positive and negative wind pressure acting normal to plane of glass.
  - 1. Comply with ASTM E1300 for design load resistance of glass type, thickness, dimensions, and maximum lateral deflection of supported glass.
  - 2. Provide glass edge support system sufficiently stiff to limit lateral deflection of supported glass edges to less than 1/175 of their lengths under specified design load.
  - 3. Glass thicknesses listed are minimum.
- B. Vapor Retarder and Air Barrier Seals: Provide completed assemblies that maintain building enclosure vapor retarder and air barrier continuity.
- C. Thermal and Optical Performance: Provide exterior glazing products with performance properties as indicated, in accordance with manufacturer's published data as determined with the following procedures or test methods:
  - 1. Center of Glass U-Value: Comply with NFRC 100 using Lawrence Berkeley National Laboratory (LBNL) WINDOW software.
  - 2. Center of Glass Solar Heat Gain Coefficient (SHGC): Comply with NFRC 200 using Lawrence Berkeley National Laboratory (LBNL) WINDOW software.
  - 3. Solar Optical Properties: Comply with NFRC 300 test method.

### 2.03 GLASS MATERIALS

- A. Float Glass: Provide float glass based glazing unless otherwise indicated.
  - 1. Kind FT - Fully Tempered Type: Comply with ASTM C1048.

### 2.04 GLAZING UNITS

- A. Type FPG-1 - Fire-Protection-Rated Glazing: Type, thickness, and configuration of glazing that contains flame, smoke, and does not block radiant heat, as required to achieve indicated fire rating period of 180 minutes or less.
  - 1. Applications:
  - 2. Glass Type: Specialty tempered float glass.

3. Provide products listed by ITS (DIR) or UL (DIR) and approved by authorities having jurisdiction.
4. Safety Glazing Certification: 16 CFR 1201 Category II.
5. Glazing Method: As required for fire rating.
6. Fire-Rating Period: As indicated on drawings.
7. Markings for Fire-Protection-Rated Glazing Assemblies: Provide permanent markings on fire-protection-rated glazing in compliance with ICC (IBC), local building code, and authorities having jurisdiction
  - a. "D" - meets fire door assembly criteria of NFPA 252, UL 10B, or UL 10C fire test standards.
  - b. "OH" - meets fire window assembly criteria, including hose stream test of NFPA 257 or UL 9 fire test standards.
  - c. "H" - meets fire door assembly hose stream test of NFPA 252, UL 10B, or UL 10C fire tests standards.
  - d. "XXX" - placeholder that represents fire-rating period, in minutes.
8. Products:
  - a. Technical Glass Products; Firelite: [www.fireglass.com/#sle](http://www.fireglass.com/#sle). For glazing rated or 20-90 minutes. Refer to drawings for type needed.
  - b. Technical Glass Products; Firelite Plus: [www.fireglass.com/#sle](http://www.fireglass.com/#sle). For glazing rated for >90-180 minutes. Refer to drawings for type needed.

## 2.05 GLAZING COMPOUNDS

- A. Type GC-1 - Silicone Sealant: Single component; neutral curing; capable of water immersion without loss of properties; nonbleeding, nonstaining; ASTM C920 Type S, Grade NS, Class 25, Uses M, A, and G; with cured Shore A hardness range of 15 to 25; black color.
  1. Manufacturers:
    - a. Dow Corning Corporation; 795: [www.dowcorning.com/construction/#sle](http://www.dowcorning.com/construction/#sle).
    - b. Substitutions: See Section 016000 - Product Requirements.

## 2.06 ACCESSORIES

- A. Spacer Shims: Neoprene, 70 to 90 Shore A durometer hardness; ASTM C864 Option II. Continuous by one half the height of glazing stop by thickness to suit application, self adhesive on one face.
- B. Glazing Tape: Closed-cell polyvinyl chloride (PVC) foam, coiled on release paper over adhesive on two sides, maximum water absorption by volume of 2 percent, designed for compression of 25 percent to affect air barrier and vapor retarder seal. Glass panels that exceed 1,393 sq. inches for 90-minute ratings must be glazed with fire-rated glazing tape supplied by manufacturer.
- C. Cleaners, Primers, and Sealers: Type recommended by manufacturer of glass and gaskets.

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Verify that openings for glazing are correctly sized and within tolerances, including those for size, squareness, and offsets at corners.
- B. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and support framing is ready to receive glazing system.
- C. Verify that sealing between joints of glass framing members has been completed effectively.
- D. Proceed with glazing system installation only after unsatisfactory conditions have been corrected.

**3.02 FABRICATION**

- A. Fabricate glass and other glazing products in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with recommendations of product manufacturer and referenced glazing standard as required to comply with system performance requirements.

**3.03 PREPARATION**

- A. Clean contact surfaces with appropriate solvent and wipe dry within maximum of 24 hours before glazing. Remove coatings that are not tightly bonded to substrates.
- B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.
- C. Prime surfaces scheduled to receive sealant where required for proper sealant adhesion.

**3.04 INSTALLATION - GENERAL**

- A. Install glazing in compliance with written instructions of glass, gaskets, and other glazing material manufacturers unless more stringent requirements are indicated, including those in referenced glazing standards.
- B. Install glazing sealants in accordance with ASTM C1193, GANA (SM), and manufacturer's instructions.
- C. Do not exceed edge pressures around perimeter of glass lites as stipulated by glass manufacturer.
- D. Set glass lites of system with uniform pattern, draw, bow, and similar characteristics.
- E. Set glass lites in proper orientation so that coatings face exterior or interior as indicated.
- F. Prevent glass from contact with contaminating substances that may result from construction operations including, but not limited to weld spatter, fire-safing, plastering, mortar droppings, etc.

**3.05 INSTALLATION - DRY GLAZING METHOD (TAPE AND TAPE)**

- A. Application - Interior Glazed: Set glazing infills from interior of building.
- B. Cut glazing tape to length and set against permanent stops, projecting 1/16 inch (1.6 mm) above sightline.
- C. Place setting blocks at 1/4 points with edge block no more than 6 inches (152 mm) from corners.
- D. Rest glazing on setting blocks and push against tape for full contact at perimeter of pane or unit.
- E. Place glazing tape on free perimeter of glazing in same manner described above.
- F. Install removable stop without displacement of tape. Exert pressure on tape for full continuous contact.
- G. Carefully trim protruding tape with knife.

**3.06 CLEANING**

- A. Remove excess glazing materials from finish surfaces immediately after application using solvents or cleaners recommended by manufacturers.
- B. Remove nonpermanent labels immediately after glazing installation is complete.
- C. Clean glass and adjacent surfaces after sealants are fully cured.
- D. Clean glass on both exposed surfaces not more than four days prior to Date of Substantial Completion in accordance with glass manufacturer's written recommendations.

**3.07 PROTECTION**

- A. Protect glass from contact with contaminating substances resulting from construction operations. Remove any such substances by method approved by glass manufacturer.
- B. After installation, mark pane with 'X' by using removable plastic tape or paste; do not mark heat-absorbing or reflective glass units.
- C. Remove and replace glass that is damaged during construction period prior to Date of Substantial Completion.

**END OF SECTION**





**SECTION 092116  
GYPSUM BOARD ASSEMBLIES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Performance criteria for gypsum board assemblies.
- B. Metal stud wall framing.
- C. Interior wall and ceiling sound attenuation insulation.
- D. Gypsum wallboard.
- E. Joint treatment and accessories.

**1.02 RELATED REQUIREMENTS**

- A. Section 061000 - Rough Carpentry: Wood blocking product and execution requirements.

**1.03 REFERENCE STANDARDS**

- A. AISI S240 - North American Standard for Cold-Formed Steel Structural Framing; 2015, with Errata (2020).
- B. ANSI A108.11 - American National Standard Specifications for Interior Installation of Cementitious Backer Units; 2018.
- C. ANSI A118.9 - American National Standard Specifications for Test Methods and Specifications for Cementitious Backer Units; 2019.
- D. ASTM A1003/A1003M - Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members; 2015.
- E. ASTM C1007 - Standard Specification for Installation of Load Bearing (Transverse and Axial) Steel Studs and Related Accessories; 2020.
- F. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 2017 (Reapproved 2022).
- G. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2020.
- H. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board; 2023.
- I. ASTM C954 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness; 2022.
- J. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2022.
- K. ASTM C1047 - Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base; 2019.
- L. ASTM C1325 - Standard Specification for Fiber-Mat Reinforced Cementitious Backer Units; 2022, with Editorial Revision (2023).
- M. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2017.
- N. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2021.
- O. GA-216 - Application and Finishing of Gypsum Panel Products; 2021.
- P. UL (FRD) - Fire Resistance Directory; Current Edition.

**1.04 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements for submittal procedures.

## B. Product Data:

1. Provide data on metal framing, gypsum board, accessories, and joint finishing system.

**1.05 QUALITY ASSURANCE**

- A. Installer Qualifications: Company specializing in performing gypsum board installation and finishing, with minimum five years of experience.

**PART 2 PRODUCTS****2.01 GYPSUM BOARD ASSEMBLIES**

- A. Provide completed assemblies complying with ASTM C840 and GA-216.
  1. See PART 3 for finishing requirements.
- B. Fire-Resistance-Rated Assemblies: Provide completed assemblies with the following characteristics:
  1. UL Assembly Numbers: Provide construction equivalent to that listed for the particular assembly in the current UL (FRD).

**2.02 METAL FRAMING MATERIALS**

- A. Steel Sheet: ASTM A1003/A1003M, subject to the ductility limitations indicated in AISI S220 or equivalent.
- B. Manufacturers - Metal Framing, Connectors, and Accessories:
  1. Clarkwestern Dietrich Building Systems LLC; <>: [www.clarkdietrich.com/#sle](http://www.clarkdietrich.com/#sle).
  2. Substitutions: See Section 016000 - Product Requirements.
- C. Non-Loadbearing Framing System Components: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 for the spacing indicated, with maximum deflection of wall framing of L/360 at 5 psf (L/360 at 240 Pa).
  1. Studs: "C" shaped with flat or formed webs. Size as called for on the drawings unless deflection requirements above require deeper members.
  2. Runners: U shaped, sized to match studs. Size as called for on the drawings unless deflection requirements above require deeper members.
  3. Metal Stud Clip Angles: Size as required for proper installation and support of adjacent studwork.
- D. Partition Head To Structure Connections: Provide track fastened to structure with legs of sufficient length to accommodate deflection, for friction fit of studs cut short and fastened as indicated on drawings.
  1. For walls with top tracks that do not connect directly to building structure: Diagonally Brace Stud wall partitions to structure above as required to maintain deflection requirements herein.

**2.03 BOARD MATERIALS**

- A. Manufacturers - Gypsum-Based Board:
  1. Georgia-Pacific Gypsum; <>: [www.gpgypsum.com/#sle](http://www.gpgypsum.com/#sle).
  2. National Gypsum Company; <>: [www.nationalgypsum.com/#sle](http://www.nationalgypsum.com/#sle).
  3. USG Corporation; <>: [www.usg.com/#sle](http://www.usg.com/#sle).
  4. Substitutions: See Section 016000 - Product Requirements.
- B. Gypsum Wallboard: Paper-faced gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
  1. Application: Use for vertical surfaces and ceilings, unless otherwise indicated.
  2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
    - a. Mold-resistant board is required whenever board is being installed before the building is enclosed and conditioned.
    - b. Mold resistant board is required in all restrooms, janitors closets, kitchens, shower rooms, and any other wet type locations of similar nature..

3. At Assemblies Indicated with Fire-Resistance Rating: Use type required by indicated tested assembly; if no tested assembly is indicated, use Type X board, UL or WH listed.
  4. At Ceilings where Gypsum Board occurs: Special sag resistant gypsum ceiling board as defined in ASTM C1396/C1396M; sizes to minimize joints in place.
  5. Thickness:
    - a. Vertical Surfaces: 5/8 inch (16 mm).
    - b. Ceilings: 5/8 inch (16 mm).
  6. Paper-Faced Products:
    - a. Georgia-Pacific Gypsum; ToughRock Fireguard X: [www.gpgypsum.com/#sle](http://www.gpgypsum.com/#sle).
  7. Mold-Resistant, Paper-Faced Products:
    - a. Georgia-Pacific Gypsum; ToughRock Fireguard X Mold-Guard:  
[www.gpgypsum.com/#sle](http://www.gpgypsum.com/#sle).
- C. Backing Board For Wet Areas: One of the following products:
1. Application: Surfaces behind tile in wet areas including tub and shower surrounds.
  2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
  3. ANSI Cement-Based Board: Non-gypsum-based; aggregated Portland cement panels with glass fiber mesh embedded in front and back surfaces complying with ANSI A118.9 or ASTM C1325.
    - a. Products:
      - 1) PermaBASE Building Products, LLC provided by National Gypsum Company;  
PermaBase Cement Board: [www.goldbondbuilding.com/#sle](http://www.goldbondbuilding.com/#sle).
      - 2) Substitutions: See Section 016000 - Product Requirements.

#### **2.04 GYPSUM BOARD ACCESSORIES**

- A. Interior Sound Attenuation Insulation
1. Product: Owens Corning PINK Next Gen Sound Attenuation Batts (SAB) or equal.
  2. Faced: No
  3. Thickness: 3.5 inches
  4. Width: As required for stud spacing
- B. Beads, Joint Accessories, and Other Trim: ASTM C1047, galvanized steel or rolled zinc, unless noted otherwise.
1. Corner Beads: Low profile, for 90 degree outside corners.
    - a. Products:
      - 1) Phillips Manufacturing Co; Everlast Corner Bead: [www.phillipsmfg.com/#sle](http://www.phillipsmfg.com/#sle).
      - 2) Substitutions: See Section 016000 - Product Requirements.
- C. Joint Materials: ASTM C475/C475M and as recommended by gypsum board manufacturer for project conditions.
1. Paper Tape: 2 inch (50 mm) wide, creased paper tape for joints and corners.
    - a. Application: Areas not requiring moisture resistant drywall.
  2. Joint Compound: Drying type, vinyl-based, ready-mixed.
- D. Screws for Fastening of Gypsum Panel Products to Cold-Formed Steel Studs Less than 0.033 inches (0.84 mm) in Thickness and Wood Members: ASTM C1002; self-piercing tapping screws, corrosion-resistant.
- E. Screws for Fastening of Gypsum Panel Products to Steel Members from 0.033 to 0.112 inch (0.84 to 2.84 mm) in Thickness: ASTM C954; steel drill screws, corrosion-resistant.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify that project conditions are appropriate for work of this section to commence.

### 3.02 FRAMING INSTALLATION

- A. Metal Framing: Install in accordance with ASTM C1007/AISI S220 and manufacturer's instructions.
- B. Studs: Space studs at 16 inches on center (at 406 mm on center).
  - 1. Extend partition framing to structure where indicated and to ceiling in other locations.
  - 2. Partitions Terminating at Ceiling: Attach ceiling runner securely to ceiling track in accordance with manufacturer's instructions.
  - 3. Partitions Terminating at Structure: Attach extended leg top runner to structure, maintain clearance between top of studs and structure, and brace both flanges of studs with continuous bridging.
- C. Openings: Reinforce openings as required for weight of doors or operable panels, using not less than double studs at jambs.
- D. Standard Wall Furring: Install at masonry walls scheduled to receive gypsum board, not more than 4 inches (100 mm) from floor and ceiling lines and abutting walls. Secure in place on alternate channel flanges at maximum 16 inches (\_\_\_\_ mm) on center.
  - 1. Orientation: Horizontal.
  - 2. Spacing: At 16 inches on center (At 400 mm on center).
- E. Blocking: Install wood blocking for support of:
  - 1. Framed openings.
  - 2. Wall-mounted cabinets.
  - 3. Plumbing fixtures.
  - 4. Toilet partitions.
  - 5. Toilet accessories.
  - 6. Wall-mounted door hardware.

### 3.03 BOARD INSTALLATION

- A. Comply with ASTM C840, GA-216, and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.
- B. Single-Layer Nonrated: Install gypsum board in most economical direction, with ends and edges occurring over firm bearing.
  - 1. Exception: Tapered edges to receive joint treatment at right angles to framing.
- C. Fire-Resistance-Rated Construction: Install gypsum board in strict compliance with requirements of assembly listing.
- D. Cementitious Backing Board: Install over steel framing members and plywood substrate where indicated, in accordance with ANSI A108.11 and manufacturer's instructions.
- E. Installation on Metal Framing: Use screws for attachment of gypsum board.

### 3.04 INSTALLATION OF TRIM AND ACCESSORIES

- A. Corner Beads: Install at external corners, using longest practical lengths.
- B. Edge Trim: Install at locations where gypsum board abuts dissimilar materials.

### 3.05 JOINT TREATMENT

- A. Paper Faced Gypsum Board: Use paper joint tape, bedded with ready-mixed vinyl-based joint compound and finished with ready-mixed vinyl-based joint compound.
- B. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
  - 1. Level 4: Walls and ceilings to receive paint finish or wall coverings, unless otherwise indicated.
  - 2. Level 3: Walls to receive textured wall finish.
  - 3. Level 2: In utility areas, behind cabinetry, and on backing board to receive tile finish.

4. Level 1: Fire-resistance-rated wall areas above finished ceilings, whether or not accessible in the completed construction.
- C. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
  1. Feather coats of joint compound so that camber is maximum 1/32 inch (0.8 mm).
- D. Fill and finish joints and corners of cementitious backing board as recommended by manufacturer.

**3.06 TOLERANCES**

- A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet (3 mm in 3 m) in any direction.

**END OF SECTION**



**SECTION 093000  
TILING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Tile for floor applications.
- B. Ceramic accessories.
- C. Trim and accessories for a complete installation.

**1.02 RELATED REQUIREMENTS**

- A. Section 079200 - Joint Sealants: Sealing joints between tile work and adjacent construction and fixtures.
- B. Section 092116 - Gypsum Board Assemblies: Tile backer board.

**1.03 REFERENCE STANDARDS**

- A. ANSI A108.1b - American National Standard Specifications for Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set or Latex-Portland Cement Mortar; 2017.
- B. ANSI A108.2 - American National Standard General Requirements: Materials, Environmental and Workmanship; 2019.
- C. ANSI A108.4 - American National Standard Specifications for Installation of Ceramic Tile with Organic Adhesive or Water Cleanable Tile-Setting Epoxy Adhesive; 2019.
- D. ANSI A108.5 - American National Standard Specifications for Installation of Ceramic Tile with Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar; 2021.
- E. ANSI A108.6 - American National Standard Specifications for Installation of Ceramic Tile with Chemical Resistant, Water Cleanable Tile-Setting and -Grout Epoxy; 1999 (Reaffirmed 2019).
- F. ANSI A108.10 - American National Standard Specifications for Installation of Grout in Tilework; 2017 (Reaffirmed 2022).
- G. ANSI A108.11 - American National Standard Specifications for Interior Installation of Cementitious Backer Units; 2018.
- H. ANSI A108.19 - American National Standard Specifications for Interior Installation of Gauged Porcelain Tiles and Gauged Porcelain Tile Panels/Slabs by the Thin-Bed Method Bonded with Modified Dry-Set Cement Mortar or Improved Modified Dry-Set Cement Mortar; 2020.
- I. ANSI A108.20 - American National Standard Specifications for Exterior Installation of Gauged Porcelain Tiles and Gauged Porcelain Tile Panels/Slabs; 2020.
- J. ANSI A118.12 - American National Standard Specifications for Crack Isolation Membranes for Thin-Set Ceramic Tile and Dimension Stone Installation; 2014 (Reaffirmed 2019).
- K. ANSI A137.1 - American National Standard Specifications for Ceramic Tile; 2022.
- L. ASTM C373 - Standard Test Methods for Determination of Water Absorption and Associated Properties by Vacuum Method for Pressed Ceramic Tiles and Glass Tiles and Boil Method for Extruded Ceramic Tiles and Non-tile Fired Ceramic Whiteware Products; 2018 (Reapproved 2023).
- M. TCNA (HB) - Handbook for Ceramic, Glass, and Stone Tile Installation; 2023.

**1.04 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide manufacturers' data sheets on tile, mortar, grout, and accessories. Include instructions for using grouts and adhesives.

- C. Shop Drawings: Indicate tile layout, patterns, color arrangement, perimeter conditions, junctions with dissimilar materials, control and expansion joints, thresholds, ceramic accessories, and setting details.
- D. Samples: provide two samples in actual size of each tile specified.
- E. Maintenance Data: Include recommended cleaning methods, cleaning materials, and stain removal methods.
- F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
  - 1. See Section 016000 - Product Requirements, for additional provisions.
  - 2. Extra Tile: 5 percent of each size, color, and surface finish combination, but not less than one box of each type.

### 1.05 MOCK-UPS

- A. See Section 014000 - Quality Requirements for general requirements for mock-up.
- B. Construct tile mock-up where indicated on drawings, incorporating all components specified for the location.
  - 1. Approved mock-up may remain as part of work.

### 1.06 DELIVERY, STORAGE, AND HANDLING

- A. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.
  - 1. Deliver packaged materials and store in original containers with seals unbroken and labels intact until time of use, in accordance with manufacturer's instructions. All cartons must be from the same Lot.

### 1.07 FIELD CONDITIONS

- A. Do not install solvent-based products in an unventilated environment.
- B. Maintain ambient and substrate temperature above 50 degrees F (10 degrees C) and below 100 degrees F (38 degrees C) during installation and curing of setting materials.

## PART 2 PRODUCTS

### 2.01 TILE

- A. Manufacturers: All products by the same manufacturer.
  - 1. Dal-Tile Corporation; \_\_\_\_\_: [www.daltile.com/#sle](http://www.daltile.com/#sle).
  - 2. Substitutions: See Section 016000 - Product Requirements.
- B. Colors, patterns, and locations of all tile types are as indicated on the Drawings. Manufacturer's listed on the Drawings and below are to be Architect's control samples. Other manufacturer's must submit samples prior to bid matching color and finish in order to be considered "equal".
  - 1. Color(s): Puritan Gray.
    - a. Substitutions: See Section 016000 - Product Requirements.
- C. Porcelain Tile, Type FT-1 and TB-1: ANSI A137.1, standard grade.
  - 1. Provide as floor tile in locations scheduled on Drawings and provide as wall tile in locations scheduled on Drawings and provide as wall base in locations scheduled on Drawings.
  - 2. Moisture Absorption: 0 to 0.5 percent as tested in accordance with ASTM C373.
  - 3. Sizes:
    - a. Floor Tile FT-1: 12x24
    - b. Tile Base TB-1: 6x12 Cove Base, Cove Base Left, Cove Base Right
  - 4. Thickness: 3/8 inch (9.5 mm).
  - 5. Edges: Square.
  - 6. Surface Finish: Unglazed.
  - 7. Color(s): To be selected by Engineer/Architect from manufacturer's full range.
  - 8. Trim Units: Matching bullnose and cove base shapes in sizes coordinated with field tile.



9. Products:
  - a. DAL TILE.
    - 1) Floor Tile FT-1: DAL TILE VOLUME 1 ELECTRIC MOSS
  - b. Or Equal
  - c. Substitutions: See Section 016000 - Product Requirements.

## 2.02 TRIM AND ACCESSORIES

- A. Trim/Termination Strips: Satin natural anodized extruded aluminum, style and dimensions to suit application, indicated below, or if not indicated to suit application, for setting using tile mortar or adhesive.
  1. Floor transitions must be ADA compliant.
  2. Applications:
    - a. Open cut or unfinished edges (end or top) of wall tile equal to Schluter QUADDEC.
    - b. Tile to Tile Outside corners equal to Schluter QUADDEC.
    - c. Tile to carpet transitions equal to Schluter SCHIENE.
    - d. Tile to VCT transitions equal to Schluter RENO-U
    - e. Wall corners, outside and inside where tile abuts another material besides tile equal to Schluter QUADDEC.
    - f. Tile to concrete transitions equal to Schluter Reno-Ramp/-K.
    - g. In other locations as indicated on Drawings.
    - h. Provide in heights to suit application.
  3. Manufacturers:
    - a. Schluter-Systems: [www.schluter.com/#sle](http://www.schluter.com/#sle).
    - b. Substitutions: See Section 016000 - Product Requirements.

## 2.03 SETTING MATERIALS

- A. Manufacturers:
  1. LATICRETE International, Inc: [www.laticrete.com](http://www.laticrete.com).
  2. Merkrete, by Parex USA, Inc: [www.merkrete.com](http://www.merkrete.com).
  3. ProSpec, an Oldcastle brand: [www.prospec.com](http://www.prospec.com).
  4. Substitutions: See Section 016000 - Product Requirements.
- B. Latex-Portland Cement Mortar Bond Coat: ANSI A118.4.
- C. Mortar Bed Materials: Pre-packaged mix of Portland cement, sand, latex additive, and water.
  1. Products:
    - a. LATICRETE International, Inc; LATICRETE 3701 Fortified Mortar Bed: [www.laticrete.com/#sle](http://www.laticrete.com/#sle).
    - b. Merkrete, by Parex USA, Inc; Merkrete Underlay C: [www.merkrete.com/#sle](http://www.merkrete.com/#sle).
    - c. Proflex Products, Inc; MSI - Mud Set Installation: [www.proflex.us/#sle](http://www.proflex.us/#sle).
    - d. Substitutions: See Section 016000 - Product Requirements.

## 2.04 GROUTS

- A. Manufacturers:
  1. LATICRETE International, Inc: [www.laticrete.com/#sle](http://www.laticrete.com/#sle).
  2. Substitutions: See Section 016000 - Product Requirements.
- B. Epoxy Grout: ANSI A118.3 chemical resistant and water-cleanable epoxy grout.
  1. Applications: At all floor and wall tile locations except kitchen.
  2. Color(s): As selected by Engineer/Architect from manufacturer's full line.
  3. Products:
    - a. LATICRETE International, Inc; LATICRETE SPECTRALOCK PRO Premium Grout: [www.laticrete.com/#sle](http://www.laticrete.com/#sle).
    - b. Substitutions: See Section 016000 - Product Requirements.
- C. High Performance Epoxy Grout:

**2.05 ACCESSORY MATERIALS**

- A. Concrete Floor Slab Crack Isolation Membrane: Material complying with ANSI A118.12; not intended as waterproofing.
  - 1. Crack Resistance: No failure at 1/8 inch (3.2 mm) gap, minimum.

**PART 3 EXECUTION****3.01 EXAMINATION**

- A. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive tile.
- B. Verify that subfloor surfaces are dust free and free of substances that could impair bonding of setting materials to subfloor surfaces.

**3.02 PREPARATION**

- A. Protect surrounding work from damage.
- B. Vacuum clean surfaces and damp clean.
- C. Seal substrate surface cracks with filler. Level existing substrate surfaces to acceptable flatness tolerances.
- D. Install backer board in accordance with ANSI A108.11 and board manufacturer's instructions. Tape joints and corners, cover with skim coat of setting material to a feather edge.

**3.03 INSTALLATION - GENERAL**

- A. Install tile, thresholds, and stair treads and grout in accordance with applicable requirements of ANSI A108.1a through ANSI A108.20, manufacturer's instructions, and TCNA (HB) recommendations.
- B. Lay tile to pattern indicated. Do not interrupt tile pattern through openings.
- C. Extend tile work into recesses and under or behind equipment and fixtures, to form a complete covering without interruptions, except as otherwise shown. Terminate work neatly at obstructions, edges and corners without disrupting pattern or joint alignments.
- D. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases neatly. Align floor joints.
- E. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make grout joints without voids, cracks, excess mortar or excess grout, or too little grout.
- F. Form internal angles square and external angles square.
- G. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish or built up items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures and other penetrations, so that plates, collars or covers overlap tile.
- H. Install tile base without wall tile using dry set or latex portland cement.
- I. Jointing Pattern: Unless indicated otherwise, lay tile in grid pattern. Layout tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting and slithers of tile. Provide uniform joint widths.
- J. Install expansion joints where tile work abuts restraining surfaces such as perimeter walls, columns, etc. Install directly over joints in structural floor including construction joints or cold joints. Set compressible back up strip when mortar is placed or utilize removable wood strips to provide space for back up after mortar has cured. Install sealant after tile work and grout are dry. Follow sealant manufacturer's recommendations.
- K. Install non-ceramic trim in accordance with manufacturer's instructions.
- L. Sound tile after setting. Replace hollow sounding units.
- M. Keep control and expansion joints free of mortar, grout, and adhesive.

- N. Prior to grouting, allow installation to completely cure; minimum of 48 hours.
- O. Grout tile joints unless otherwise indicated.
- P. At changes in plane and tile-to-tile control joints, use tile sealant instead of grout, with either bond breaker tape or backer rod as appropriate to prevent three-sided bonding.

**3.04 INSTALLATION - FLOORS - THIN-SET METHODS**

- A. Over interior concrete substrates, install in accordance with TCNA (HB) Method F113, dry-set or latex-Portland cement bond coat, with standard grout, unless otherwise indicated.
  - 1. Where epoxy bond coat and grout are indicated, install in accordance with TCNA (HB) Method F131.
  - 2. Where furan bond coat and grout are indicated, install in accordance with TCNA (HB) Method F133.
- B. Install tile-to-tile floor movement joints in accordance with TCNA (HB) Method EJ171F.

**3.05 INSTALLATION - FLOORS - MORTAR BED METHODS**

- A. Over interior concrete substrates, install in accordance with TCNA (HB) Method F112, bonded, unless otherwise indicated.
  - 1. Where epoxy bond coat and grout are indicated, install in accordance with TCNA (HB) Method F132, bonded.
  - 2. Where epoxy or furan grout is indicated, but not epoxy or furan bond coat, install in accordance with TCNA (HB) Method F114, with cleavage membrane.
- B. Cleavage Membrane: Lap edges and ends.
- C. Mortar Bed Thickness: 1 1/2" inch (\_\_\_\_ mm), unless otherwise indicated on Drawings.

**3.06 CLEANING**

- A. Clean tile and grout surfaces per manufacturers requirements for each specific product.
- B. Clean all tile surfaces so they are free of foreign matter.
- C. Leave tile work clean and free of non-uniform joints, cracked, chipped, broken, unbonded, or otherwise defective tile work.

**3.07 PROTECTION**

- A. Do not permit traffic over finished floor surface for seven days after installation.
- B. Protect wall tile surfaces to prevent damage for duration of construction.

**END OF SECTION**



**SECTION 095100  
ACOUSTICAL CEILINGS****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Acoustical ceiling panels.
- B. Exposed grid suspension system.
- C. Wire hangers, fasteners, main runners, cross tees, and wall angle moldings.
- D. Perimeter Trim.

**1.02 RELATED REQUIREMENTS**

- A. Section 092116 - Gypsum Board Assemblies

**1.03 REFERENCE STANDARDS**

- A. ASTM C 423 Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
- B. ASTM C635/C635M - Standard Specification for Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings; 2022.
- C. ASTM C636/C636M - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels; 2019.
- D. ASTM A 641 Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire
- E. ASTM A 653 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process
- F. ASTM E1264 - Standard Classification for Acoustical Ceiling Products; 2023.
- G. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials

**1.04 ADMINISTRATIVE REQUIREMENTS**

- A. Sequence work to ensure acoustical ceilings are not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.
- B. Do not install acoustical units until after interior wet work is dry.

**1.05 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Shop Drawings: Indicate grid layout and related dimensioning. Coordinating installation and spacing with hanger attachment to building structure and ceiling mounted items.
- C. Product Data: Provide data on suspension system components and acoustical units.
- D. Samples: Submit two samples 6 by 6 inch (\_\_\_\_by\_\_\_\_ mm) in size illustrating material and finish of acoustical units.
- E. Samples: Submit two samples each, 8 inches (\_\_\_\_ mm) long, of suspension system main runner.
- F. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.
- G. Certifications: Manufacturer's certifications that products comply with specified requirements, including laboratory reports showing compliance with specified tests and standards. For acoustical performance, each carton of material must carry an approved independent laboratory classification of NRC, CAC, and AC.
- H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1. See Section 016000 - Product Requirements, for additional provisions.
2. Extra Acoustical Units: Quantity equal to 5 percent of total installed or minimum one full box per tile type.

#### **1.06 QUALITY ASSURANCE**

- A. Suspension System Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- B. Acoustical Unit Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- C. Installer: Firm with not less than Five years documented experience in installation of ceiling systems similar to those specified and is acceptable to Manufacturer of specified products.
- D. Provide acoustical panel units and grid components by a single manufacturer.
- E. Coordination of Work: Coordinate acoustical ceiling work with installers of related work including, but not limited to building insulation, gypsum board, light fixtures, mechanical systems, electrical systems, and sprinklers.

#### **1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver acoustical ceiling units to project site in original, unopened packages and store them in a fully enclosed space where they will be protected against damage from moisture, direct sunlight, surface contamination, and other causes.
- B. Handle acoustical ceiling units carefully to avoid chipping edges or damaged units in any way.

#### **1.08 FIELD CONDITIONS**

- A. Maintain uniform temperature of minimum 60 degrees F (16 degrees C), and maximum humidity of 40 percent prior to, during, and after acoustical unit installation.
- B. Do not install acoustical units until after interior wet work is dry.
- C. Do not install until space is fully enclosed and fully conditioned.
- D. Do not install until work above ceiling is complete.

#### **1.09 WARRANTY**

- A. Acoustical Panel: Submit a written warranty executed by the manufacturer, agreeing to repair or replace panels that fail within the warranty period. Failures include, but are not limited to the following:
  1. Acoustical Panels: Sagging and warping
  2. Grid System: Rusting and manufacturer's defects
- B. Warranty Period:
  1. Acoustical panels: Ten (10) years from date of substantial completion.
  2. Grid: Ten (10) years from date of substantial completion.

### **PART 2 PRODUCTS**

#### **2.01 MANUFACTURERS**

- A. Acoustic Tiles/Panels:
  1. Armstrong World Industries, Inc; \_\_\_\_: [www.armstrongceilings.com/#sle](http://www.armstrongceilings.com/#sle).
  2. CertainTeed Corporation; \_\_\_\_: [www.certainteed.com/ceilings-and-walls/#sle](http://www.certainteed.com/ceilings-and-walls/#sle).
  3. USG Corporation; \_\_\_\_: [www.usg.com/ceilings/#sle](http://www.usg.com/ceilings/#sle).
- B. Suspension Systems:
  1. Armstrong World Industries, Inc; \_\_\_\_: [www.armstrongceilings.com/#sle](http://www.armstrongceilings.com/#sle).
  2. CertainTeed Corporation; \_\_\_\_: [www.certainteed.com/ceilings-and-walls/#sle](http://www.certainteed.com/ceilings-and-walls/#sle).
  3. USG Corporation; \_\_\_\_: [www.usg.com/ceilings/#sle](http://www.usg.com/ceilings/#sle).
- C. Perimeter Systems:

1. Armstrong World Industries, Inc: [www.armstrong.com](http://www.armstrong.com).
2. CertainTeed Corporation: [www.certainteed.com](http://www.certainteed.com).
3. USG: [www.usg.com](http://www.usg.com).
4. Substitutions: See Section 016000 - Product Requirements.

## 2.02 PRODUCTS

- A. Basis of Design: Products are Manufacturer Armstrong Ceilings or approved equal.
- B. General: Eliminate tee near wall by providing a cut 24X48 inch panel extending to wall where units at wall are less than six (6) inches wide.
- C. ACT-1: Standard Acoustical Ceiling Tile
  1. 1717 School Zone Fine Fissured as manufactured by Armstrong Ceilings or Radar High-CAC / High-NRC 22523 as manufactured by USG.
    - a. Surface Texture: Medium
    - b. Composition: Mineral Fiber
    - c. Color: White
    - d. Size: 24IN x 24IN
    - e. Edge Profile: Angled Tegular 15/16IN for interface with Prelude XL 15/16" Exposed Tee grid.
    - f. Noise Reduction Coefficient (NRC): ASTM C 423; Classified with UL label on product carton 0.70.
    - g. Ceiling Attenuation Class (CAC) : ASTM C 1414; Classified with UL label on product carton 40.
    - h. Articulation Class (AC):
    - i. Flame Spread: ASTM E 1264; Class A (UL)
    - j. Light Reflectance White Panel: ASTM E 1477; 0.85
    - k. Dimensional Stability: HumiGuard Plus
    - l. Recycle Content: Post-Consumer - 1% Pre-Consumer Waste - 55%

## 2.03 SUSPENSION SYSTEM(S)

- A. Metal Suspension Systems Interior:
  1. Components: Main beams and cross tees, base metal and end detail, fabricated from commercial quality hot dipped galvanized steel complying with ASTM A 653. Main beams and cross tees are double-web steel construction with exposed flange design. Exposed surfaces chemically cleansed, capping prefinished galvanized steel in baked polyester paint. Main beams and cross tees shall have rotary stitching.
    - a. Structural Classification: ASTM C 635 Intermediate Duty
    - b. Color: White and match the actual color of the selected ceiling tile, unless noted otherwise.
    - c. Product: Prelude XL 15/16" Exposed Tee as manufactured by Armstrong Ceilings.
  2. Attachment Devices: Size for five times design load indicated in ASTM C 635, Table 1, Direct Hung unless otherwise indicated.
  3. Wire for Hangers and Ties: ASTM A 641, Class 1 zinc coating, soft annealed, with a yield stress load of at least three times design load, but not less than 12 gauge.
  4. Edge Moldings and Trim:
    - a. 7800 - 12ft Wall Molding
  5. Floating Acoustical Ceiling Clouds: provide 4 inch vertical Axiom trim in the color white; model number AX4STRWH".

## 2.04 ACCESSORIES

- A. Support Channels and Hangers: Galvanized steel; size and type to suit application and ceiling system flatness requirement specified.
- B. Hanger Wire: 12 gauge, 0.08 inch (2 mm) galvanized steel wire.

- C. Perimeter Moldings: Same metal and finish as grid.
- D. Touch-up Paint: Type and color to match acoustical and grid units.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify existing conditions before starting work.
- B. Verify that layout of hangers will not interfere with other work.
- C. Do not proceed with installation until all wet work such as concrete, terrazzo, plastering and painting has been completed and thoroughly dried out, unless expressly permitted by manufacturer's printed recommendations.

#### **3.02 PREPARATION**

- A. Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling. Avoid use of less than half width units at borders, and comply with reflected ceiling plans. Coordinate panel layout with mechanical and electrical fixtures.
- B. Allow acoustical ceiling units to reach room temperature and stabilized moisture content before installation of units.

#### **3.03 INSTALLATION - SUSPENSION SYSTEM**

- A. Install suspension system in accordance with ASTM C636/C636M, ASTM C636/C636M, and ASTM C636/C636M and as supplemented in this section.
- B. Install system per manufacturer's installation instructions.
- C. Suspend main beam from overhead construction with hanger wires spaced 4'-0" on center along the length of the main runner. Install hanger wires plumb and straight.
- D. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.
- E. Locate system on room axis according to reflected plan.
- F. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.
  - 1. Use longest practical lengths.
- G. Suspension System, Non-Seismic: Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.
- H. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.
- I. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.
- J. Support fixture loads using supplementary hangers located within 6 inches (152 mm) of each corner, or support components independently.
- K. Do not eccentrically load system or induce rotation of runners.
- L. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.
  - 1. Miter corners accurately and connect securely or install corner caps.
  - 2. Attach molding to substrate at intervals of 16 inches o.c. and not more than 3 inches from ends.
  - 3. Maintain tolerance of 1/8 inch in 12 feet of ceiling suspension system.

#### **3.04 INSTALLATION - ACOUSTICAL UNITS**

- A. Install acoustical units in accordance with manufacturer's instructions.



- B. Install acoustical panels in coordination with suspended system, with edges resting on flanges of main runner and cross tees. Cut and fit panels neatly against abutting surfaces. Support edges by wall moldings.
- C. Before installing acoustical ceiling units, permit them to reach room temperature and a stabilized moisture content.
- D. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.
- E. Fit border trim neatly against abutting surfaces.
- F. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.
- G. Cutting Acoustical Units:
  - 1. Make field cut edges of same profile as factory edges.
- H. For reveal edge panels: Cut and reveal or rabbet edges of ceiling panels at border areas and vertical surfaces.
- I. Install hold-down clips on panels within 20 ft (6 m) of an exterior door.

### **3.05 TOLERANCES**

- A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet (3 mm in 3 m).
- B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

### **3.06 CLEANING**

- A. Clean exposed surfaces of acoustical ceilings per manufacturer's instructions.
- B. Clean trim, edge moldings and suspension members per manufacturer's instructions.
- C. Remove and replace all work that can not be cleaned to eliminate evidence of soil or residue, that is broken or damaged.
- D. Before disposing of ceilings, contact the Armstrong Recycling Center at 877-276-7876, select option #1 then #8 to review with a consultant the condition and location of building where the ceilings will be removed. The consultant will verify the condition of the material and that it meets the Armstrong requirements for recycling. The Armstrong consultant will provide assistance to facilitate the recycle of the ceiling.

**END OF SECTION**



**SECTION 096500  
RESILIENT FLOORING****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Resilient tile flooring.
- B. Resilient base.
- C. Installation accessories.
- D. Concrete Testing prior to Flooring Installation.

**1.02 RELATED REQUIREMENTS**

- A. Section 033000 - Cast-in-Place Concrete: Restrictions on curing compounds for concrete slabs and floors to receive adhesive-applied resilient flooring.

**1.03 REFERENCE STANDARDS**

- A. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source; 2023.
- B. ASTM E662 - Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials
- C. ASTM D2047 - Standard Test Method for Static Coefficient of Friction of Polish-Coated Flooring Surfaces as Measured by the James Machine.
- D. ASTM F137 - Standard Test Method for Flexibility of Resilient Flooring Materials with Cylindrical Mandrel Apparatus
- E. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2022.
- F. ASTM F925 - Standard Test Method for Resistance to Chemicals of Resilient Flooring
- G. ASTM F970 - Standard Test Method for Measuring Recovery Properties of Floor Coverings after Static Loading; 2022.
- H. ASTM F1514 - Standard Test Method for Measuring Heat Stability of Resilient Flooring by Color Change.
- I. ASTM F1515 - Standard Test Method for Measuring Light Stability of Resilient Flooring by Color Change
- J. ASTM F1700 - Standard Specification for Solid Vinyl Floor Tile; 2020.
- K. ASTM F1914 - Standard Test Methods for Short-Term Indentation and Residual Indentation of Resilient Floor Covering.
- L. ASTM F2199 - Standard Test Method for Determining Dimensional Stability of Resilient Floor Tile after Exposure to Heat.

**1.04 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.
- C. Shop Drawings: Indicate pattern layout plan and grain direction.
- D. Verification Samples: Submit two samples, 12 by 12 inch (\_\_\_\_by\_\_\_\_ mm) in size illustrating color and pattern for each resilient flooring product specified.
- E. Certification: Prior to installation of flooring, submit written certification by flooring manufacturer and adhesive manufacturer that condition of subfloor is acceptable.

- F. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.
- G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
  - 1. See Section 016000 - Product Requirements, for additional provisions.
  - 2. Extra Flooring Material: 180 square feet (\_\_\_\_\_ square meters) of each type and color.
  - 3. Extra Wall Base: 50 linear feet (\_\_\_\_\_ linear meters) of each type and color.
  - 4. Extra Stair Materials: Quantity equivalent to 5 percent of each type and color.

#### **1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Upon receipt, immediately remove any shrink-wrap and check materials for damage and the correct style, color, quantity and run numbers.
- B. Store all materials off of the floor in an acclimatized, weather-tight space.
- C. Maintain temperature in storage area between 55 degrees F (13 degrees C) and 90 degrees F (72 degrees C).
- D. Protect roll materials from damage by storing on end.
- E. Do not double stack pallets.

#### **1.06 WARRANTY**

- A. Provide Manufacturer's standard finish and ware warranties for each product specified.

#### **1.07 FIELD CONDITIONS**

- A. Store materials for not less than 48 hours prior to installation in area of installation at a temperature of 70 degrees F (21 degrees C) to achieve temperature stability. Thereafter, maintain conditions above 55 degrees F (13 degrees C).
- B. Install resilient flooring and accessories after other finishing operations, including painting, have been completed. Moisture content of concrete slabs and environmental conditions must be within limits recommended by manufacturer of products being installed.

### **PART 2 PRODUCTS**

#### **2.01 TILE FLOORING**

- A. Solid Vinyl Tile (LVT): Next Floor Patina - Antique Pewter.
  - 1. Minimum Requirements: Comply with ASTM F1700, of Class I, Type B.
  - 2. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E 648.
  - 3. Size:
    - a. LVT-1: 18x24
  - 4. Thickness: .0120 inch (\_\_\_\_\_ mm).
  - 5. Color and Pattern: Antique Pewter
  - 6. Edge Treatment: Beveled
  - 7. Manufacturers:
    - a. Next Floor.
    - b. Substitutions: See Section 016000 - Product Requirements.

#### **2.02 RESILIENT BASE**

- A. Resilient Base (RBR 1): ASTM F1861, Type TP, rubber, thermoplastic; top set Style B, Cove.
  - 1. Manufacturers:
    - a. Johnsonite, a Tarkett Company; DURACOVE THERMOPLASTIC RUBBER 1/8" (TYPE TP): [www.johnsonite.com/#sle](http://www.johnsonite.com/#sle).
  - 2. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E 648 or ASTM E 648.
  - 3. Height: 6 inch (150 mm); provide 4 inch at millwork base cabinet locations.
  - 4. Thickness: 0.125 inch (3.2 mm).

5. Toe: Yes
6. Length: Roll.
7. Color: As indicated on drawings.
8. Color: To be selected by Engineer/Architect from manufacturer's full range.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION AND TESTING**

- A. Verify that surfaces are flat to tolerances acceptable to flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of flooring to substrate.
- B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive resilient base.
- C. Cementitious Subfloor Surface Testing: Verify that substrates are ready for resilient flooring installation by providing third party testing for relative humidity (ASTM F2170-19a) and alkalinity (ASTM F3441-23).
  1. Obtain instructions if test results are not within limits recommended by resilient flooring manufacturer and adhesive materials manufacturer.
  2. If subfloor fails testing, it will be the contractor's responsibility to provide remediation to the subfloor to comply with required relative humidity and alkalinity at no additional cost to the Owner.
- D. Verify that required floor-mounted utilities are in correct location.
- E. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to installer.

#### **3.02 PREPARATION**

- A. Vacuum and broom clean substrate.
- B. Apply concrete slab primer if recommended by flooring manufacturer, prior to application of adhesive. Apply in compliance with manufacturer's directions.
- C. Start of flooring installation indicates acceptance of sub-floor conditions and full responsibility for completed work.

#### **3.03 INSTALLATION - GENERAL**

- A. Starting installation constitutes acceptance of subfloor conditions.
- B. Install in accordance with manufacturer's written instructions.

#### **3.04 INSTALLATION - TILE FLOORING**

- A. Mix tile from container to ensure shade variations are consistent when tile is placed, unless otherwise indicated in manufacturer's installation instructions.
- B. Lay flooring with joints and seams parallel to building lines to produce symmetrical tile pattern or in direction indicated on Drawings.
- C. Install tile floors according to color and pattern as indicated on Drawings. Lay out tile from center of room or area, so that tile at opposite edges of room are at equal width. Adjust as necessary to avoid use of cut widths less than 1/2 tile at room perimeters.
- D. Match tile for color and pattern by using tile from cartons in same sequence as manufactured and packaged if so numbered. Cut tile neatly around all fixtures. Broken, chipped, or deformed tiles are not acceptable.
- E. Lay tile with grain running in one direction; direction as indicated on Drawings.
- F. Sealing/Waxing:
  1. For Vinyl Composition Tile (VCT) provide sealer/wax per the manufacturer's installation and/or protection instructions.

2. For Luxury Vinyl Tile (LVT) there will be no waxing/sealing required unless specifically required by the LVT manufacturer. If the submitted LVT requires any waxing/sealing, then the General Contractor will be required to provide.

**3.05 INSTALLATION - RESILIENT BASE**

- A. Miter internal corners. At external corners, 'V' cut back of base strip to 2/3 of its thickness and fold.
- B. Install base on solid backing. Bond tightly to wall and floor surfaces.
- C. Install base in lengths as long as practicable, with field formed outside corner units, and with mitered or coped inside corners.
- D. On irregular surfaces, fill voids along top edge of resilient wall base with manufacturer's recommended adhesive filler material.
- E. Scribe and fit to door frames and other interruptions.

**3.06 INSTALLATION - STAIR COVERINGS**

- A. Install stair coverings in one piece for full width and depth of tread.
- B. Adhere over entire surface. Fit accurately and securely.

**3.07 CLEANING**

- A. Remove excess adhesive from floor, base, and wall surfaces without damage.
- B. Clean in accordance with manufacturer's written instructions.

**3.08 PROTECTION**

- A. Prohibit traffic on resilient flooring for 48 hours after installation.
- B. Protect solid vinyl tile against damage by covering with plywood or hardboard in high traffic areas and heavy kraft paper in other areas or as recommended by Manufacturer.

**END OF SECTION**

**SECTION 099123  
INTERIOR PAINTING****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Surface preparation.
- B. Field application of paints.
- C. Scope: Finish interior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated.
  - 1. Both sides and edges of plywood backboards for electrical and telecom equipment before installing equipment.
  - 2. Prime surfaces to receive wall coverings.
  - 3. Mechanical and Electrical:
    - a. In finished areas, paint insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, mechanical equipment, and electrical equipment, unless otherwise indicated.
    - b. In finished areas, paint shop-primed items.
    - c. Paint interior surfaces of air ducts that are visible through grilles and louvers with one coat of flat black paint to visible surfaces.
    - d. Paint dampers exposed behind louvers, grilles, to match face panels.
- D. Do Not Paint or Finish the Following Items:
  - 1. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
  - 2. Items indicated to receive other finishes.
  - 3. Items indicated to remain unfinished.
  - 4. Fire rating labels, equipment serial number and capacity labels, bar code labels, and operating parts of equipment.
  - 5. Floors, unless specifically indicated.
  - 6. Ceramic and other tiles.
  - 7. Glass.
  - 8. Concealed pipes, ducts, and conduits.

**1.02 DEFINITIONS**

- A. Comply with ASTM D16 for interpretation of terms used in this section.

**1.03 REFERENCE STANDARDS**

- A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; current edition.
- B. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications; 2024.
- C. ASTM D4258 - Standard Practice for Surface Cleaning Concrete for Coating; 2023.
- D. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Based Materials; 2020.
- E. ICRI 310.2R - Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, Polymer Overlays, and Concrete Repair; 2013.
- F. MPI (APL) - Master Painters Institute Approved Products List; Master Painters and Decorators Association; Current Edition.
- G. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual; Current Edition.
- H. SSPC V1 (PM1) - Good Painting Practice: Painting Manual Volume 1; 2016.

- I. SSPC-SP 1 - Solvent Cleaning; 2015, with Editorial Revision (2016).
- J. SSPC-SP 2 - Hand Tool Cleaning; 2018.
- K. SSPC-SP 3 - Power Tool Cleaning; 2018.
- L. SSPC-SP 13 - Surface Preparation of Concrete; 2018.

#### **1.04 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide complete list of products to be used, with the following information for each:
  - 1. Manufacturer's name, product name and/or catalog number, and general product category (e.g., "alkyd enamel").
  - 2. MPI product number (e.g., MPI #47).
  - 3. Cross-reference to specified paint system products to be used in project; include description of each system.
- C. Samples: Submit three paper "draw down" samples, 8-1/2 by 11 inches (216 by 279 mm) in size, illustrating range of colors available for each finishing product specified.
  - 1. Where sheen is specified, submit samples in only that sheen.
  - 2. Where sheen is not specified, discuss sheen options with Engineer/Architect before preparing samples, to eliminate sheens not required.
  - 3. Allow 10 days for approval process, after receipt of complete samples by Engineer/Architect.
  - 4. Paint color submittals will not be considered until color submittals for major materials not to be painted, such as masonry, have been approved.
- D. Certification: By manufacturer that paints and finishes comply with VOC limits specified.
- E. Manufacturer's Instructions: Indicate special surface preparation procedures.
- F. Maintenance Data: Submit data including finish schedule showing where each product/color/finish was used, product technical data sheets, care and cleaning instructions, touch-up procedures, repair of painted and finished surfaces, and color samples of each color and finish used. Finish Schedule is not required if it matches the Construction Documents.
- G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
  - 1. See Section 016000 - Product Requirements, for additional provisions.
  - 2. Extra Paint and Finish Materials: 1 gal (4 L) of each color; from the same product run, store where directed.
  - 3. Label each container with color in addition to the manufacturer's label.

#### **1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum three years documented experience.
- B. Applicator Qualifications: Company specializing in performing the type of work specified with minimum 5 years experience and approved by manufacturer.

#### **1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- C. Paint Materials: Store at minimum ambient temperature of 45 degrees F (7 degrees C) and a maximum of 90 degrees F (32 degrees C), in ventilated area, and as required by manufacturer's instructions.



**1.07 FIELD CONDITIONS**

- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.
- B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
- C. Do not apply materials when relative humidity exceeds 85 percent, at temperatures less than 5 degrees F (3 degrees C) above the dew point, or to damp or wet surfaces.
- D. Minimum Application Temperatures for Paints: 50 degrees F (10 degrees C) for interiors unless required otherwise by manufacturer's instructions.
- E. Provide lighting level of 80 fc (860 lux) measured mid-height at substrate surface.

**PART 2 PRODUCTS****2.01 MANUFACTURERS**

- A. Provide paints and finishes from the same manufacturer to the greatest extent possible.
  - 1. If a single manufacturer cannot provide specified products; minor exceptions will be permitted provided approval by Engineer/Architect is obtained using the specified procedures for substitutions.
  - 2. Substitution of MPI-approved products by a different manufacturer is preferred over substitution of unapproved products by the same manufacturer.
  - 3. Substitution of a different paint system using MPI-approved products by the same manufacturer will be considered.
- B. Paints:
  - 1. Behr Process Corporation: [www.behr.com/#sle](http://www.behr.com/#sle).
  - 2. PPG Paints: [www.ppgpaints.com/#sle](http://www.ppgpaints.com/#sle).
  - 3. Sherwin-Williams Company: [www.sherwin-williams.com/#sle](http://www.sherwin-williams.com/#sle).

**2.02 PAINTS AND FINISHES - GENERAL**

- A. Paints and Finishes: Ready-mixed, unless intended to be a field-catalyzed paint.
  - 1. Where MPI paint numbers are specified, provide products listed in Master Painters Institute Approved Product List, current edition available at [www.paintinfo.com](http://www.paintinfo.com), for specified MPI categories, except as otherwise indicated.
  - 2. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
  - 3. DOOR SLABS, DOOR FRAMES, AND OPENING FRAMES TO BE FIELD PAINTED MUST BE SPRAYED. BRUSH OR ROLLED APPLICATION WILL NOT BE ACCEPTED. If brushed or rolled, then the contractor will be required to strip and/or replace the product or installation in question and repaint, which will be up to the Architect's discretion with no fault to the Architect or Owner and without time or monetary compensation to the Contractor.
  - 4. Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
  - 5. Supply each paint material in quantity required to complete entire project's work from a single production run.
  - 6. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.
- B. Volatile Organic Compound (VOC) Content:
  - 1. Provide paints and finishes that comply with the most stringent requirements specified in the following:

- a. 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.
- b. Architectural coatings VOC limits of the State in which the Project is located.
2. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.
- C. Flammability: Comply with applicable code for surface burning characteristics.
- D. Sheens: Provide the sheens specified; where sheen is not specified, sheen will be selected later by Engineer/Architect from the manufacturer's full line.
- E. Colors: As indicated on drawings.
  1. Allow for minimum of three colors for each system, unless otherwise indicated, without additional cost to Owner.
  2. Extend colors to surface edges; colors may change at any edge as directed by Engineer/Architect.
  3. In finished areas, finish pipes, ducts, conduit, and equipment the same color as the wall/ceiling under which they are mounted.

### 2.03 PAINT SYSTEMS - INTERIOR

- A. Non Wet Area Interior Surfaces to be Painted, Unless Otherwise Indicated: Including gypsum board.
  1. Two top coats and one coat primer.
  2. Top Coat(s): Institutional Low Odor/VOC Interior Latex; MPI #143, 144, 145, 146, 147, or 148.
  3. Top Coat Sheen:
    - a. Flat: MPI gloss level 1; use this sheen for ceilings and other overhead surfaces.
    - b. Eggshell: MPI gloss level 3; use this sheen at walls.
    - c. Satin: MPI gloss level 4; use this sheen for items subject to frequent touching by occupants, including door frames and railings.
  4. Primer: As recommended by top coat manufacturer for specific substrate.
- B. Medium Duty Door/Trim: For surfaces subject to frequent contact by occupants, including metals:
  1. Medium duty applications include doors and door frames.
  2. Two top coats and one coat primer.
  3. Top Coat(s): Interior Epoxy-Modified Latex; MPI #115 or 215.
  4. Top Coat Sheen:
    - a. Semi-Gloss: MPI gloss level 5; use this sheen at all locations.
- C. Wet Area Medium Duty Vertical and Overhead: Including gypsum board.
  1. Two top coats and one coat primer.
  2. Top Coat(s): Interior Epoxy-Modified Latex; MPI #115 or 215.
  3. Top Coat Sheen:
    - a. Satin: MPI gloss level 4; use this sheen at all locations.
- D. SC - Transparent Finish on Concrete Floors.
  1. Product: H&C ClariShield Solvent-Based Natural Look Sealer or approved equal.
  2. Coats: 2 coats sealer.
  3. Color: Clear
  4. Sheen: Satin
  5. Sealer: Water Based Sealer for Concrete Floors; MPI #99.
    - a. Products:
      - 1) Sherwin-Williams H&C Clarishield Water-Based Wet-Look Concrete Sealer. (MPI #99)
  6. Sealer Sheen:

- a. Eggshell: MPI gloss level 3; use this sheen at all locations.
7. Concrete Surface Preparation:
  - a. CSP 3 in accordance with ICIR and/or as required by Sealer manufacturer installation requirements.

## 2.04 PRIMERS

- A. Primers: Provide the following unless other primer is required or recommended by manufacturer of top coats.
  1. Interior/Exterior Latex Block Filler; MPI #4.
    - a. Products:
      - 1) Kilz Pro-X p50 Block Filler Primer.
  2. Interior Latex Primer Sealer; MPI #50.
    - a. Products:
      - 1) Behr Premium Plus Interior All-In-One Primer and Sealer [No.75]. (MPI #50)
  3. Interior Drywall Primer Sealer.
    - a. Products:
      - 1) Behr Premium Plus Interior Drywall Primer and Sealer [No.73].
  4. Interior Rust-Inhibitive Water Based Primer; MPI #107.
    - a. Products:
      - 1) Behr Premium Plus Interior/Exterior Multi-Surface Primer and Sealer [No.436]. (MPI #107)
  5. Interior Water Based Primer for Galvanized Metal; MPI #134 or #134 X-Green.
    - a. Products:
      - 1) Behr Premium Plus Interior/Exterior Multi-Surface Primer and Sealer [No.436]. (MPI #134)
  6. Latex Primer for Interior Wood; MPI #39.
    - a. Products:
      - 1) Kilz Premium Water-Based Primer [No.1300].

## 2.05 ACCESSORY MATERIALS

- A. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of painted surfaces.
- B. Patching Material: Latex filler.
- C. Fastener Head Cover Material: Latex filler.

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Do not begin application of paints and finishes until substrates have been adequately prepared.
- B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.
- D. If substrate preparation is the responsibility of another installer, notify Engineer/Architect of unsatisfactory preparation before proceeding.
- E. Test shop-applied primer for compatibility with subsequent cover materials.
- F. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces is below the following maximums:
  1. Gypsum Wallboard: 12 percent.
  2. Interior Wood: 15 percent, measured in accordance with ASTM D4442.
  3. Concrete Floors and Traffic Surfaces: 8 percent.

**3.02 PREPARATION**

- A. Clean surfaces thoroughly and correct defects prior to application.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Remove or repair existing paints or finishes that exhibit surface defects.
- D. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.
- E. Seal surfaces that might cause bleed through or staining of topcoat.
- F. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
- G. Concrete:
  - 1. Remove release agents, curing compounds, efflorescence, and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.
  - 2. Clean concrete according to ASTM D4258. Allow to dry.
  - 3. Prepare surface as recommended by top coat manufacturer and according to SSPC-SP 13.
- H. Concrete Floors and Traffic Surfaces: Remove contamination, acid etch and rinse floors with clear water. Verify required acid-alkali balance is achieved. Allow to dry.
- I. Gypsum Board: Fill minor defects with filler compound. Spot prime defects after repair.
- J. Wood Surfaces to Receive Opaque Finish: Wipe off dust and grit prior to priming. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats. Back prime concealed surfaces before installation.
- K. Wood Doors to be Field-Finished: Seal wood door top and bottom edge surfaces with clear sealer.
- L. Metal Doors to be Painted: Prime metal door top and bottom edge surfaces.

**3.03 APPLICATION**

- A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
- B. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".
- C. Where adjacent sealant is to be painted, do not apply finish coats until sealant is applied.
- D. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- E. Apply each coat to uniform appearance in thicknesses specified by manufacturer.
- F. Sand wood and metal surfaces lightly between coats to achieve required finish.
- G. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- H. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

**3.04 CLEANING**

- A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

**3.05 PROTECTION**

- A. Protect finishes until completion of project.

B. Touch-up damaged finishes after Substantial Completion.

**END OF SECTION**



**SECTION 101419  
DIMENSIONAL LETTER SIGNAGE**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Dimensional letter signage.

**1.02 REFERENCE STANDARDS**

- A. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines; current edition.
- B. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.
- C. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.

**1.03 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Manufacturer's product literature for each type of dimensional letter sign, indicating style, font, colors, locations, and overall dimensions of each sign.
- C. Shop Drawings:
  - 1. Include dimensions, locations, elevations, materials, text and graphic layout, and attachment details.

**1.04 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

**1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Package dimensional letter signs as required to prevent damage before installation.
- B. Store under cover and elevated above grade.
- C. Store tape adhesive at a normal room temperature of 68 to 72 degrees F (20 to 22 degrees C).

**1.06 FIELD CONDITIONS**

- A. Do not install tape adhesive when ambient temperature is lower than recommended by manufacturer.
- B. Maintain minimum ambient temperature during and after installation.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

**2.02 REGULATORY REQUIREMENTS**

- A. Accessibility Requirements: Comply with ADA Standards and ICC A117.1 and applicable building codes, unless otherwise indicated; in the event of conflicting requirements, comply with the most restrictive requirements.

**2.03 DIMENSIONAL LETTERS**

- A. Applications: Building identification.
  - 1. Use individual metal letters.
  - 2. Mounting Location: Exterior as indicated on drawings.
  - 3. Text/Verbiage: As indicated on the drawings.
- B. Metal Letters:
  - 1. Material: Aluminum sheet, fabricated reverse channel.
  - 2. Thickness: 1/8 inch minimum (3 mm).
  - 3. Letter Height: As indicated on drawings.

4. Text and Typeface:
  - a. Character Font: Helvetica, Arial, or other sans serif font unless indicated/represented otherwise on the drawings.
  - b. Character Case: Upper case only unless indicated/represented otherwise on the drawings.
5. Finish: Brushed, satin.
6. Color: As selected by Architect from manufacturer's full range.
7. Mounting: Concealed screws.
8. Building Address Numbers: Whether called for on the drawings or not, the contractor will be required to provide no less than five (5) six (6) inch high numbers to be mounted on the street side of the building to comply with the requirements of the local fire department. Final location of the address numbers will need to be verified with the Architect prior to installation. Provide all necessary blocking required for proper installation. Mounting to be concealed screws.

#### **2.04 ACCESSORIES**

- A. Concealed Screws: Noncorroding metal; stainless steel, galvanized steel, chrome plated, or other.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify that substrate surfaces are ready to receive work.
- B. Notify Engineer/Architect if conditions are not suitable for installation of signs; do not proceed until conditions are satisfactory.

#### **3.02 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Install with horizontal edges level.
- C. Locate dimensional letter signs and mount at heights indicated on drawings and in accordance with ADA Standards and ICC A117.1.
- D. Protect from damage until substantial completion; repair or replace damaged items.

**END OF SECTION**



**SECTION 101423  
PANEL SIGNAGE**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Panel signage.

**1.02 REFERENCE STANDARDS**

- A. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.
- B. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.

**1.03 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Manufacturer's product literature for each type of panel sign, indicating styles, font, foreground and background colors, locations, and overall dimensions of each sign.
- C. Shop Drawings:
  - 1. Include dimensions, locations, elevations, materials, text and graphic layout, attachment details, and schedules.
  - 2. Include a scaled floor plan indicating locations that all signs will be installed. A digital markup of the Architects original digital print file is acceptable. The markup must be clearly noticeable and legible using contrasting colors as needed.
  - 3. Include a scaled legible elevation of EVERY sign even if the name of the sign is duplicated. The elevation must describe the sign location that refers back to the floor plan required under 1.03-C-2 herein, the room name, the room number, and any associated global or room specific graphics.
  - 4. Schedule: Provide information sufficient to completely define each panel sign for fabrication, including room number, room name, other text to be applied, sign and letter sizes, fonts, and colors.
    - a. When room numbers to appear on signs differ from those on drawings, include the drawing room number on schedule.
    - b. When content of signs is indicated to be determined later, request such information from Owner through Engineer/Architect at least 2 months prior to start of fabrication; upon request, submit preliminary schedule.
    - c. Submit for approval by Owner through Engineer/Architect prior to fabrication.
- D. Samples: Submit two samples of each type of sign, of size similar to that required for project, indicating sign style, font, and method of attachment.
- E. Provide a physical on-the-job- sample for each signage type upon request.
  - 1. Final color, lettering, and numbering designations to be complete prior to on-the-job- sample production.
    - a. If approved, on-the-job- sample may be used as final signage for specific location of sample.
- F. Selection Samples: Where colors, materials, and finishes are not specified, submit two sets of color selection charts or chips.
- G. Manufacturer's Installation Instructions: Include installation templates and attachment devices.
- H. Manufacturer's qualification statement.

**1.04 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

**1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Package signs as required to prevent damage before installation.
- B. Package room and door signs in sequential order of installation, labeled by floor or building.
- C. Store under cover and elevated above grade.
- D. Store tape adhesive at normal room temperature.

**1.06 FIELD CONDITIONS**

- A. Do not install tape adhesive when ambient temperature is lower than recommended by manufacturer.
- B. Maintain minimum ambient temperature during and after installation.

**PART 2 PRODUCTS****2.01 MANUFACTURERS**

- A. Panel Signage:
  - 1. Mohawk Sign Systems, Inc; Mowhawk 1000 ADA System, Series 200A Sand Carved: [www.mohawksign.com/#sle](http://www.mohawksign.com/#sle).
  - 2. Substitutions: See Section 016000 - Product Requirements.

**2.02 REGULATORY REQUIREMENTS**

- A. Accessibility Requirements: Comply with ADA Standards and ICC A117.1 and applicable building codes, unless otherwise indicated; in the event of conflicting requirements, comply with the most restrictive requirements.

**2.03 PANEL SIGNAGE**

- A. Panel Signage:
  - 1. Application: Room and door signs.
  - 2. Description: Flat signs with sand blasted plastic panel media, tactile characters.
  - 3. Sign Size and Graphic Requirements:
    - a. Non Graphic / Non Insert room function and room number only signs: 3" tall x length as required.
    - b. Classroom Signs: M-310-B with two windows. Window inserts by Owner. Sign size, 6" x 6".
    - c. Restroom Signs shall be size 8" x 8" with symbols listed below and the verbal description placed directly below followed by Grade 2 braille.
      - 1) Adult Restroom Signage:
        - (a) Unisex: MS 5
    - d. Janitor Room Signs shall be size 8" x 8" with MS 25 symbol and the verbal description placed directly below followed by Grade 2 braille.
    - e. Electrical Room Signs shall be size 8" x 8" with MS 28 symbol and the verbal description placed directly below followed by Grade 2 braille.
    - f. Office Room Signs and others requiring Insert shall be 8"x8" with verbal description and followed by Grade 2 braille.
  - 4. Size of letters and numbers shall be as follows:
    - a. Room numbers shall be 1" tall.
    - b. Lettering for room ID signs shall be 3/4" tall.
    - c. Symbol size shall be 4" tall.
    - d. Standard Grade 2 braille shall be 1/2" below copy.
    - e. Copy Position: Centered
  - 5. Total Thickness: 1/4 inch (\_\_\_\_ mm) plus raised letter depth.
  - 6. Sign Edges: Bevelled.
  - 7. Letter Edges: Squared.

8. Corners: Radiused with square inner border.
9. Color and Font, unless otherwise indicated:
  - a. Character Font: Helvetica, Arial, or other sans serif font.
  - b. Character Case: Upper case only.
  - c. Background Color: If not scheduled on the drawings, then it shall be chosen by the Architect from the manufacturer's standard colors..
  - d. Character Color: If not scheduled on the drawings, then it shall be chosen by the Architect from the manufacturer's standard colors.
10. Material: Laminated colored plastic engraved through face to expose core as background color.
11. Material: High gloss acrylic plastic with letters and graphics sandblasted to dull sheen.
12. Profile: Flat panel in matching plastic frame.
13. Tactile Letters: Raised 1/32 inch minimum.
14. Braille: Grade II, ADA-compliant.
15. One-Sided Wall Mounting: Tape adhesive.

#### **2.04 SIGNAGE APPLICATIONS**

- A. Room and Door Sign:
  1. Locations as indicated on the door schedule and the standard mounting height drawings.

#### **2.05 ACCESSORIES**

- A. Tape Adhesive: Double-sided tape, permanent adhesive.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify that substrate surfaces are ready to receive work.
- B. Notify Engineer/Architect if conditions are not suitable for installation of signs; do not proceed until conditions are satisfactory.

#### **3.02 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Install with horizontal edges level.
- C. Locate panel signs and mount at heights indicated on drawings and in accordance with ADA Standards and ICC A117.1.
- D. Protect from damage until mm-dd-yyyy; repair or replace damaged items.

**END OF SECTION**



**SECTION 102800**  
**TOILET, BATH, AND LAUNDRY ACCESSORIES**

**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Commercial toilet accessories.
- B. Provide Accessories for restrooms, janitor closets, toilet rooms, showers, utility rooms, and other accessory items as indicated on the Drawings and as specified herein..
  - 1. Refer to the Enlarged Restroom/Janitor Accessory Schedule on the Drawings.
  - 2. Contractor to coordinate all installs and provide blocking in wall as required for installation.

**1.02 RELATED REQUIREMENTS**

- A. Section 093000 - Tiling
- B. Section 102113.19 - Plastic Toilet Compartments.

**1.03 REFERENCE STANDARDS**

- A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2019a.
- B. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.
- C. ASTM C1036 - Standard Specification for Flat Glass; 2021.
- D. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2018.

**1.04 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Submit data on accessories describing size, finish, details of function, and attachment methods.
- C. Manufacturer's Installation Instructions: Indicate special procedures and conditions requiring special attention.
- D. Manufacturer's Cleaning and Maintenance Instructions and replacement parts information.

**1.05 QUALITY ASSURANCE**

- A. Furnish and install inserts and anchoring devices that must be set in concrete or built into masonry; coordinate delivery with other work to avoid delays.
- B. Coordinate accessory location with other work to avoid interference and to assure proper operation and servicing of accessory units.
- C. Provide a single source manufacturer to the greatest extent possible for accessories.
- D. Manufacturer: Provide products manufactured by a company with a minimum of 10 years successful experience manufacturing similar products.
- E. Accessibility Requirements: Comply with requirements applicable in the jurisdiction of the project, including but not limited to ADA and ICC/ANSI A117.1 requirements as applicable.

**1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver, store and handle materials and products in strict compliance with manufacturer's instructions and recommendations. Protect from damage.

**1.07 WARRANTY**

- A. Manufacturer's Warranty for Washroom Accessories: Manufacturer's standard 1 year warranty for materials and workmanship.

- B. Manufacturer's Warranty for Electric Hand Dryers: Manufacturer's standard 10 year warranty on parts, except 3 year warranty on motor brushes from Substantial Completion Date.

## **PART 2 PRODUCTS**

### **2.01 MANUFACTURERS**

- A. Commercial Toilet, Shower, and Bath Accessories:
  - 1. ASI - American Specialties, Inc: [www.americanspecialties.com](http://www.americanspecialties.com).
  - 2. Bradley Corporation: [www.bradleycorp.com](http://www.bradleycorp.com).
  - 3. Bobrick Washroom Equipment, Inc.; [www.bobrick.com](http://www.bobrick.com)
  - 4. Substitutions: Section 016000 - Product Requirements.

### **2.02 MATERIALS**

- A. Accessories - General: Shop assembled, free of dents and scratches and packaged complete with anchors and fittings, steel anchor plates, adapters, and anchor components for installation.
  - 1. Grind welded joints smooth.
- B. Keys: Provide 4 keys for each accessory to Owner.
- C. Stainless Steel Sheet: ASTM A666, Type 304, 22 gauge minimum thickness unless noted otherwise.
- D. Galvanized Sheet Steel: Hot-dipped galvanized steel sheet, ASTM A653/A653M, with G90/Z275 coating.
- E. Mirror Glass: Tempered safety glass, ASTM C1048; and ASTM C1036 Type I, Class 1, Quality Q2, with silvering as required.
- F. Fasteners, Screws, and Bolts: Hot dip galvanized; tamper-proof; security type.

### **2.03 FINISHES**

- A. Stainless Steel: Satin finish, unless otherwise noted.

### **2.04 COMMERCIAL TOILET ACCESSORIES**

- A. Grab Bars:
  - 1. Provide 18-8 S , type 304, 18 gauge stainless steel tubing with satin finish. 1-1/2 inch outside diameter. Ends are heliarc welded to flanges.
  - 2. Clearance between grab bar and wall is 1-1/2 inch.
  - 3. Provide concealed mounting flanges: 18-8 S, type 304, 1/8 inch thick, stainless steel plate; end flanges 2 inches x 3-1/8 inch with two holes for attachment to wall. Intermediate flanges 2-5/8 inch x 3-1/8 diameter.
  - 4. Provide Snap Flange covers: 18-8S, type 304, 22 gauge drawn stainless steel with satin finish. 3-1/4 inch diameter x 1/2 inch deep. Each cover snaps over mounting flange to conceal mounting screws.
  - 5. Strength: support loads in excess of 250 pounds.
  - 6. Finish: Satin Finish
  - 7. Provide in locations as shown on Drawings.
  - 8. Products:
    - a. 36" Grab Bar, equal to Bobrick B-6806 or Bradley 812
    - b. 42" Grab Bar, equal to Bobrick B-6806 or Bradley 812
    - c. 18" Grab Bar, equal to Bobrick B-6806 or Bradley 812 (install vertical at ADA Toilet Stalls)
    - d. 24"x36" Shower Grab Bar, equal to Bobrick B-68616 (Provide at ADA Showers)
- B. Mirrors:
  - 1. One piece, 18-8, type 304 heavy gauge stainless steel angle frame, 3/4 inchx3/4 inch with continuous integral stiffener on all sides and beveled front to hold frame tightly against mirror; corners shall be welded, ground and polished smooth. All exposed surfaces shall

- have satin finish with vertical grain. Galvanized steel backing with integral horizontal hanging brackets. Provide with concealed locking screws.
- a. Manufacturers standard concealed mounting.
  - b. Provide with Tempered Glass Mirror.
  - c. Size: minimum of 18x36 unless larger is called for on the drawings.
2. Provide in locations as shown on Drawings.
  3. Finish: Satin Finish
  4. Products:
    - a. Bradley Angle Frame Mirror Model 780.
    - b. Bobrick B-2908 Tempered Glass Welded-Frame Mirror
- C. Toilet Paper Dispenser: Double roll, surface mounted, for coreless type rolls.
1. Owner Furnished, Owner Installed.
- D. Soap Dispenser:
1. Owner Furnished, Owner Installed.
- E. Robe Hook: Surface mounted stainless steel robe hook with satin finish.
1. 18-8, type 304, 22 gauge stainless steel flange and support arm with 18 gauge stainless steel concealed mounting bracket, 19 gauge stainless steel concealed wall plate, and 14 gauge stainless steel cap. All welded construction; secured to wall with a stainless steel setscrew.
  2. Finish: Satin Finish
  3. Mounting Style: Surface
  4. Products:
    - a. Bradley 915 Chrome Plated Hook and Bumper
    - b. Bobrick B-212 Clothes Hook with Bumper
    - c. Substitutions: Section 016000 - Product Requirements.
- F. Sanitary Napkin Disposal Unit: Stainless steel, surface-mounted, self-closing door, locking bottom panel with full-length stainless steel piano-type hinge, removable receptacle.
1. Finish: Satin Finish
  2. Mounting Style: Surface
  3. Products:
    - a. Bradley 4A10 Sanitary Napkin Disposal.
    - b. Bobrick B-270 Commercial Restroom Sanitary Napkin/Tampon Disposal
    - c. Substitutions: Section 016000 - Product Requirements.

## 2.05 SHOWER ACCESSORIES

- A. Shower Curtain Rod: 18-8, Type 304, 18 gauge Stainless steel tube, 1-1/4 inch (32 mm) outside diameter, 0.04 inch (1.0 mm) wall thickness, satin-finished, with 3 inch (75 mm) outside diameter, minimum 0.04 inch (1.0 mm) thick satin-finished stainless steel flanges, for installation with exposed fasteners.
1. Finish: Satin Finish
  2. Mounting: Concealed Screws
  3. Products:
    - a. Bobrick B-6047 Extra-Heavy-Duty Shower Curtain Rod.
    - b. Bradley 9538 Stainless Steel Concealed Mount Shower Curtain Rod.
    - c. Substitutions: Section 016000 - Product Requirements.
  4. Length: As required per shower size - see drawings.
- B. Shower Curtain:
1. Material: Opaque vinyl, 0.008 inch (0.2 mm) thick, matte finish, with antibacterial treatment, flameproof and stain-resistant.
  2. Size:
    - a. Height: 72 inches

- b. Length: Match shower width - see plans
    3. Grommets: Stainless steel; pierced through top hem on 6 inch (150 mm) centers.
    4. Color: White.
    5. Shower Curtain Hooks: Stainless steel spring wire designed for snap closure.
    6. Products:
      - a. Bobrick 204-2 Shower Curtain.
      - b. Bradley 9533 Antimicrobial Vinyl Shower Curtain.
      - c. Substitutions: Section 016000 - Product Requirements.
  - C. ADA Locker Room Bench - Floor Mounted
    1. Size: L42xW20xH17.5 inches (measured off finish floor)
    2. Weight Capacity: Must exceed 250 lbs minimum.
    3. Hardware: Stainless Steel
    4. Seat: 1-1/4 inch thick mixed hardwood with two-coat clear catalyzed lacquer top/sides; 1 bottom
    5. Pedestals: Stainless Steel
    6. Products:
      - a. Equal to Robinson Steel Company ADA Locker Room Bench
      - b. Substitutions: Section 016000-Product Requirements.
  - D. In Shower ADA Transfer Bench: Wall mounted surface; Folding ADA Compliant seat.
    1. Seat: Solid Phenolic one-piece seat, 1/2 inch thick, solid phenolic with matte finish, standard ivory color. Integral slots for water drainage. Secured to frame with stainless steel carriage bolts and acorn nuts. Reversible for left or right hand installation in the field.
    2. Frame: 18-8, type-304, stainless steel with satin finish. 16-gauge(1.6mm), 1-1/4 inch (30mm) square tubing and 18-gauge (1.2mm), 1 inch (25mm) diameter seamless tubing.
    3. Mounting Flanges: Two (2) 18-8, type 304, 3/16 inch (5mm) thick stainless steel with satin finish. 3 inch (75mm) diameter with three mounting screw hols.
    4. Baseplate: 18-8, type 304 heavy gauge stainless steel.
    5. Spring: 17-7, type 301, 24 gauge (0.6 mm) stainless steel. Spot welded to baseplate.
    6. Guide Bracket: 18-8, type 304, 16 gauge (1.6mm) stainless steel with satin finish.
    7. Products:
      - a. Bobrick B5181 Reversible Solid Phenolic Folding Shower Seat
      - b. Bradley 9569 Reversible Phenolic Shower Seat.
      - c. Substitutions: Section 016000-Product Requirements.
  - E. Wall-Mounted Soap Dish: Heavy duty, seamless stainless steel, surface-mounted with drain holes, without grab bar, satin finish; with concealed mechanical fastening suitable for substrate and backplate.
    1. Products:
      - a. Bradley 9014 Surface-Mounted Sttainless Steel Soap Dish.
      - b. Substitutions: Section 016000 - Product Requirements.
  - F. Towel Bar: Stainless steel, 3/4 inch (20 mm) square tubular bar; rectangular brackets, concealed attachment, satin finish.
    1. Length: 30 inches (760 mm).

## 2.06 JANITOR ROOM ACCESSORIES

- A. Combination Utility Shelf/Mop and Broom Holder:
  1. Utility shelf with mop/broom holders and rag hooks shall be type 304 stainless steel with all welded construction; exposed surfaces shall have satin finish. Shelf shall be 18 gauge, 8 inch deep with 3/4 inch return edges, and shall have front edge hemmed for safety. Mop/broom holders shall be spring loaded rubber cams with anti-slip coating.
  2. Products:
    - a. Equal to Bobrick B239x34 or Bradley 9933 BradEx.



### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify existing conditions before starting work.
- B. Verify exact location of accessories for installation.
- C. Examine substrates, any previously installed inserts or anchorages.
- D. For electrically-operated accessories, verify that electrical power connections are ready and in the correct locations.
- E. Verify that field measurements are as indicated on drawings.
- F. Do not proceed with work until conditions are acceptable for installation.

#### **3.02 INSTALLATION**

- A. Install accessories in accordance with manufacturers' instructions in locations indicated on drawings.
- B. Install plumb and level, securely and rigidly anchored to substrate.
- C. Mounting Heights: Provide as indicated on Drawings and as required to meet accessibility regulations, unless otherwise indicated.
- D. Install utilizing fasteners which are appropriate to substrate and recommended by Manufacturer for unit.
- E. Adjust toilet accessories for proper operation and verify that all mechanisms function smoothly.

#### **3.03 PROTECTION**

- A. Protect installed accessories from damage due to subsequent construction operations.

**END OF SECTION**



**SECTION 104400  
FIRE PROTECTION SPECIALTIES****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Building Master Key Security Box
- B. Fire extinguishers.
  - 1. Provide fully charged portable fire extinguisher where noted on drawings. Provide the following types:
    - a. Semi-Recessed Cabinet and Extinguisher mounted noted on drawings as (FEC)
      - 1) These are to be installed in new walls that have the FEC designation.
    - b. Surface mounted Cabinet and Extinguisher noted on drawings as (FEC)
      - 1) These are to be installed on existing walls that have the FEC designation.
    - c. Bracket Mounted Extinguisher noted on drawings as (FE)
- C. Fire extinguisher cabinets.
- D. Accessories.

**1.02 REFERENCE STANDARDS**

- A. FM (AG) - FM Approval Guide; Current Edition.
- B. NFPA 10 - Standard for Portable Fire Extinguishers; 2022.
- C. UL (DIR) - Online Certifications Directory; Current Edition.

**1.03 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate locations of cabinets and cabinet physical dimensions.
- C. Manufacturer's Installation Instructions: Indicate special criteria and wall opening coordination requirements.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

**PART 2 PRODUCTS****2.01 MANUFACTURERS**

- A. Fire Extinguishers:
  - 1. J.L. Industries, Inc.: [www.jlindustries.com](http://www.jlindustries.com).
  - 2. Larsens Manufacturing Company: [www.larsensmfg.com](http://www.larsensmfg.com).
  - 3. Or Equal
  - 4. Substitutions: See Section 016000 - Product Requirements.
- B. Fire Extinguisher Cabinets (FEC) and Accessories:
  - 1. J.L. Industries, Inc.: [www.jlindustries.com](http://www.jlindustries.com)
  - 2. Larsen's Manufacturing Co: [www.larsensmfg.com/#sle](http://www.larsensmfg.com/#sle).
  - 3. Or Equal.
  - 4. Substitutions: See Section 016000 - Product Requirements.
- C. Building Master Key Lock Box
  - 1. Knox: [www.knoxbox.com](http://www.knoxbox.com)
  - 2. Or Equal
  - 3. Substitutions: See Section 016000 - Product Requirements.

**2.02 FIRE EXTINGUISHERS**

- A. Fire Extinguishers - General: Comply with product requirements of NFPA 10 and applicable codes, whichever is more stringent.

1. Provide extinguishers labeled by UL (DIR) or FM (AG) for purpose specified and as indicated.
2. Provide fire extinguishers, cabinets, and accessories from a single manufacturer.
- B. Multipurpose Dry Chemical Type Fire Extinguishers: Carbon steel tank, with pressure gauge.
  1. Stored Pressure Operated: Deep Drawn.
  2. Class: A:B:C type.
  3. Size: 10 pound (4.54 kg).
  4. Finish: Baked polyester powder coat, red color.
  5. Temperature range: Minus 65 degrees F (Minus 54 degrees C) to 120 degrees F (\_\_\_ degrees C).
- C. Wet Chemical Type Fire Extinguishers: Stainless steel tank, with pressure gauge.
  1. Class: K type.
  2. Temperature range: Minus 20 degrees F (Minus 29 degrees C) to 120 degrees F (49 degrees C).

### 2.03 FIRE EXTINGUISHER CABINETS

- A. Cabinet Configuration: Semi-recessed type for 6" metal stud, 2x6 wood stud, or 8" CMU walls.
  1. Steel; sized to accommodate fire extinguisher as specified.
    - a. Equal to J.L. Industries Academy Aluminum Series, Model 1027
      - 1) Cabinet Door Style: Vertical Duo with recessed pull and Saf-T-Lok with a 5/8" stop attached by a continuous hinge.
      - 2) Cabinet Door Glazing: Laminated Safety Glass
      - 3) Cabinet Trim Style and Depth: Semi-recessed with 3 inch rolled edge.
      - 4) Cabinet Door & Trim Construction: Aluminum with 180 clear anodized finish.
      - 5) 3/4 inch wide trim on frame and 1-1/4 inch trim on doors with glazing.
      - 6) Tub: Aluminum with 180 clear anodized finish.
      - 7) Decal: 2"x19" vertical red/clear Fire Extinguisher #LDVRFE.
- B. Cabinet Configuration: Semi-recessed type for 3-5/8" metal stud or 2x4 wood stud walls.
  1. The following cabinet size shall be verified by the contractor and adjusted as necessary to accommodate fire extinguisher as specified.
    - a. Equal to J.L. Industries Academy Aluminum Series, Model 1022
      - 1) Provide fire rated cabinet construction in all fire rated walls.
      - 2) Cabinet Door Style: Vertical Duo with recessed pull and Saf-T-Lok with a 5/8" stop attached by a continuous hinge.
      - 3) Cabinet Door Glazing: Laminated Safety Glass
      - 4) Cabinet Trim Style and Depth: Semi-recessed with 4 inch rolled edge.
      - 5) Cabinet Door & Trim Construction: Aluminum with 180 clear anodized finish.
      - 6) 3/4 inch wide trim on frame and 1-1/4 inch trim on doors with glazing.
      - 7) Tub: Aluminum with 180 clear anodized finish.
      - 8) Decal: 2"x19" vertical red/clear Fire Extinguisher #LDVRFE.
- C. Cabinet Configuration: Surface type.
  1. The following cabinet size shall be verified by the contractor and adjusted as necessary to accommodate fire extinguisher as specified.
    - a. Equal to J.L. Industries Academy Aluminum Series, Model 1029
      - 1) Cabinet Door Style: Vertical Duo with recessed pull and Saf-T-Lok with a 5/8" stop attached by a continuous hinge.
      - 2) Cabinet Door Glazing: Laminated Safety Glass
      - 3) Cabinet Trim Style and Depth: Semi-recessed with 1-1/2 inch square edge.
      - 4) Cabinet Door & Trim Construction: Aluminum with 180 clear anodized finish.
      - 5) 3/4 inch wide trim on frame and 1-1/4 inch trim on doors with glazing.
      - 6) Tub: Aluminum with 180 clear anodized finish.

7) Decal: 2"x19" vertical red/clear Fire Extinguisher #LDVWFE.

- D. Cabinet Mounting Hardware: Appropriate to cabinet, with pre-drilled holes for placement of anchors.

#### **2.04 BUILDING MASTER KEY LOCK BOX**

- A. Manufacturer: Equal to Knox  
B. Basis of Design Product: KnoxBox 3200 Series Standard Capacity  
C. Model: #3275 Recessed Mount  
D. Size:  
1. Box Body: 4"Hx5"Wx3-7/8"D  
2. Recessed Mounting Flange: 7"Hx7"W  
E. Capacity: Will hold up to 10 keys, access cards, or entry items  
F. Color: To be chosen by Architect from Manufacturer's standard color options.  
G. Mounting: Recess Mount Model Number #3275  
H. Location: To be determined during construction. Coordinate with Architect prior to installation.

#### **2.05 ACCESSORIES**

- A. Extinguisher Brackets: Formed steel, galvanized and enamel finished. Provide bracket as applicable for the specified fire extinguishers in locations as indicated on Drawings.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify existing conditions before starting work.  
B. Verify rough openings for cabinet are correctly sized and located.

#### **3.02 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.  
B. Install cabinets plumb and level in wall openings at height indicated on drawings; fully comply to ADA requirements and local jurisdiction for mounting heights. For the surface mounted cabinets that protrude more than 4 inches into a space, the mounting height must be mounted so that the bottom of the cabinet is no more than 27 inches off the finish floor. Do not mount them lower than 26" off the finish floor.  
C. Prepare recesses in walls for fire extinguisher cabinets as required for size, type, and style of trim specified.  
D. Secure cabinets and bracket mounted extinguishers rigidly in place.  
E. Provide and install brackets for the extinguishers that are inside a FEC.  
F. Provide and verify servicing, charging and tagging of all fire extinguishers.  
G. Place extinguishers and accessories in cabinets.

**END OF SECTION**



**SECTION 107313  
AWNINGS****PART 1 GENERAL****1.01 SECTION INCLUDES****1.02 REFERENCE STANDARDS**

- A. AAMA 2603 - Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.
- B. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.
- C. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2021.
- D. ASTM B241/B241M - Standard Specification for Aluminum and Aluminum-Alloy Seamless Pipe and Seamless Extruded Tube; 2022.
- E. ASTM B483/B483M - Standard Specification for Aluminum and Aluminum-Alloy Drawn Tube and Drawn Pipe for General Purpose Applications; 2021.

**1.03 DESIGN REQUIREMENTS**

- A. Awning materials, assembly and attachments shall be designed to resist snow loads, positive and negative wind design loads as indicated on the structural drawings at any point without damage or permanent set.
- B. Design Load: 20 lbs per sq. ft.
- C. Roof decking must withstand concentrated walking load of 200 lbs.
- D. Maximum Deflection Limit: L/120 of span.

**1.04 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Shop Drawings: Indicate awning profiles, sizes, connection attachments, anchorage, size and type of fasteners, accessories. Provide sections and details at connections.
- C. Selection Samples: Manufacturer's color charts for metal framing and awning panel colors and finishes.
- D. Verification Samples: Two samples, minimum size 2 by 3 inches (50 by 75 mm), representing actual material and finish of exposed metal.
- E. Manufacturer's qualification statement.
- F. Executed warranty.
- G. Specimen warranty.

**1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with at least 5 years of experience in similar work.

**1.06 WARRANTY**

- A. See Section 017800 - Closeout Submittals for additional warranty requirements.
- B. Installer Warranty: Provide 1 warranty for defective installation commencing on the Date of Substantial Completion. Complete forms in Owner's name and register with installer.
- C. Finish Warranty: Provide 10-year manufacturer warranty against excessive degradation of factory-applied finishes. Include provision for replacement of units with excessive fading, chalking, or flaking. Complete forms in Owner's name and register with warrantor.

**1.07 REGULATORY REQUIREMENTS**

- A. Conform to applicable code for fire resistance ratings for awning covering.

**1.08 QUALITY ASSURANCE:**

- A. General: Provide awning units, which are complete assemblies, produced by one manufacturer/fabricator.
- B. All structural framework elements are single source responsibility of fabricator.
- C. Fabricator's Qualifications: Where indicated units require custom fabrication, provide units fabricated by shop which is skilled, and with a minimum of five (5) years of experience in similar work. Where units cannot be fully shop-fabricated, complete fabrication work at project site.

**1.09 WARRANTY**

- A. Exposed roof panel finish shall be warranted by the panel manufacturer for a minimum of 20 years. Labor to replace defective roof panel shall be warranted for 1 year. Aluminum frame shall be warranted for 10 years. Installation shall be warranted against defective material and workmanship for a period of 1 year by awning manufacturer.

**PART 2 PRODUCTS****2.01 MANUFACTURERS**

- A. Basis of Design: Parasol Awnings, LLC: [www.parasolawnings.com](http://www.parasolawnings.com), 4834 Hickory Hill Road, Memphis, Tennessee 38141, Phone (901) 368-4477 Fax (901) 368-1798
- B. Gulf South Metals, 615 Wynn Rd. Summerdale, AL 36580, 251-989-6443, [www.gulfsouthmetals.com/](http://www.gulfsouthmetals.com/)
- C. Pre-Approved Equal
- D. Substitutions: See Section 016000 - Product Requirements.

**2.02 AWNINGS - GENERAL**

- A. Configuration: As indicated on drawings.
- B. Shop fabricate to the greatest extent possible; disassemble if necessary for shipping.

**2.03 PRODUCT**

- A. Basis of Design: Parasol Awnings, Suspended Metal Canopy with Hangers
  - 1. Decking: Fabricated from 0.032 inch thick aluminum
    - a. Roll formed flat-panel deck, 3 inch deep x 12 inch wide section.
  - 2. Fascia/gutter: Fabricated from 0.125 inch thick aluminum.
    - a. 4 inch wide extruded with offset
      - 1) 8 inch tall
  - 3. Brackets: 6" diamond
  - 4. Hangers: Fabricated from 0.125 inch thick aluminum
    - a. 1.5 inch square tube
    - b. 1.5 inch round tube
  - 5. Beams: Extruded "I" beams or "C" beams and "U" (drain) beams of sufficient depths to adequately support imposed loads.

**2.04 MATERIALS**

- A. Smooth aluminum:
  - 1. Extrusions: Meeting requirements of ASTM B221, alloy 6061-T6, 6063-T5, or 6063-T6.
- B. Anchorage Devices, Clips and Fasteners: Manufacturer's standard type, compatible with materials being secured, of size and spacing sufficient to resist indicated loads. Above roof deck, utilize fasteners with neoprene washers.
- C. Sealants: Single component silicone, in color to match sheets and extrusions.



- D. Accessories: Flashings, brackets, drainage scupper/tail spout and other items as necessary for complete system.

## **2.05 FABRICATION - FRAMING**

- A. Shop Assembly: Pre-assemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.
- B. Awning Framework: Use materials of size and thickness as required to produce strength and durability in finished product for use intended. Work to dimensions indicated or accepted on shop drawings. Use type of materials indicated or specified for various components of work.
  - 1. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges. Maintain cross-section tubing. Crimped ends, fitting and tee connections are not acceptable.
  - 2. Junctions bearing major stress shall receive no less than 3 welds per joint.
  - 3. Welding process to be mig wire welded with argon gas and 4043 alloy aluminum welding wire.
  - 4. Rafter spacing shall be no more than 60" on center.
  - 5. Drop and projection arms shall be no more than 72" on center.
- C. Fit and shop assemble components in largest practical sizes, for delivery to site.
- D. Fabricate components with joints tightly fitted and secured.
- E. Exposed Fastenings: Unobtrusively located; consistent with design of component, except where specifically noted otherwise.
- F. Supply components required for anchorage of framing. Fabricate anchors and related components of same material and finish as framing, except where specifically noted otherwise.
- G. Accurately form components to suit each other and to building structure.

## **2.06 FINISHES**

- A. Pigmented Organic Coatings: AAMA 2603; polyester or acrylic baked enamel finish.
- B. Finish Color: As selected by Engineer/Architect from manufacturer's standard range.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that wall substrate anchors are acceptable and are ready to receive work.

### **3.02 PREPARATION**

- A. Clean and strip primed steel items to bare metal where site welding is required.
- B. Supply items required to be placed in partitions with setting templates, to appropriate Sections.

### **3.03 INSTALLATION - FRAMING**

- A. General: Install awning units in manner indicated to comply with manufacturer's instructions. Position units level, plumb, secure at proper height and location relative to adjoining window units, openings and other related work. Secure anchor units with proper clips, brackets, and anchorages, suited to type of mounting indicated.
- B. Install in accordance with manufacturer's instructions.
- C. Install components plumb and level, accurately fitted, free from distortion or defects.
- D. Provide anchors required for connecting framing to structure. Anchor framing to structure.
- E. Conceal bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings.

**3.04 INSTALLATION - METAL COVERING**

- A. Install in accordance with manufacturer's instructions.
- B. Fasten metal covering panels to metal support members, aligned level and plumb.
- C. Install fascia panels, trim, and flashing.
- D. Separate dissimilar metals using concealed bituminous paint.
- E. Touch-up damaged finish coating using material provided by manufacturer to match original coating.

**3.05 TOLERANCES**

- A. Maximum Variation From Plumb: 1/4 inch (6 mm) per story, non-cumulative.
- B. Maximum Misalignment From True Position: 1/4 inch (6 mm).

**END OF SECTION**

**SECTION 122113  
HORIZONTAL LOUVER BLINDS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Horizontal slat louver blinds.
- B. Operating hardware.

**1.02 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data indicating physical and dimensional characteristics.
- C. Samples: Submit two samples, six inch (\_\_\_\_ mm) long illustrating slat materials and finish, cord type and color.
- D. Manufacturer's Installation Instructions: Indicate special procedures.

**1.03 DELIVERY, STORAGE, AND HANDLING**

- A. Product to be delivered to jobsite in manufacturer's original packaging.
- B. Products to be handled and stored to prevent damage to materials, finishes and operating mechanisms. Store in a clean, dry area, laid flat to prevent sagging and twisting of packaging.

**1.04 PROJECT SITE CONDITIONS**

- A. Building shall be enclosed; and windows, frames and sills shall be installed and glazed.
- B. Wet work shall be complete and dry.
- C. Ceilings, electrical, and mechanical work above window covering shall be complete.

**1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- B. Installer Qualifications: Company with prior experience in installing specified products with minimum three years documented experience.

**1.06 WARRANTY**

- A. Manufacturer Lifetime Warranty against original defects in materials or workmanship.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

- A. Horizontal Louver Blinds:
  - 1. Hunter Douglas: [www.hunterdouglas.com](http://www.hunterdouglas.com).
  - 2. Levolor Contract: [www.levolorcontract.com](http://www.levolorcontract.com).
  - 3. SWFcontract, a division of Spring Window Fashions, LLC.; Bali Classics 1" Aluminum Blinds: [www.swfcontract.com](http://www.swfcontract.com).
  - 4. Substitutions: See Section 016000 - Product Requirements.

**2.02 HORIZONTAL BLINDS**

- A. Description: Horizontal slat louvers hung from full-width headrail with full-width bottom rail.
- B. Manual Operation: Control of raising and lowering by cord with full range locking; blade angle adjustable by control wand.
- C. Metal Slats: Spring tempered pre-finished aluminum; radiused slat corners, with manufacturing burrs removed.
  - 1. Width: 1 inch (25 mm).
  - 2. Thickness: 0.006 inch (0.15 mm).

- 3. Color: match existing.
- D. Head Rail: Pre-finished, formed steel box, with end caps; internally fitted with hardware, pulleys, and bearings for operation; 1" high x 1-1/2" wide x .025" thick U-shaped steel.
  - 1. Color: Same as slats.
- E. Lift Cord: Braided nylon; complying with WCMA A100.1.
  - 1. Free end weighted.
- F. Control Wand: clear polycarbonate; hexagonal shape.
  - 1. Removable type with spring clip.
  - 2. Color: Clear.
- G. Accessory Hardware: Type recommended by blind manufacturer.

**2.03 FABRICATION**

- A. Determine sizes by field measurement.
- B. Fabricate blinds to fit within openings with uniform edge clearance of 1/2 inch (\_\_\_\_ mm).
- C. At openings requiring multiple blind units, provide separate blind assemblies with space of 1/2 inch (\_\_\_\_ mm) between blinds, located at window mullion centers.

**PART 3 EXECUTION**

**3.01 EXAMINATION**

- A. Verify that openings are ready to receive the work.

**3.02 INSTALLATION**

- A. Install blinds in accordance with manufacturer's instructions including recommended support brackets and fasteners.
- B. Install blinds with adequate clearance to permit smooth operation of the blinds. Demonstrate blinds to be in smooth, uniform working order.

**3.03 TOLERANCES**

- A. Maximum Variation of Gap at Window Opening Perimeter: 1/4 inch (6 mm).
- B. Maximum Offset From Level: 1/8 inch (3 mm).

**3.04 ADJUSTING**

- A. Adjust blinds for smooth operation.

**3.05 CLEANING**

- A. Clean blind surfaces just prior to occupancy. Clean per Manufacturer recommendations.

**END OF SECTION**

**SECTION 133419  
METAL BUILDING SYSTEMS****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Manufacturer-engineered, shop-fabricated structural steel building frame.
- B. Metal wall and roof panels including soffits and gutters and downspouts.
- C. Exterior Wall Insulation
- D. Exterior doors, windows, skylights, overhead doors, and louvers.

**1.02 REFERENCE STANDARDS**

- A. AISC 360 - Specification for Structural Steel Buildings; 2022.
- B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- C. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.
- D. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2021.
- E. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2023.
- F. ASTM A501/A501M - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing; 2021.
- G. ASTM A529/A529M - Standard Specification for High-Strength Carbon-Manganese Steel of Structural Quality; 2019.
- H. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2019a.
- I. ASTM A792/A792M - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process; 2023.
- J. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2023.
- K. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.
- L. ASTM C1107/C1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink); 2020.
- M. ASTM F1554 - Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength; 2020.
- N. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength; 2023.
- O. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; 2020.
- P. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2020, with Errata (2023).
- Q. IAS AC472 - Accreditation Criteria for Inspection Programs for Manufacturers of Metal Building Systems; 2018, with Editorial Revision (2019).
- R. SSPC-Paint 20 - Zinc-Rich Coating (Type I - Inorganic, and Type II - Organic); 2019.
- S. UL 580 - Standard for Tests for Uplift Resistance of Roof Assemblies; Current Edition, Including All Revisions.

**1.03 ADMINISTRATIVE REQUIREMENTS**

- A. Preinstallation Meeting: Convene one week before starting work of this section.

**1.04 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data on profiles, component dimensions, fasteners.
- C. Shop Drawings: Indicate assembly dimensions including field dimensions of existing building components to insure proper alignment of new building, provide locations of structural members, connections; wall and roof system dimensions, panel layout, general construction details, anchorages and method of anchorage, installation; framing anchor bolt settings, sizes, and locations from datum, foundation loads; indicate welded connections with AWS A2.4 welding symbols; indicate net weld lengths; provide professional seal and signature.
- D. Samples: Submit two samples of precoated metal panels for each color selected, 2x4 inch (\_\_\_\_by\_\_\_\_ mm) in size illustrating color and texture of finish.
- E. Manufacturer's Instructions: Indicate preparation requirements, anchor bolt placement.
- F. Erection Drawings: Indicate members by label, assembly sequence, and temporary erection bracing.
- G. Certification:
  - 1. Submit written certification prepared, signed and sealed by a Professional Engineer, licensed and registered to practice in the State of Mississippi, verifying the building design meets requirements of adopted building code, before fabrication and/or delivery of materials to project site.
  - 2. Provide certification that roof system has been tested and listed by Underwriters Laboratories, Inc. to have a Wind Uplift Classification of Class 90.
- H. Manufacturer's Qualification Statement: Provide documentation showing metal building manufacturer is accredited under IAS AC472.
  - 1. Include statement that manufacturer designs and fabricates metal building system as integrated components and assemblies, including but not limited to primary structural members, secondary members, joints, roof, and wall cladding components specifically designed to support and transfer loads and properly assembled components form a complete or partial building shell.
- I. Project Record Documents: Record actual locations of concealed components and utilities.

**1.05 QUALITY ASSURANCE**

- A. Designer Qualifications: Design structural components, develop shop drawings, and perform shop and site work under direct supervision of a Professional Structural Engineer experienced in design of this type of work.
  - 1. Design Engineer Qualifications: Licensed in the State in which the Project is located.
  - 2. Comply with applicable code for submission of design calculations as required for acquiring permits.
  - 3. Cooperate with regulatory agency or authorities having jurisdiction (AHJ), and provide data as requested.
- B. All work shown on these documents are intended as a guide only. The contractor shall be responsible for producing complete signed and stamped shop drawings and calculations for review.
- C. Manufacturer Qualifications: Company specializing in the manufacture of products similar to those required for this project.
  - 1. Not less than 10 years of documented experience
- D. Erector Qualifications: Company specializing in performing the work of this section approved by manufacturer.

**1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver and store all components so they will not be damaged or deformed.
- B. Stack all materials on platforms or pallets, covered with tarpaulins or other suitable weathertight and ventilated covering. Store all metal sheets or panel components in order for water accumulations to drain freely. Do not store sheets or panels in contact with other materials which might cause staining. Do NOT store materials on the ground.
- C. Protect materials and finish during storage, handling, and installation to prevent damage.

**1.07 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. Provide 20 year manufacturer warranty for wall, roof, and soffit panel finish.
  - 1. Include coverage for exterior pre-finished surfaces to cover pre-finished color coat against chipping, cracking or crazing, blistering, peeling, chalking, or fading. Include coverage for weather tightness of building enclosure elements after installation.
- D. Provide 20 year No Dollar Limit (NDL) weathertightness warranty.

**PART 2 PRODUCTS****2.01 MANUFACTURERS**

- A. Metal Buildings Systems:
  - 1. Butler Manufacturing Company: [www.butlermfg.com](http://www.butlermfg.com).
  - 2. Ceco Building Systems: [www.cecobuildings.com](http://www.cecobuildings.com).
  - 3. Kirby Building Systems, a Nucor Company; \_\_\_\_\_: [www.kirbybuildingsystems.com/#sle](http://www.kirbybuildingsystems.com/#sle).
  - 4. Metallic Building Systems; \_\_\_\_\_: [www.metallic.com/#sle](http://www.metallic.com/#sle).
  - 5. VP Buildings: [www.vp.com](http://www.vp.com).
  - 6. Whirlwind Metal Buildings
  - 7. Substitutions: See Section 016000 - Product Requirements.

**2.02 ASSEMBLIES**

- A. Single span rigid frame.
- B. Primary Framing: Rigid frame of rafter beams and straight columns, canopy beams and end wall columns, and wind bracing.
- C. Secondary Framing: Purlins, and other items detailed.
- D. Wall System: Preformed metal panels of horizontal profile, with sub-girt framing/anchorage assembly, insulation, and liner sheets, and accessory components.
- E. Roof System: Preformed metal panels oriented parallel to slope, with sub-girt framing/anchorage assembly, insulation, and liner panels, and accessory components.
- F. Roof Slope: As indicated on the drawings.

**2.03 PERFORMANCE REQUIREMENTS**

- A. Installed Thermal Resistance of Wall System: R-value of 13 (RSI-value of \_\_\_\_).
- B. Installed Thermal Resistance of Roof System: R-value of 13 (RSI-value of \_\_\_\_).
- C. Design structural members to withstand dead load, and design loads due to pressure and suction of wind calculated in accordance with ASCE 7-16 code and as called for on the drawings. Whichever is most stringent governs.
- D. Design structural members to withstand Class 90 wind uplift in accordance with UL 580.
- E. Provide drainage to exterior for water entering or condensation occurring within wall or roof system.

- F. Permit movement of components without buckling, failure of joint seals, undue stress on fasteners or other detrimental effects, when subject to temperature range of \_\_\_\_ degrees F (\_\_\_\_ degrees C).
- G. Size and fabricate wall and roof systems free of distortion or defects detrimental to appearance or performance.

#### **2.04 MATERIALS - FRAMING**

- A. Structural Steel Members: ASTM A36/A36M.
- B. Structural Tubing: ASTM A500/A500M Grade B cold-formed.
- C. Plate or Bar Stock: ASTM A529/A529M, Grade 50.
- D. Anchor Bolts: ASTM F1554, Grade 36, Class 1A, with no preference for protective coating.
- E. Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1; galvanized to ASTM A153/A153M.
- F. Welding Materials: Perform in accordance with AWS D1.1/D1.1M.
- G. Primer: SSPC-Paint 20 zinc rich.
- H. Grout: ASTM C1107/C1107M; Non-shrink; premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents.
  - 1. Minimum Compressive Strength at 48 Hours: 2,000 pounds per square inch (13.7 MPa).
  - 2. Minimum Compressive Strength at 28 Days: 7,000 pounds per square inch (48 MPa).

#### **2.05 MATERIALS - WALLS AND ROOF**

- A. Steel Sheet: ASTM A792/A792M aluminum-zinc alloy coated to AZ50/AZM150.
- B. Insulation: ASTM C665 Type I; 4 inches (\_\_\_\_ mm) thick.
  - 1. Facing: Sheet vinyl, .004 inch thick, white
- C. Joint Seal Gaskets: Manufacturer's standard type.
- D. Fasteners: Manufacturer's standard type, galvanized to comply with requirements of ASTM A153/A153M, finish to match adjacent surfaces when exterior exposed.
- E. Bituminous Paint: Asphaltic type. For use as a discimilar metal separation or as a sperapration when attaching members to concrete or CMU substrate.
- F. Sealant: ASTM C920, elastomeric sealant with movement capability of at least plus/minus 50 percent; 100 percent silicone; for exposed applications, match adjacent colors as closely as possible.
- G. Metal Mesh: Galvanized steel wire, woven.
- H. Trim, Closure Pieces, Caps, Flashings, Gutters, Downspouts, Rain Water Diverter, Fascias, and Infills: Same material, thickness and finish as exterior sheets; brake formed to required profiles.

#### **2.06 COMPONENTS**

- A. Insulated Galvanized Hollow Metal Doors and Hollow Metal Frames: Manufacturer's standard to meet hurricane rating requirements.
- B. Rod Mounted Door Canopies: Manufacturer's standard framed as required for hurricane rating, finish to match wall and roof panels.

#### **2.07 DESIGN CRITERIA**

- A. Installed Thermal Resistance of Wall System: R-value of R-13 (RSI-value of \_\_\_\_).
- B. Installed Thermal Resistance of Roof System: R-value of R-13 (RSI-value of \_\_\_\_).
- C. Design members to withstand dead load, and design loads due to pressure and suction of wind calculated in accordance with applicable code.
- D. Design members to withstand UL 580 Uplift Class 90.



- E. Permit movement of roofing components without buckling, failure of joint seals, undue stress on fasteners or other detrimental effects, when subject to temperature difference between interior structural framework and exterior of plus or minus 100 degrees F (\_\_\_\_ degrees C).

## 2.08 FABRICATION - FRAMING

- A. Fabricate members in accordance with AISC 360 for plate, bar, tube, or rolled structural shapes.
- B. Anchor Bolts: Formed with bent shank, assembled with template for casting into concrete.
- C. Provide wall opening framing for doors and other accessory components.

## 2.09 FABRICATION - WALL AND ROOF PANELS

- A. Exterior and Interior Wall Panels: Minimum 24 gauge .025 inch (\_\_\_\_ mm) metal thickness, PBR Panel profile indicated, 1-1/4" inch (\_\_\_\_ mm) deep, lapped edges fitted with continuous gaskets.
  - 1. Equal to MBCI PBR Metal Panel
  - 2. Smooth Finish
- B. Roof Panel: Minimum 22 gauge .020 inch (\_\_\_\_ mm) metal thickness, Double Lok profile, lapped edges fitted with continuous gaskets.
  - 1. Equal to MBCI Double Lok Metal Panel
  - 2. Smooth Finish
- C. Girts/Purlins: Rolled formed structural shape to receive siding, roofing and liner sheet.
- D. Internal and External Corners: Same material thickness and finish as adjacent material, profile brake formed to required angles. Back brace mitered internal corners with .020 inch thick sheet.
- E. Expansion Joints: Same material and finish as adjacent material where exposed, .020 inch thick, manufacturer's standard brake formed type, of profile to suit system.
- F. Flashings, Closure Pieces, Fascia: Same material and finish as adjacent material, profile to suit system.
- G. Fasteners: To maintain load requirements and weather tight installation, same finish as cladding, non-corrosive type.

## 2.10 ROOF INSULATION SYSTEM

- A. PEMB insulation system is comprised of 1 layer 8-1/4" R25 pomb insul laid parallel to purlins + 1 layer 2-1/2" R8 pomb insulation on top to achieve an R33 es rating. Pemb manuf shall provide roof clips to accommodate roof insulation for roof panel standoff from purlins. This insulation and clip system shall be used at locations where the double lock metal roof panels occur.

## 2.11 FABRICATION - GUTTERS AND DOWNSPOUTS

- A. Fabricate of same material and finish as roofing metal.
- B. Form gutters and downspouts and scuppers of square profile and size indicated to collect and remove water. Fabricate with connection pieces.
- C. Form sections in maximum possible lengths. Hem exposed edges. Allow for expansion at joints.
- D. Fabricate support straps of same material and finish as roofing metal, color as selected.

## 2.12 FINISHES

- A. Framing Members: Clean, prepare, and shop prime. Do not prime surfaces to be field welded.
- B. Exterior Surfaces of Wall Components and Accessories: Precoated enamel on steel of Polyvinylidene Difluoride (PVDF) finish, <> color as selected from manufacturer's standard range.

- C. Interior Surfaces of Roof Components and Accessories: Precoated enamel on steel of modified silicone finish, <> color as selected from manufacturer's standard range.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify that foundation, floor slab, mechanical and electrical utilities, and placed anchors are in correct position

#### **3.02 ERECTION - FRAMING**

- A. Erect framing in accordance with AISC 360.
- B. Provide for erection and wind loads. Provide temporary bracing to maintain structure plumb and in alignment until completion of erection and installation of permanent bracing. Locate braced bays as indicated.
- C. Set column base plates with non-shrink grout to achieve full plate bearing.
- D. Do not field cut or alter structural members without approval.
- E. After erection, prime welds, abrasions, and surfaces not shop primed.

#### **3.03 ERECTION - WALL AND ROOF PANELS**

- A. Install in accordance with manufacturer's instructions.
- B. Exercise care when cutting prefinished material to ensure cuttings do not remain on finish surface.
- C. Fasten cladding system to structural supports, aligned level and plumb.
- D. Locate end laps over supports. End laps minimum 2 inches (50 mm). Place side laps over bearing.
- E. Provide expansion joints where indicated.
- F. Use concealed fasteners.
- G. Install sealant and gaskets, providing weather tight installation. Field applied tape sealant or manufactured equivalent is required at all panel sidelaps and endlaps.

#### **3.04 ERECTION - GUTTERS AND DOWNSPOUTS**

- A. Rigidly support and secure components. Join lengths with formed seams sealed watertight. Flash and seal gutters to downspouts.
- B. Apply bituminous paint on surfaces in contact with cementitious materials.
- C. Slope gutters minimum 1/16" inch/ft (\_\_\_\_ mm/m).
- D. Install concrete splash pans under each downspout.

#### **3.05 TOLERANCES**

- A. Framing Members: 1/4 inch (6 mm) from level; 1/8 inch (3 mm) from plumb.
- B. Siding and Roofing: 1/8 inch (3 mm) from true position.

**END OF SECTION**

**SECTION 220516  
EXPANSION FITTINGS AND LOOPS FOR PLUMBING PIPING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Pipe loops, offsets, and swing joints.

**1.02 REFERENCE STANDARDS**

- A. EJMA (STDS) - EJMA Standards; Tenth Edition.

**1.03 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data:
  - 1. Expansion Joints: Indicate maximum temperature and pressure rating, and maximum expansion compensation.
- C. Design Data: Indicate selection calculations.
- D. Manufacturer's Instructions: Indicate manufacturer's installation instructions, special procedures, and external controls.
- E. Project Record Documents: Record installed locations of flexible pipe connectors, expansion joints, anchors, and guides.

**PART 2 PRODUCTS**

**2.01 EXPANSION LOOPS - HOSE AND BRAID**

- A. Manufacturers:
  - 1. The Metraflex Company; Metraloop: [www.metroflex.com/#sle](http://www.metroflex.com/#sle).
  - 2. Substitutions: See Section 016000 - Product Requirements.
- B. Provide flexible loops with two flexible sections of hose and braid, two 90 degree elbows, and 180 degree return with support bracket and air release or drain plug.
- C. Provide flexible loops capable of movement in the x, y, and z planes. Flexible loops to impart no thrust loads to the building structure.
- D. Flexible Connectors: Female copper sweat, braided type with wetted components of bronze, sized to match piping.
  - 1. Maximum Allowable Working Pressure: 150 psig (1030 kPa) at 120 degrees F (49 degrees C).
  - 2. End Connections: Same as specified for pipe jointing.
  - 3. Provide necessary accessories including, but not limited to, swivel joints.

**2.02 ACCESSORIES**

- A. -----
- B. Note to Specifier: The stainless steel material option above is an accessory not relating to the material of the other products below.
- C. -----
- D. Pipe Alignment Guides:
  - 1. Manufacturers:
    - a. The Metraflex Company; PGQ Glide Riser Guide: [www.metroflex.com/#sle](http://www.metroflex.com/#sle).
    - b. Substitutions: See Section 016000 - Product Requirements.
  - 2. Two piece welded steel with enamel paint, bolted, with spider to fit standard pipe, frame with four mounting holes, clearance for minimum 1 inch (25 mm) thick insulation, minimum 3 inches (75 mm) travel.

**PART 3 EXECUTION**

**3.01 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Install in accordance with EJMA (Expansion Joint Manufacturers Association) Standards.
- C. Anchor pipe to building structure where necessary. Provide pipe guides so movement is directed along axis of pipe only. Erect piping such that strain and weight is not on cast connections or apparatus.
- D. Provide support and equipment required to control expansion and contraction of piping. Provide loops, pipe offsets, and swing joints, or expansion joints where required.

**END OF SECTION**

**SECTION 220517**  
**SLEEVES AND SLEEVE SEALS FOR PLUMBING PIPING**

**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Pipe sleeves.
- B. Manufactured sleeve-seal systems.

**1.02 REFERENCE STANDARDS**

- A. ASTM C592 - Standard Specification for Mineral Fiber Blanket Insulation and Blanket-Type Pipe Insulation (Metal-Mesh Covered) (Industrial Type); 2022a.
- B. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems; 2023a.

**1.03 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate pipe materials used, jointing methods, supports, floor and wall penetration seals. Indicate installation, layout, weights, mounting and support details, and piping connections.

**1.04 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified this section.
  - 1. Minimum three years experience.
- C. Clean equipment, pipes, valves, and fittings of grease, metal cuttings, and sludge that may have accumulated from the installation and testing of the system.

**1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver and store sleeve and sleeve seals in shipping containers, with labeling in place.
- B. Provide temporary protective coating on cast iron and steel sleeves if shipped loose.

**1.06 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.

**PART 2 PRODUCTS****2.01 PIPE SLEEVES**

- A. Manufacturers:
  - 1. Flexicraft Industries: [www.flexicraft.com/#sle](http://www.flexicraft.com/#sle).
  - 2. Substitutions: See Section 016000 - Product Requirements.
- B. Vertical Piping:
  - 1. Sleeve Length: 1 inch (25 mm) above finished floor.
  - 2. Provide sealant for watertight joint.
  - 3. Blocked Out Floor Openings: Provide 1-1/2 inch (40 mm) angle set in silicon adhesive around opening.
  - 4. Drilled Penetrations: Provide 1-1/2 inch (40 mm) angle ring or square set in silicone adhesive around penetration.
- C. Plastic or Sheet Metal: Pipe passing through interior walls, partitions, and floors, unless steel or brass sleeves are specified below.
- D. Clearances:

1. Provide allowance for insulated piping.
2. Wall, Floor, Floor, Partitions, and Beam Flanges: 1 inch (25 mm) greater than external; pipe diameter.
3. All Rated Openings: Caulked tight with fire stopping material complying with ASTM E814 in accordance with Section 078400 to prevent the spread of fire, smoke, and gases.

## **2.02 MANUFACTURED SLEEVE-SEAL SYSTEMS**

- A. Manufacturers:
  1. Flexicraft Industries; PipeSeal: [www.flexicraft.com/#sle](http://www.flexicraft.com/#sle).
  2. Substitutions: See Section 016000 - Product Requirements.
- B. Modular/Mechanical Seal:
  1. Synthetic rubber interlocking links continuously fill annular space between pipe and wall/casing opening.
  2. Provide watertight seal between pipe and wall/casing opening.
  3. Elastomer element size and material in accordance with manufacturer's recommendations.
  4. Glass reinforced plastic pressure end plates.

## **PART 3 EXECUTION**

### **3.01 PREPARATION**

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and foreign material, from inside and outside, before assembly.

### **3.02 INSTALLATION**

- A. Route piping in orderly manner, plumb and parallel to building structure. Maintain gradient.
- B. Install piping to conserve building space, to not interfere with use of space and other work.
- C. Install piping and pipe sleeves to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- D. 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 recessed into and grouted flush with slab.
- E. Structural Considerations:
  1. Do not penetrate building structural members unless indicated.
- F. Provide sleeves when penetrating footings, floors, walls, and partitions. Seal pipe including sleeve penetrations to achieve fire resistance equivalent to fire separation required.
  1. Underground Piping: Caulk pipe sleeve watertight with lead and oakum or mechanically expandable chloroprene inserts with bitumen sealed metal components.
  2. Aboveground Piping:
    - a. Pack solid using mineral fiber complying with ASTM C592.
    - b. Fill space with an elastomer caulk to a depth of 0.50 inch (15 mm) where penetrations occur between conditioned and unconditioned spaces.
  3. All Rated Openings: Caulk tight with fire stopping material complying with ASTM E814 in accordance with Section 078400 to prevent the spread of fire, smoke, and gases.
  4. Caulk exterior wall sleeves watertight with lead and oakum or mechanically expandable chloroprene inserts with mastic-sealed components.
- G. When installing more than one piping system material, ensure system components are compatible and joined to ensure the integrity of the system. Provide necessary joining fittings.

Ensure flanges, union, and couplings for servicing are consistently provided.

**3.03 CLEANING**

- A. Upon completion of work, clean all parts of the installation.
- B. Clean equipment, pipes, valves, and fittings of grease, metal cuttings, and sludge that may have accumulated from the installation and testing of the system.

**END OF SECTION**





**SECTION 220523**  
**GENERAL-DUTY VALVES FOR PLUMBING PIPING**

**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Applications.
- B. General requirements.
- C. Ball valves.

**1.02 REFERENCE STANDARDS**

- A. ASME B1.20.1 - Pipe Threads, General Purpose, Inch; 2013 (Reaffirmed 2018).
- B. ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250; 2020.
- C. ASME B16.10 - Face-to-Face and End-to-End Dimensions of Valves; 2022, with Errata (2023).
- D. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; 2021.
- E. ASME B16.34 - Valves — Flanged, Threaded, and Welding End; 2020.
- F. ASME B31.9 - Building Services Piping; 2020.
- G. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends; 2010, with Errata .

**1.03 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on valves including manufacturers catalog information. Submit performance ratings, rough-in details, weights, support requirements, and piping connections.
- C. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
- D. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, maintenance and repair data, and parts listings.

**1.04 QUALITY ASSURANCE**

- A. Manufacturer:
  - 1. Obtain valves for each valve type from single manufacturer.
  - 2. Company must specialize in manufacturing products specified in this section, with not less than three years of experience.

**1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Prepare valves for shipping as follows:
  - 1. Minimize exposure of operable surfaces by setting plug and ball valves to open position.
  - 2. Protect valve parts exposed to piped medium against rust and corrosion.
  - 3. Protect valve piping connections such as grooves, weld ends, threads, and flange faces.
  - 4. Secure check valves in either the closed position or open position.
- B. Use the following precautions during storage:
  - 1. Maintain valve end protection and protect flanges and specialties from dirt.
    - a. Provide temporary inlet and outlet caps.
    - b. Maintain caps in place until installation.
  - 2. Store valves in shipping containers and maintain in place until installation.
    - a. Store valves indoors in dry environment.
    - b. Store valves off the ground in watertight enclosures when indoor storage is not an option.

**PART 2 PRODUCTS****2.01 APPLICATIONS**

- A. See drawings for specific valve locations.
- B. Required Valve End Connections for Non-Wafer Types:
  - 1. Copper Tube:
    - a. 2 NPS (50 DN) and Smaller: Threaded ends except where solder-joint valve-end option is indicated in valve schedules below.
    - b. 2-1/2 NPS (65 DN) to 4 NPS (100 DN): Grooved or flanged ends except where threaded valve-end option is indicated in valve schedules below.
- C. Domestic, Hot and Cold Water Valves:
  - 1. 2 NPS (50 DN) and Smaller:
    - a. Bronze and Brass: Provide with solder-joint or threaded ends.
    - b. Ball: Two piece, full port, brass or bronze with brass trim.
  - 2. 2-1/2 NPS (65 DN) and Larger:
    - a. Iron, 2-1/2 NPS (65 DN) to 4 NPS (100 DN): Provide with threaded or flanged ends.
    - b. Iron Ball: Class 150.

**2.02 GENERAL REQUIREMENTS**

- A. Valve Pressure and Temperature Ratings: No less than rating indicated; as required for system pressures and temperatures.
- B. Valve Sizes: Match upstream piping unless otherwise indicated.
- C. Valve Actuator Types:
  - 1. Hand Lever: Quarter-turn valves 6 NPS (150 DN) and smaller.
- D. Valves in Insulated Piping: With 2 NPS (50 DN) stem extensions and the following features:
  - 1. Ball Valves: Extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.
- E. Valve-End Connections:
  - 1. Threaded End Valves: ASME B1.20.1.
  - 2. Flanges on Iron Valves: ASME B16.1 for flanges on iron valves.
  - 3. Pipe Flanges and Flanged Fittings 1/2 NPS (15 DN) through 24 NPS (600 DN): ASME B16.5.
  - 4. Solder Joint Connections: ASME B16.18.
- F. General ASME Compliance:
  - 1. Ferrous Valve Dimensions and Design Criteria: ASME B16.10 and ASME B16.34.
  - 2. Solder-joint Connections: ASME B16.18.
  - 3. Building Services Piping Valves: ASME B31.9.
- G. Valve Materials for Potable Water: NSF 61 and NSF 372.
- H. Bronze Valves:
  - 1. Fabricate from dezincification resistant material.
  - 2. Copper alloys containing more than 15 percent zinc are not permitted.
- I. Source Limitations: Obtain each valve type from a single manufacturer.

**2.03 BRASS BALL VALVES**

- A. Two Piece, Full Port with Brass Trim:
  - 1. Comply with MSS SP-110.
  - 2. SWP Rating: 150 psig (1035 kPa).
  - 3. CWP Rating: 600 psig (4140 kPa).
  - 4. Body: Forged brass.

5. Ends: Threaded or soldered.
6. Seats: PTFE.
7. Stem: Brass.
8. Ball: Chrome-plated brass.
9. Manufacturers:
  - a. Apollo.
  - b. Substitutions: See Section 016000 - Product Requirements.

#### **2.04 BRONZE BALL VALVES**

- A. Two Piece, Full Port with Bronze Trim:
  1. Comply with MSS SP-110.
  2. SWP Rating: 150 psig (1035 kPa).
  3. CWP Rating: 600 psig (4140 kPa).
  4. Body: Bronze.
  5. Ends: Threaded.
  6. Seats: PTFE.
  7. Stem: Bronze.
  8. Ball: Chrome plated brass.
  9. Manufacturers:
    - a. Apollo.
    - b. Substitutions: See Section 016000 - Product Requirements.

#### **2.05 IRON BALL VALVES**

1. CWP Rating: 200 psig (1380 kPa).
2. Ends: Flanged.
3. Stem: Stainless steel.
4. Ball: Stainless steel.
5. Operator: Lever, with locking handle.
6. Manufacturers:
  - a. Apollo Valves: [www.apollovalves.com/#sle](http://www.apollovalves.com/#sle).
  - b. Substitutions: See Section 016000 - Product Requirements.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Discard all packing materials and verify that valve interior, including threads and flanges are completely clean without signs of damage or degradation that could result in leakage.
- B. Verify valve parts to be fully operational in all positions from closed to fully open.
- C. Confirm gasket material to be suitable for the service, to be of correct size, and without defects that could compromise effectiveness.
- D. Should valve is determined to be defective, replace with new valve.

#### **3.02 INSTALLATION**

- A. Provide unions or flanges with valves to facilitate equipment removal and maintenance while maintaining system operation and full accessibility for servicing.
- B. Provide separate valve support as required and locate valve with stem at or above center of piping, maintaining unimpeded stem movement.
- C. Where valve support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welds.

**END OF SECTION**



**SECTION 220529  
HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT**

**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Support and attachment components for equipment, piping, and other plumbing work.

**1.02 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:
1. Coordinate sizes and arrangement of supports and bases with the actual equipment and components to be installed.
  2. Coordinate the work with other trades to provide additional framing and materials required for installation.
  3. Coordinate compatibility of support and attachment components with mounting surfaces at the installed locations.
  4. Coordinate the arrangement of supports with ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
  5. Notify Engineer/Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- B. Sequencing:
1. Do not install products on or provide attachment to concrete surfaces until concrete has fully cured in accordance with Section 033000.

**1.03 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for metal channel (strut) framing systems and post-installed concrete and masonry anchors.
- C. Shop Drawings: Include details for fabricated hangers and supports.

**1.04 QUALITY ASSURANCE**

- A. Comply with applicable building code.

**PART 2 PRODUCTS****2.01 SUPPORT AND ATTACHMENT COMPONENTS**

- A. General Requirements:
1. Comply with MSS SP-58.
  2. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of plumbing work.
  3. Provide products listed, classified, and labeled as suitable for the purpose intended, where applicable.
  4. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supported. Include consideration for vibration, equipment operation, and shock loads where applicable.
  5. Do not use wire, chain, perforated pipe strap, or wood for permanent supports unless specifically indicated or permitted.
  6. Steel Components: Use corrosion resistant materials suitable for the environment where installed.
    - a. Indoor Dry Locations: Use zinc-plated steel or approved equivalent unless otherwise indicated.
    - b. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
    - c. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.

- B. Metal Channel (Strut) Framing Systems:
1. Manufacturers:
    - a. Cooper B-Line, a division of Eaton Corporation: [www.cooperindustries.com/#sle](http://www.cooperindustries.com/#sle).
    - b. Thomas & Betts Corporation: [www.tnb.com/#sle](http://www.tnb.com/#sle).
    - c. Unistrut, a brand of Atkore International Inc: [www.unistrut.com/#sle](http://www.unistrut.com/#sle).
    - d. Substitutions: See Section 016000 - Product Requirements.
    - e. Source Limitations: Furnish channels (struts) and associated fittings, accessories, and hardware produced by a single manufacturer.
  2. Provide factory-fabricated continuous-slot metal channel (strut) and associated fittings, accessories, and hardware required for field-assembly of supports.
  3. Comply with MFMA-4.
  4. Channel Material:
    - a. Indoor Dry Locations: Use painted steel, zinc-plated steel, or galvanized steel.
  5. Minimum Channel Thickness: Steel sheet, 12 gage, 0.1046 inch (2.66 mm).
  6. Minimum Channel Dimensions: 1-5/8 inch (41 mm) width by 13/16 inch (21 mm) height.
- C. Hanger Rods: Threaded zinc-plated steel unless otherwise indicated.
1. Minimum Size, Unless Otherwise Indicated or Required:
    - a. Equipment Supports: 1/2 inch (13 mm) diameter.
    - b. Piping up to 1 inch (27 mm) nominal: 1/4 inch (6 mm) diameter.
    - c. Piping larger than 1 inch (27 mm) nominal: 3/8 inch (10 mm) diameter.
    - d. Trapeze Support for Multiple Pipes: 3/8 inch (10 mm) diameter.
- D. Anchors and Fasteners:
1. Manufacturers - Mechanical Anchors:
    - a. Hilti, Inc: [www.us.hilti.com/#sle](http://www.us.hilti.com/#sle).
    - b. ITW Red Head, a division of Illinois Tool Works, Inc: [www.itwredhead.com/#sle](http://www.itwredhead.com/#sle).
    - c. Powers Fasteners, Inc: [www.powers.com/#sle](http://www.powers.com/#sle).
    - d. Simpson Strong-Tie Company Inc: [www.strongtie.com/#sle](http://www.strongtie.com/#sle).
    - e. Substitutions: See Section 016000 - Product Requirements.
  2. Manufacturers - Powder-Actuated Fastening Systems:
    - a. Hilti, Inc: [www.us.hilti.com/#sle](http://www.us.hilti.com/#sle).
    - b. ITW Ramset, a division of Illinois Tool Works, Inc: [www.ramset.com/#sle](http://www.ramset.com/#sle).
    - c. Powers Fasteners, Inc: [www.powers.com/#sle](http://www.powers.com/#sle).
    - d. Simpson Strong-Tie Company Inc: [www.strongtie.com/#sle](http://www.strongtie.com/#sle).
    - e. Substitutions: See Section 016000 - Product Requirements.
  3. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.
  4. Concrete: Use preset concrete inserts, expansion anchors, or screw anchors.
  5. Solid or Grout-Filled Masonry: Use expansion anchors or screw anchors.
  6. Hollow Masonry: Use toggle bolts.
  7. Hollow Stud Walls: Use toggle bolts.
  8. Steel: Use beam clamps, machine bolts, or welded threaded studs.
  9. Plastic and lead anchors are not permitted.
  10. Powder-actuated fasteners are not permitted.
  11. Hammer-driven anchors and fasteners are not permitted.
  12. Preset Concrete Inserts: Continuous metal channel (strut) and spot inserts specifically designed to be cast in concrete ceilings, walls, and floors.
    - a. Comply with MFMA-4.
    - b. Channel Material: Use galvanized steel.
    - c. Minimum Channel Thickness: Steel sheet, 12 gage, 0.1046 inch (2.66 mm) minimum base metal thickness.
    - d. Manufacturer: Same as manufacturer of metal channel (strut) framing system.

13. Post-Installed Concrete and Masonry Anchors: Evaluated and recognized by ICC Evaluation Service, LLC (ICC-ES) for compliance with applicable building code.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify that field measurements are as indicated.
- B. Verify that mounting surfaces are ready to receive support and attachment components.
- C. Verify that conditions are satisfactory for installation prior to starting work.

#### **3.02 INSTALLATION**

- A. Install products in accordance with manufacturer's instructions.
- B. Provide independent support from building structure. Do not provide support from piping, ductwork, conduit, or other systems.
- C. Unless specifically indicated or approved by Engineer/Architect, do not provide support from suspended ceiling support system or ceiling grid.
- D. Unless specifically indicated or approved by Engineer/Architect, do not provide support from roof deck.
- E. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.
- F. Equipment Support and Attachment:
  1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.
  2. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
  3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
  4. Unless otherwise indicated, mount floor-mounted equipment on properly sized 6 inch high concrete pad constructed in accordance with Section 033000.
  5. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.
- G. Preset Concrete Inserts: Use manufacturer provided closure strips to inhibit concrete seepage during concrete pour.
- H. Secure fasteners according to manufacturer's recommended torque settings.
- I. Remove temporary supports.

#### **3.03 FIELD QUALITY CONTROL**

- A. See Section 014000 - Quality Requirements, for additional requirements.
- B. Inspect support and attachment components for damage and defects.
- C. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.
- D. Correct deficiencies and replace damaged or defective support and attachment components.

**END OF SECTION**





**SECTION 220553  
IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Nameplates.
- B. Tags.
- C. Pipe markers.

**1.02 REFERENCE STANDARDS**

- A. ASME A13.1 - Scheme for the Identification of Piping Systems; 2023.

**1.03 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Chart and Schedule: Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.
- C. Product Data: Provide manufacturers catalog literature for each product required.
- D. Project Record Documents: Record actual locations of tagged valves.

**PART 2 PRODUCTS**

**2.01 IDENTIFICATION APPLICATIONS**

- A. Instrumentation: Tags.
- B. Piping: Pipe markers.
- C. Pumps: Nameplates.
- D. Small-sized Equipment: Tags.
- E. Tanks: Nameplates.
- F. Valves: Tags.

**2.02 NAMEPLATES**

- A. Manufacturers:
  - 1. Brimar Industries, Inc.: [www.pipemarker.com](http://www.pipemarker.com).
  - 2. Kolbi Pipe Marker Co.: [www.kolbipipemarkers.com](http://www.kolbipipemarkers.com).
  - 3. Seton Identification Products: [www.seton.com](http://www.seton.com).
  - 4. Substitutions: See Section 016000 - Product Requirements.
- B. Description: Laminated three-layer plastic with engraved letters.
  - 1. Letter Color: White.
  - 2. Letter Height: 1/4 inch (6 mm).
  - 3. Background Color: Black.
  - 4. Plastic: Comply with ASTM D709.

**2.03 TAGS**

- A. Manufacturers:
  - 1. Advanced Graphic Engraving: [www.advancedgraphicengraving.com](http://www.advancedgraphicengraving.com).
  - 2. Brady Corporation: [www.bradycorp.com](http://www.bradycorp.com).
  - 3. Brimar Industries, Inc.: [www.pipemarker.com](http://www.pipemarker.com).
  - 4. Kolbi Pipe Marker Co.: [www.kolbipipemarkers.com](http://www.kolbipipemarkers.com).
  - 5. Seton Identification Products: [www.seton.com](http://www.seton.com).
  - 6. Substitutions: See Section 016000 - Product Requirements.

- B. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inch (40 mm) diameter with smooth edges.
- C. Valve Tag Chart: Typewritten letter size list in anodized aluminum frame.

## **2.04 PIPE MARKERS**

- A. Manufacturers:
  - 1. Brady Corporation: [www.bradycorp.com](http://www.bradycorp.com).
  - 2. Brimar Industries, Inc.: [www.pipemarker.com](http://www.pipemarker.com).
  - 3. Kolbi Pipe Marker Co.: [www.kolbipipemarkers.com](http://www.kolbipipemarkers.com).
  - 4. MIFAB, Inc.: [www.mifab.com](http://www.mifab.com).
  - 5. Seton Identification Products: [www.seton.com](http://www.seton.com).
  - 6. Substitutions: See Section 016000 - Product Requirements.
- 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. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.
- E. 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.
- F. Color code as follows:
  - 1. Potable, Cooling, Boiler, Feed, Other Water: Green with white letters.

## **PART 3 EXECUTION**

### **3.01 PREPARATION**

- A. Degrease and clean surfaces to receive adhesive for identification materials.

### **3.02 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.
- G. Identify service, flow direction, and pressure.
- H. Install in clear view and align with axis of piping.
- I. 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.

**END OF SECTION**

**SECTION 220719  
PLUMBING PIPING INSULATION**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Piping insulation.
- B. Jackets and accessories.

**1.02 REFERENCE STANDARDS**

- A. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus; 2019, with Editorial Revision (2023).
- B. ASTM C195 - Standard Specification for Mineral Fiber Thermal Insulating Cement; 2007 (Reapproved 2019).
- C. ASTM C449 - Standard Specification for Mineral Fiber Hydraulic-Setting Thermal Insulating and Finishing Cement; 2007 (Reapproved 2019).
- D. ASTM C547 - Standard Specification for Mineral Fiber Pipe Insulation; 2022a.
- E. ASTM C795 - Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel; 2008 (Reapproved 2023).
- F. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023.
- G. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

**1.03 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

**1.04 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than three years of experience.
- B. Applicator Qualifications: Company specializing in performing the type of work specified in this section with minimum three years of experience.

**1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Accept materials on site, labeled with manufacturer's identification, product density, and thickness.

**1.06 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**

**2.01 REGULATORY REQUIREMENTS**

- A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or ASTM E84.

**2.02 GLASS FIBER**

- A. Manufacturers:
  - 1. CertainTeed Corporation: [www.certainteed.com](http://www.certainteed.com).

2. Johns Manville Corporation: [www.jm.com](http://www.jm.com).
  3. Knauf Insulation: [www.knaufusa.com](http://www.knaufusa.com).
  4. Owens Corning Corporation; Fiberglas Pipe Insulation ASJ:  
[www.ocbuildingspec.com/#sle](http://www.ocbuildingspec.com/#sle).
  5. Substitutions: See Section 016000 - Product Requirements.
- B. 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).
  2. Maximum Service Temperature: 650 degrees F (343 degrees C).
  3. Maximum Moisture Absorption: 0.2 percent by volume.
- C. 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).
- D. Tie Wire: 0.048 inch (1.22 mm) stainless steel with twisted ends on maximum 12 inch (300 mm) centers.
- E. Vapor Barrier Lap Adhesive: Compatible with insulation.
- F. Insulating Cement/Mastic: ASTM C195; hydraulic setting on mineral wool.
- G. Fibrous Glass Fabric:
1. Cloth: Untreated; 9 oz/sq yd (305 g/sq m) weight.
  2. Blanket: 1.0 lb/cu ft (16 kg/cu m) density.
  3. Weave: 5 by 5.
- H. Indoor Vapor Barrier Finish:
1. Cloth: Untreated; 9 oz/sq yd (305 g/sq m) weight.
  2. Vinyl emulsion type acrylic, compatible with insulation, white color.
- I. Outdoor Vapor Barrier Mastic: Vinyl emulsion type acrylic or mastic, compatible with insulation, black color.
- J. Outdoor Breather Mastic: Vinyl emulsion type acrylic or mastic, compatible with insulation, black color.
- K. Insulating Cement: ASTM C449.

### 2.03 JACKETS

- A. PVC Plastic.
1. Manufacturers:
    - a. Johns Manville Corporation: [www.jm.com](http://www.jm.com).
    - b. Substitutions: See Section 016000 - Product Requirements.
  2. Jacket: One piece molded type fitting covers and sheet material, black 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.
  3. Covering Adhesive Mastic: Compatible with insulation.
- 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.

**PART 3 EXECUTION****3.01 EXAMINATION**

- A. Verify that piping has been tested before applying insulation materials.
- B. Verify that surfaces are clean and dry, with foreign material removed.

**3.02 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. Cover with black PVC jacketing.
- 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. 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.
- G. 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.
  - 5. Insert Material: Hydrous calcium silicate insulation or other heavy density insulating material suitable for the planned temperature range.
- H. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions. At fire separations, refer to Section 078400.
- I. 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.
- J. Pipes routed in exposed ceilings: Finish with PVC jacket and fitting covers. Color: Black.
- K. Buried Piping: Provide factory fabricated assembly with inner all-purpose service jacket with self-sealing lap, and asphalt impregnated open mesh glass fabric, with one mil (0.025 mm) thick aluminum foil sandwiched between three layers of bituminous compound; outer surface faced with a polyester film.

**3.03 SCHEDULES**

- A. Plumbing Systems:
  - 1. Domestic Hot Water Supply:
    - a. Glass Fiber Insulation:
  - 2. Domestic Hot Water Recirculation:

- a. Glass Fiber Insulation:
- 3. Domestic Cold Water:
  - a. Glass Fiber Insulation:

**END OF SECTION**

**SECTION 221005  
PLUMBING PIPING****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Pipe, pipe fittings, specialties, and connections for piping systems.
  - 1. Sanitary sewer.
  - 2. Domestic water.
  - 3. Flanges, unions, and couplings.
  - 4. Manufactured sleeve-seal systems.
  - 5. Valves.
  - 6. Relief valves.
  - 7. Strainers.

**1.02 REFERENCE STANDARDS**

- A. ASME B16.3 - Malleable Iron Threaded Fittings: Classes 150 and 300; 2021.
- B. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; 2021.
- C. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; 2021.
- D. ASME B16.23 - Cast Copper Alloy Solder Joint Drainage Fittings: DWV; 2021.
- E. ASME B31.1 - Power Piping; 2022.
- F. ASME B31.9 - Building Services Piping; 2020.
- G. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2022.
- H. ASTM A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service; 2023a.
- I. ASTM B32 - Standard Specification for Solder Metal; 2020.
- J. ASTM B42 - Standard Specification for Seamless Copper Pipe, Standard Sizes; 2020.
- K. ASTM B43 - Standard Specification for Seamless Red Brass Pipe, Standard Sizes; 2020.
- L. ASTM B88 - Standard Specification for Seamless Copper Water Tube; 2022.
- M. ASTM B88M - Standard Specification for Seamless Copper Water Tube (Metric); 2020.
- N. ASTM B813 - Standard Specification for Liquid and Paste Fluxes for Soldering of Copper and Copper Alloy Tube; 2016.
- O. ASTM B828 - Standard Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings; 2016.
- P. ASTM D2513 - Standard Specification for Polyethylene (PE) Gas Pressure Pipe, Tubing, and Fittings; 2020.
- Q. ASTM D2564 - Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems; 2020.
- R. ASTM D2665 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings; 2020.
- S. ASTM D2683 - Standard Specification for Socket-Type Polyethylene Fittings for Outside Diameter-Controlled Polyethylene Pipe and Tubing; 2020.
- T. ASTM D2729 - Standard Specification for Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings; 2021.
- U. ASTM D2855 - Standard Practice for the Two-Step (Primer and Solvent Cement) Method of Joining Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and

Piping Components with Tapered Sockets; 2020.

- V. ASTM D3034 - Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings; 2023.
- W. ASTM F876 - Standard Specification for Crosslinked Polyethylene (PEX) Tubing; 2023a.
- X. ASTM F877 - Standard Specification for Crosslinked Polyethylene (PEX) Hot- and Cold-Water Distribution Systems; 2023.
- Y. ASTM F1960 - Standard Specification for Cold Expansion Fittings with PEX Reinforcing Rings for Use with Cross-Linked Polyethylene (PEX) and Polyethylene of Raised Temperature (PE-RT) Tubing; 2023b.
- Z. AWS A5.8M/A5.8 - Specification for Filler Metals for Brazing and Braze Welding; 2019.
- AA. AWWA C651 - Disinfecting Water Mains; 2014, with Addendum (2020).
- BB. ICC-ES AC01 - Acceptance Criteria for Expansion Anchors in Masonry Elements; 2018, with Editorial Revision (2020).
- CC. ICC-ES AC106 - Acceptance Criteria for Predrilled Fasteners (Screw Anchors) in Masonry; 2018, with Editorial Revision (2020).
- DD. ICC-ES AC193 - Acceptance Criteria for Mechanical Anchors in Concrete Elements; 2017, with Editorial Revision (2020).
- EE. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2018, with Amendment (2019).
- FF. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends; 2010, with Errata .
- GG. NSF 61 - Drinking Water System Components - Health Effects; 2023.
- HH. NSF 372 - Drinking Water System Components - Lead Content; 2022.
- II. PPI TR-4 - PPI HSB Listing of Hydrostatic Design Basis (HDB), Hydrostatic Design Stress (HDS), Strength Design Basis (SDB), Pressure Design Basis (PDB) and Minimum Required Strength (MRS) Ratings for Thermoplastic Piping Materials or Pipe; 2021.

### **1.03 SUBMITTALS**

- A. See Section 013000 - 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. Project Record Documents: Record actual locations of valves.

### **1.04 QUALITY ASSURANCE**

- A. Perform work in accordance with applicable codes.
- B. Valves: Manufacturer's name and pressure rating marked on valve body.
- C. Identify pipe with marking including size, ASTM material classification, ASTM specification, potable water certification, water pressure rating.

### **1.05 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.



**1.06 FIELD CONDITIONS**

- A. Do not install underground piping when bedding is wet or frozen.

**PART 2 PRODUCTS****2.01 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.

**2.02 SANITARY SEWER PIPING, BURIED BEYOND 5 FEET (1500 MM) OF BUILDING**

- A. PVC Pipe: ASTM D2665 or ASTM D3034.
  - 1. Fittings: PVC.
  - 2. Joints: Solvent welded, with ASTM D2564 solvent cement.

**2.03 SANITARY SEWER PIPING, BURIED WITHIN 5 FEET (1500 MM) OF BUILDING**

- A. PVC Pipe: ASTM D2665 or ASTM D3034.
  - 1. Fittings: PVC.
  - 2. Joints: Solvent welded, with ASTM D2564 solvent cement.

**2.04 SANITARY SEWER PIPING, ABOVE GRADE**

- A. Brass Pipe: ASTM B43, chrome plated.
  - 1. Fittings: ASME B16.23, cast bronze, chrome plated.
  - 2. Joints: Mechanical compression.
- B. PVC Pipe: ASTM D2665.
  - 1. Fittings: PVC.
  - 2. Joints: Solvent welded, with ASTM D2564 solvent cement.

**2.05 DOMESTIC WATER PIPING, BURIED BEYOND 5 FEET (1500 MM) OF BUILDING**

- A. Copper Pipe: ASTM B42, hard drawn, Type K, polyethylene coated.
  - 1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22 wrought copper and bronze.
  - 2. Joints: AWS A5.8M/A5.8, BCuP copper/silver braze.

**2.06 DOMESTIC WATER PIPING, BURIED WITHIN 5 FEET (1500 MM) OF BUILDING**

- A. Copper Pipe: ASTM B42, annealed, Type K, polyethylene coated.
  - 1. No joints below slab.

**2.07 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. Joints: ASTM B32, alloy Sn95 solder.
- B. Cross-Linked Polyethylene (PEX) Pipe: ASTM F876 or ASTM F877.
  - 1. Manufacturers:
    - a. Uponor, Inc; \_\_\_\_\_: [www.uponorengineering.com/#sle](http://www.uponorengineering.com/#sle).
    - b. Zurn Industries, LLC; \_\_\_\_\_: [www.zurn.com/#sle](http://www.zurn.com/#sle).
    - c. Substitutions: See Section 016000 - Product Requirements.
  - 2. PPI TR-4 Pressure Design Basis:
  - 3. Fittings: Brass and engineered polymer (EP) ASTM F1960.
  - 4. Joints: ASTM F1960 cold-expansion fittings.

**2.08 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. Flanges for Pipe Size Over 1 Inch (25 mm):

1. Ferrous Pipe: Class 150 malleable iron threaded or forged steel slip-on flanges; preformed neoprene gaskets.
  2. Copper Tube and Pipe: Class 150 slip-on bronze flanges; preformed neoprene gaskets.
- C. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

## 2.09 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.
  4. Vertical Pipe Support: Steel riser clamp.
  5. Floor Supports: Concrete pier or steel pedestal with floor flange; fixture attachment.
- 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.
  5. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
- 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.
  3. Hangers for Hot Pipe Sizes 2 Inches (50 mm) to 4 Inches (100 mm): Carbon steel, adjustable, clevis.
  4. Wall Support for Pipe Sizes to 3 Inches (80 mm): Cast iron hook.
  5. Wall Support for Pipe Sizes 4 Inches (100 mm) and Over: Welded steel bracket and wrought steel clamp.
  6. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
  7. Floor Support for Hot Pipe Sizes to 4 Inches (100 mm): Cast iron adjustable pipe saddle, locknut, nipple, floor flange, and concrete pier or steel support.
  8. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.
- D. Hanger Fasteners: Attach hangers to structure using appropriate fasteners, as follows:
1. Concrete Wedge Expansion Anchors: Complying with ICC-ES AC193.
  2. Masonry Wedge Expansion Anchors: Complying with ICC-ES AC01.
  3. Concrete Screw Type Anchors: Complying with ICC-ES AC193.
  4. Masonry Screw Type Anchors: Complying with ICC-ES AC106.
  5. Other Types: As required.
  6. Manufacturers:
    - a. Powers Fasteners, Inc: [www.powers.com/#sle](http://www.powers.com/#sle).
    - b. Substitutions: See Section 016000 - Product Requirements.

## 2.10 MANUFACTURED SLEEVE-SEAL SYSTEMS

- A. Manufacturers:
1. The Metraflex Company: [www.metraflex.com/#sle](http://www.metraflex.com/#sle).
  2. Substitutions: See Section 016000 - Product Requirements.

- B. Modular/Mechanical Seal:
  - 1. Synthetic rubber interlocking links continuously fill annular space between pipe and wall/casing opening.
  - 2. Provide watertight seal between pipe and wall/casing opening.
  - 3. Elastomer element size and material in accordance with manufacturer's recommendations.

## 2.11 BALL VALVES

- A. Manufacturers:
  - 1. Conbraco Industries, Inc: [www.apollovalves.com](http://www.apollovalves.com).
  - 2. Grinnell Products; \_\_\_\_\_: [www.grinnell.com/#sle](http://www.grinnell.com/#sle).
  - 3. Shurjoint Piping Products, Inc., a Tyco Business: [www.shurjoint.com](http://www.shurjoint.com).
  - 4. Nibco, Inc: [www.nibco.com](http://www.nibco.com).
  - 5. Milwaukee Valve Company: [www.milwaukeevalve.com](http://www.milwaukeevalve.com).
  - 6. Substitutions: See Section 016000 - Product Requirements.
- B. 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, solder, threaded, or grooved ends with union.

## 2.12 RELIEF VALVES

- A. Temperature and Pressure:
  - 1. Manufacturers:
    - a. Watts Regulator Company: [www.wattsregulator.com/#sle](http://www.wattsregulator.com/#sle).
    - b. Substitutions: See Section 016000 - Product Requirements.
  - 2. 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.

## 2.13 STRAINERS

- A. Manufacturers:
  - 1. Armstrong International, Inc: [www.armstronginternational.com/#sle](http://www.armstronginternational.com/#sle).
  - 2. Green Country Filter Manufacturing: [www.greencountryfilter.com/#sle](http://www.greencountryfilter.com/#sle).
  - 3. WEAMCO: [www.weamco.com/#sle](http://www.weamco.com/#sle).
  - 4. Substitutions: See Section 016000 - Product Requirements.
- B. Size 2 inch (50 mm) and Under:
- C. Size 1-1/2 inch (40 mm) to 4 inch (100 mm):

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Verify that excavations are to required grade, dry, and not over-excavated.

### 3.02 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.

### 3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Provide non-conducting dielectric connections wherever jointing dissimilar metals.
- C. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.

- D. Install piping to maintain headroom, conserve space, and not interfere with use of space.
- E. Group piping whenever practical at common elevations.
- F. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment. Refer to Section 220516.
- G. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.
- H. Provide access where valves and fittings are not exposed.
- I. Establish elevations of buried piping outside the building to ensure not less than 2.5 ft (\_\_\_\_\_ m) of cover.
- J. Install vent piping penetrating roofed areas to maintain integrity of roof assembly; refer to Section \_\_\_\_\_.
- K. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.
- L. Provide support for utility meters in accordance with requirements of utility companies.
- M. Prepare exposed, unfinished pipe, fittings, supports, and accessories ready for finish painting.
- N. Install bell and spigot pipe with bell end upstream.
- O. Install valves with stems upright or horizontal, not inverted. Refer to Section 220523.
- P. Install water piping to ASME B31.9.
- Q. 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.
- R. PVC Pipe: Make solvent-welded joints in accordance with ASTM D2855.
- S. Sleeve pipes passing through partitions, walls and floors.
- T. 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. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches (100 mm).
  - 4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
  - 5. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut recessed into and grouted flush with slab.
- U. 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.
  - 6. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
  - 7. Provide copper plated hangers and supports for copper piping.
  - 8. Prime coat exposed steel hangers and supports. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.
  - 9. Support cast iron drainage piping at every joint.

- V. Manufactured Sleeve-Seal Systems:
  - 1. Tighten bolting for a water-tight seal.
- W. When installing more than one piping system material, ensure system components are compatible and joined to ensure the integrity of the system. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.

### 3.04 APPLICATION

- A. Install unions downstream of valves and at equipment or apparatus connections.
- B. Install brass male adapters each side of valves in copper piped system. Solder adapters to pipe.
- C. Install ball valves for shut-off and to isolate equipment, part of systems, or vertical risers.

### 3.05 TOLERANCES

- A. Drainage Piping: Establish invert elevations within 1/2 inch (10 mm) vertically of location indicated and slope to drain at minimum of 1/4 inch per foot, 1/8 inch per foot (1:100), or 1/16 inch per foot slope as dictated by pipe size. Use minimum slope possible, especially for large pipes.
- B. Water Piping: Slope at minimum of 1/32 inch per foot (1:400) and arrange to drain at low points.

### 3.06 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

- A. Prior to starting work, verify system is complete, flushed and clean.
- B. 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).
- C. Inject disinfectant, free chlorine in liquid, powder, tablet or gas form, throughout system to obtain 50 to 80 mg/L residual.
- D. Bleed water from outlets to ensure distribution and test for disinfectant residual at minimum 15 percent of outlets.
- E. Maintain disinfectant in system for 24 hours.
- F. If final disinfectant residual tests less than 25 mg/L, repeat treatment.
- G. Flush disinfectant from system until residual equal to that of incoming water or 1.0 mg/L.
- H. 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.

### 3.07 SERVICE CONNECTIONS

- A. Provide new sanitary and storm 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 in accordance with local utility.
  - 1. Provide 18 gage, 0.0478 inch (1.21 mm) galvanized sheet metal sleeve around service main to 6 inch (150 mm) above floor and 6 feet (1800 mm) minimum below grade. Size for minimum of 2 inches (50 mm) of loose batt insulation stuffing.
- C. Provide new gas service complete with gas meter and regulators. Gas service distribution piping to have initial minimum pressure of 11 inch wg (2.7 kPa).

### 3.08 SCHEDULES

- A. Pipe Hanger Spacing: Install in accordance with the International Plumbing Code.

**END OF SECTION**



**SECTION 221006  
PLUMBING PIPING SPECIALTIES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Drains.
- B. Cleanouts.
- C. Hose bibbs.
- D. Hydrants.
- E. Refrigerator valve and recessed box.
- F. Mixing valves.

**1.02 REFERENCE STANDARDS**

- A. ASME A112.6.3 - Floor Drains; 2022.
- B. ASSE 1011 - Performance Requirements for Hose Connection Vacuum Breakers; 2023.
- C. ASSE 1019 - Performance Requirements for Wall Hydrant with Backflow Protection and Freeze Resistance; 2023.
- D. NSF 61 - Drinking Water System Components - Health Effects; 2023.
- E. NSF 372 - Drinking Water System Components - Lead Content; 2022.
- F. PDI-WH 201 - Water Hammer Arresters; 2017.

**1.03 SUBMITTALS**

- A. See Section 013000 - 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.
- F. Project Record Documents: Record actual locations of equipment, cleanouts, backflow preventers, water hammer arrestors.
- G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
  - 1. See Section 016000 - Product Requirements, for additional provisions.
  - 2. Extra Loose Keys for Outside Hose Bibbs: Two.

**1.04 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than three years experience.

**1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Accept specialties on site in original factory packaging. Inspect for damage.

**PART 2 PRODUCTS**

**2.01 GENERAL REQUIREMENTS**

- A. Specialties in Potable Water Supply Systems: Provide products that comply with NSF 61 and NSF 372 for maximum lead content.

**2.02 DRAINS**

- A. Manufacturers:
  - 1. Jay R. Smith Manufacturing Company: [www.jayrsmith.com](http://www.jayrsmith.com).

2. Josam Company: [www.josam.com](http://www.josam.com).
  3. LATICRETE International, Inc; LATICRETE® HYDRO BAN® Linear Drain: [www.laticrete.com/#sle](http://www.laticrete.com/#sle).
  4. Noble Company; FreeStyle Linear Drain: [www.noblecompany.com/#sle](http://www.noblecompany.com/#sle).
  5. Zurn Industries, LLC: [www.zurn.com](http://www.zurn.com).
- B. Floor Drain:
1. ASME A112.6.3; lacquered cast iron or stainless steel, two piece body with double drainage flange, weep holes, and round, adjustable nickel-bronze strainer.
- C. Floor Sink:
1. Lacquered cast iron body with dome strainer and seepage flange.

### 2.03 CLEANOUTS

- A. Manufacturers:
1. Jay R. Smith Manufacturing Company: [www.jayrsmith.com/#sle](http://www.jayrsmith.com/#sle).
  2. Josam Company: [www.josam.com/#sle](http://www.josam.com/#sle).
  3. Zurn Industries, LLC: [www.zurn.com/#sle](http://www.zurn.com/#sle).
- 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 square 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.
- F. Cleanouts at Interior Unfinished Accessible Areas: Calked or threaded type. Provide bolted stack cleanouts on vertical rainwater leaders.

### 2.04 HYDRANTS

- A. Manufacturers:
1. Arrowhead Brass & Plumbing, LLC: [www.arrowheadbrass.com](http://www.arrowheadbrass.com).
  2. Jay R. Smith Manufacturing Company: [www.jayrsmith.com](http://www.jayrsmith.com).
  3. Zurn Industries, LLC: [www.zurn.com](http://www.zurn.com).
  4. Woodford
- B. Wall Hydrants:
1. ASSE 1019; freeze resistant, self-draining type with chrome plated wall plate hose thread spout, lockshield and removable key, and integral vacuum breaker with recessed box and lock cover.

### 2.05 REFRIGERATOR VALVE AND RECESSED BOX

- A. Valve Manufacturers:
1. IPS Corporation/Water-Tite: [www.ipscorp.com](http://www.ipscorp.com).
  2. Zurn Industries, LLC: [www.zurn.com](http://www.zurn.com).
- B. Description: Plastic preformed rough-in box with brass valves with wheel handle, slip in finishing cover.

### 2.06 BACKFLOW PREVENTERS

- A. Manufacturers:
1. Conbraco Industries, Inc: [www.apollovalves.com](http://www.apollovalves.com).



2. Watts Regulator Company, a part of Watts Water Technologies: [www.wattsregulator.com](http://www.wattsregulator.com).
  3. Zurn Industries, LLC: [www.zurn.com](http://www.zurn.com).
- 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.

## 2.07 WATER HAMMER ARRESTORS

- A. Manufacturers:
1. Jay R. Smith Manufacturing Company: [www.jayrsmith.com](http://www.jayrsmith.com).
  2. Watts Regulator Company, a part of Watts Water Technologies: [www.wattsregulator.com](http://www.wattsregulator.com).
  3. Zurn Industries, LLC: [www.zurn.com](http://www.zurn.com).
- B. Water Hammer Arrestors:
1. Stainless steel Copper construction, bellows type sized in accordance with PDI-WH 201, precharged suitable for operation in temperature range 34 to 250 degrees F (1 to 120 degrees C) and maximum 150 psi (1000 kPa) working pressure.

## 2.08 MIXING VALVES

- A. Thermostatic Mixing Valves:
1. Manufacturers:
    - a. ESBE: [www.esbe.se/en](http://www.esbe.se/en).
    - b. Leonard Valve Company: [www.leonardvalve.com](http://www.leonardvalve.com).
    - c. Honeywell International Inc: [yourhome.honeywell.com](http://yourhome.honeywell.com).
  2. Valve: Chrome plated cast brass body, stainless steel or copper alloy bellows, integral temperature adjustment.
- B. Pressure Balanced Mixing Valves:
1. Manufacturers:
    - a. Delta Faucet Company: [www.deltafaucet.com](http://www.deltafaucet.com).
    - b. TacoTherm Ltd: [www.tacotherm.co.uk](http://www.tacotherm.co.uk).
    - c. Zurn: [www.zurn.com](http://www.zurn.com)
  2. Valve: Chrome plated cast brass body, stainless steel cylinder, integral temperature adjustment.

## PART 3 EXECUTION

### 3.01 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 lavatory sinks, washing machine outlets, or other hard shut off devices.

### END OF SECTION



**SECTION 223000  
PLUMBING EQUIPMENT****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Water Heaters:
  - 1. Commercial electric.
- B. Acid neutralizers.
- C. Cooling condensate removal pumps.

**1.02 REFERENCE STANDARDS**

- A. ASME BPVC-VIII-1 - Boiler and Pressure Vessel Code, Section VIII, Division 1: Rules for Construction of Pressure Vessels; 2023.

**1.03 SUBMITTALS**

- A. See Section 013000 - 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, power requirements.
  - 3. Provide electrical characteristics and connection requirements.
- C. Shop Drawings:
  - 1. Indicate dimensions of tanks, tank lining methods, anchors, attachments, lifting points, tapings, 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.

**1.04 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of experience.
- B. Certifications:
  - 1. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.
- C. Identification: Provide pumps with manufacturer's name, model number, and rating/capacity identified by permanently attached label.

**1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Provide temporary inlet and outlet caps. Maintain caps in place until installation.

**1.06 WARRANTY**

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.
- B. Provide five year manufacturer warranty for water storage tanks.

**PART 2 PRODUCTS****2.01 WATER HEATERS**

- A. Manufacturers:
  - 1. Rheem Manufacturing Company; \_\_\_\_\_: [www.rheem.com/#sle](http://www.rheem.com/#sle).
  - 2. Substitutions: See Section 016000 - Product Requirements.
- B. Commercial Electric:

1. Type: Factory-assembled and wired, electric, vertical storage.
2. Tank: Glass lined welded steel; 4 inch (100 mm) diameter inspection port, thermally insulated with minimum 2 inches (50 mm) glass fiber encased in corrosion-resistant steel jacket; baked-on enamel finish.
3. Controls: Automatic immersion water thermostat; externally adjustable temperature range from 60 to 180 degrees F (16 to 82 degrees C), flanged or screw-in nichrome elements, high temperature limit thermostat.
4. Accessories:

## **2.02 DIAPHRAGM-TYPE COMPRESSION TANKS**

- A. Manufacturers:
  1. Amtrol Inc: [www.amtrol.com/#sle](http://www.amtrol.com/#sle).
  2. Bell & Gossett, a xylem brand: [www.bellgossett.com/#sle](http://www.bellgossett.com/#sle).
  3. Taco, Inc: [www.taco-hvac.com/#sle](http://www.taco-hvac.com/#sle).
  4. Wessels.
  5. Wilkins: [www.zurn.com](http://www.zurn.com)
  6. Substitutions: See Section 016000 - Product Requirements.
- 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).

## **2.03 IN-LINE CIRCULATOR PUMPS**

- A. Manufacturers:
  1. ITT Bell & Gossett: [www.bellgossett.com](http://www.bellgossett.com).
  2. Substitutions: See Section 016000 - Product Requirements.

## **2.04 COOLING CONDENSATE REMOVAL PUMPS**

- A. Manufacturers:
  1. Liberty Pumps Inc: [www.libertypumps.com/#sle](http://www.libertypumps.com/#sle).
  2. Substitutions: See Section 016000 - Product Requirements.

## **2.05 ELECTRICAL WORK**

- A. Electrical characteristics to be as specified or indicated.

## **PART 3 EXECUTION**

### **3.01 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 electrical work to achieve operating system.
  1. Provide electrical interlocking from cooling condensate pump safety switch to associated HVAC unit(s) furnished under other Sections.

**END OF SECTION**

**SECTION 224000  
PLUMBING FIXTURES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Water closets.
- B. Lavatories.
- C. Sinks.
- D. Mop sinks.
- E. Under-lavatory pipe supply covers.
- F. Electric water coolers.
- G. Showers.

**1.02 REFERENCE STANDARDS**

- A. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.
- B. ASME A112.18.1 - Plumbing Supply Fittings; 2018, with Errata.
- C. ASME A112.19.2 - Ceramic Plumbing Fixtures; 2018, with Errata.
- D. UL (DIR) - Online Certifications Directory; Current Edition.

**1.03 SUBMITTALS**

- A. See Section 013000 - 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.
- E. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

**1.04 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of experience.

**1.05 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.

**1.06 WARRANTY**

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.
- B. Provide five year manufacturer warranty for electric water cooler.

**PART 2 PRODUCTS**

**2.01 REGULATORY REQUIREMENTS**

- A. Comply with applicable codes for installation of plumbing systems.
- B. Comply with UL (DIR) requirements.
- C. Perform work in accordance with local health department regulations.
- D. Provide certificate of compliance from Authority Having Jurisdiction indicating approval of installation.

**2.02 FLUSH VALVE WATER CLOSETS**

- A. Water Closets: Vitreous china, ASME A112.19.2, floor mounted, siphon jet flush action, china bolt caps.
  - 1. Bowl: ASME A112.19.2; 18 inches (450 mm) high with elongated rim.
  - 2. Flush Valve: Exposed (top spud).
  - 3. Flush Operation: Manual, oscillating handle.
  - 4. Color: White.
  - 5. Manufacturers:
    - a. American Standard, Inc: [www.americanstandard-us.com/#sle](http://www.americanstandard-us.com/#sle).
    - b. Kohler Company: [www.kohler.com/#sle](http://www.kohler.com/#sle).
    - c. Zurn Industries, Inc: [www.zurn.com/#sle](http://www.zurn.com/#sle).
    - d. Substitutions: See Section 016000 - Product Requirements.
- B. Flush Valves: ASME A112.18.1, diaphragm type, complete with vacuum breaker stops and accessories.
  - 1. Manufacturers:
    - a. American Standard, Inc: [www.americanstandard-us.com/#sle](http://www.americanstandard-us.com/#sle).
    - b. Sloan Valve Company: [www.sloanvalve.com/#sle](http://www.sloanvalve.com/#sle).
    - c. Zurn Industries, Inc: [www.zurn.com/#sle](http://www.zurn.com/#sle).
    - d. Substitutions: See Section 016000 - Product Requirements.
- C. Seats:
  - 1. Manufacturers:
    - a. American Standard, Inc: [www.americanstandard-us.com/#sle](http://www.americanstandard-us.com/#sle).
    - b. Bemis Manufacturing Company: [www.bemismfg.com/#sle](http://www.bemismfg.com/#sle).
    - c. Church Seat Company: [www.churchseats.com/#sle](http://www.churchseats.com/#sle).
    - d. Olsonite: [www.olsonite.com/#sle](http://www.olsonite.com/#sle).
    - e. Zurn Industries, Inc: [www.zurn.com/#sle](http://www.zurn.com/#sle).
    - f. Substitutions: See Section 016000 - Product Requirements.
  - 2. Solid white plastic, open front, extended back, self-sustaining hinge, brass bolts, with cover.

**2.03 LAVATORIES**

- A. Lavatory Manufacturers:
  - 1. American Standard, Inc: [www.americanstandard-us.com/#sle](http://www.americanstandard-us.com/#sle).
  - 2. Kohler Company: [www.kohler.com/#sle](http://www.kohler.com/#sle).
  - 3. Zurn Industries, Inc: [www.zurn.com/#sle](http://www.zurn.com/#sle).
  - 4. Substitutions: See Section 016000 - Product Requirements.
- B. Vitreous China Wall Hung Basin: As scheduled.
- C. Supply Faucet Manufacturers:
  - 1. American Standard, Inc; \_\_\_\_\_: [www.americanstandard-us.com/#sle](http://www.americanstandard-us.com/#sle).
  - 2. Zurn Industries, Inc; \_\_\_\_\_: [www.zurn.com/#sle](http://www.zurn.com/#sle).
  - 3. Substitutions: See Section 016000 - Product Requirements.
- D. Supply Faucet: ASSE 1070, ASME A112.18.1; chrome plated combination supply fitting with open grid strainer, water economy aerator with maximum flow of 0.5 gallon per minute (low-flow) (1.9 liters per minute (low-flow)), single lever handle.
- 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. Offset waste with perforated open strainer.
  - 3. Wheel handle stops.
  - 4. Flexible supplies.

5. Carrier:
  - a. Manufacturers:
    - 1) JOSAM Company; \_\_\_\_\_: www.josam.com/#sle.
    - 2) Zurn Industries, Inc; \_\_\_\_\_: www.zurn.com/#sle.
    - 3) Substitutions: See Section 016000 - Product Requirements.
  - b. ASME A112.6.1M; cast iron and steel frame with tubular legs, lugs for floor and wall attachment, threaded studs for fixture hanger, bearing plate and studs.

#### **2.04 SINKS**

- A. Sink Manufacturers:
  1. Elkay.
  2. Substitutions: See Section 016000 - Product Requirements.
- B. Single Compartment Bowl: As scheduled.
  1. Drain: 1-1/2 inch (38 mm) chromed brass drain.
  2. Drain: 3-1/2 inch (90 mm) crumb cup and tailpiece.

#### **2.05 UNDER-LAVATORY PIPE SUPPLY COVERS**

- A. General:
  1. Insulate exposed drainage piping including hot, cold and tempered water supplies under lavatories or sinks per ADA Standards.
  2. Exterior Surfaces: Smooth nonabsorbent with no finger recessed indentations for easy cleaning.
  3. Color: High gloss white.

#### **2.06 SHOWERS**

- A. Shower Manufacturers:
  1. Praxis
  2. Substitutions: See Section 016000 - Product Requirements.
- B. Cabinet: As scheduled.
- C. Trim: As scheduled.

#### **2.07 BOTTLE FILLING STATIONS**

- A. Manufacturers:
  1. Elkay.
  2. Substitutions: See Section 016000 - Product Requirements.
- B. Bottle Filler:
  1. Wall mount assembly.
  2. Inwall mount assembly
  3. Lead-free waterways.
  4. Hands free operation.
  5. Filter replacement indicator.
  6. Remote chiller for inwall applications

#### **2.08 MOP SINKS**

- A. Mop Sink Manufacturers:
  1. MUSTEE.
  2. Substitutions: See Section 016000 - Product Requirements.

### **PART 3 EXECUTION**

#### **3.01 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.

### **3.02 PREPARATION**

- A. Rough-in fixture piping connections in accordance with minimum sizes indicated in fixture rough-in schedule for particular fixtures.

### **3.03 INSTALLATION**

- A. Install each fixture with trap, easily removable for servicing and cleaning.
- B. Provide chrome plated rigid 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 carriers and bolts.
- E. Solidly attach water closets to floor with lag screws. Lead flashing is not intended hold fixture in place.

### **3.04 INTERFACE WITH WORK OF OTHER SECTIONS**

- A. Review millwork shop drawings. Confirm location and size of fixtures and openings before rough-in and installation.

### **3.05 ADJUSTING**

- A. Adjust stops or valves for intended water flow rate to fixtures without splashing, noise, or overflow.

### **3.06 CLEANING**

- A. Clean plumbing fixtures and equipment.

### **3.07 PROTECTION**

- A. Protect installed products from damage due to subsequent construction operations.
- B. Do not permit use of fixtures by construction personnel.
- C. Repair or replace damaged products before Date of Substantial Completion.

**END OF SECTION**



**SECTION 230529  
HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Support and attachment components for equipment, piping, and other HVAC/hydraulic work.

**1.02 REFERENCE STANDARDS**

- A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.
- C. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2023.
- D. MFMA-4 - Metal Framing Standards Publication; 2004.

**1.03 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:
  - 1. Coordinate sizes and arrangement of supports and bases with the actual equipment and components to be installed.
  - 2. Coordinate the work with other trades to provide additional framing and materials required for installation.
  - 3. Coordinate compatibility of support and attachment components with mounting surfaces at the installed locations.
  - 4. Coordinate the arrangement of supports with ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
  - 5. Notify Engineer/Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- B. Sequencing:
  - 1. Do not install products on or provide attachment to concrete surfaces until concrete has fully cured in accordance with Section 033000.

**1.04 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for channel (strut) framing systems and post-installed concrete and masonry anchors.
- C. Shop Drawings: Include details for fabricated hangers and supports.
  - 1. Application of protective inserts, saddles, and shields at pipe hangers for each type of insulation and hanger.
- D. Installer's Qualifications: Include evidence of compliance with specified requirements.
- E. Manufacturer's 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.

**1.05 QUALITY ASSURANCE**

- A. Comply with applicable building code.

**PART 2 PRODUCTS**

**2.01 SUPPORT AND ATTACHMENT COMPONENTS**

- A. General Requirements:
  - 1. Comply with MSS SP-58.

2. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of plumbing work.
  3. Provide products listed, classified, and labeled as suitable for the purpose intended, where applicable.
  4. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supported. Include consideration for vibration, equipment operation, and shock loads where applicable.
  5. Do not use wire, chain, perforated pipe strap, or wood for permanent supports unless specifically indicated or permitted.
  6. Steel Components: Use corrosion resistant materials suitable for the environment where installed.
    - a. Indoor Dry Locations: Use zinc-plated steel or approved equivalent unless otherwise indicated.
    - b. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
    - c. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.
- B. Metal Channel (Strut) Framing Systems: Factory-fabricated continuous-slot metal channel (strut) and associated fittings, accessories, and hardware required for field-assembly of supports.
1. Manufacturers:
    - a. Cooper B-Line, a division of Eaton Corporation: [www.cooperindustries.com/#sle](http://www.cooperindustries.com/#sle).
    - b. Thomas & Betts Corporation: [www.tnb.com/#sle](http://www.tnb.com/#sle).
    - c. Unistrut, a brand of Atkore International Inc: [www.unistrut.com/#sle](http://www.unistrut.com/#sle).
    - d. Substitutions: See Section 016000 - Product Requirements.
    - e. Source Limitations: Furnish channels (struts) and associated fittings, accessories, and hardware produced by a single manufacturer.
  2. Provide factory-fabricated continuous-slot metal channel (strut) and associated fittings, accessories, and hardware required for field-assembly of supports.
  3. Comply with MFMA-4.
  4. Channel Material:
    - a. Indoor Dry Locations: Use painted steel, zinc-plated steel, or galvanized steel.
  5. Minimum Channel Thickness: Steel sheet, 12 gage, 0.1046 inch (2.66 mm).
  6. Minimum Channel Dimensions: 1-5/8 inch (41 mm) width by 13/16 inch (21 mm) height.
- C. Hanger Rods: Threaded zinc-plated steel unless otherwise indicated.
1. Minimum Size, Unless Otherwise Indicated or Required:
    - a. Equipment Supports: 1/2 inch (13 mm) diameter.
    - b. Piping up to 1 inch (27 mm) nominal: 1/4 inch (6 mm) diameter.
    - c. Piping larger than 1 inch (27 mm) nominal: 3/8 inch (10 mm) diameter.
    - d. Trapeze Support for Multiple Pipes: 3/8 inch (10 mm) diameter.
- D. Anchors and Fasteners:
1. Manufacturers - Mechanical Anchors:
    - a. Hilti, Inc: [www.us.hilti.com/#sle](http://www.us.hilti.com/#sle).
    - b. ITW Red Head, a division of Illinois Tool Works, Inc: [www.itwredhead.com/#sle](http://www.itwredhead.com/#sle).
    - c. Powers Fasteners, Inc: [www.powers.com/#sle](http://www.powers.com/#sle).
    - d. Simpson Strong-Tie Company Inc: [www.strongtie.com/#sle](http://www.strongtie.com/#sle).
    - e. Substitutions: See Section 016000 - Product Requirements.
  2. Manufacturers - Powder-Actuated Fastening Systems:
    - a. Hilti, Inc: [www.us.hilti.com/#sle](http://www.us.hilti.com/#sle).
    - b. ITW Ramset, a division of Illinois Tool Works, Inc: [www.ramset.com/#sle](http://www.ramset.com/#sle).
    - c. Powers Fasteners, Inc: [www.powers.com/#sle](http://www.powers.com/#sle).

- d. Simpson Strong-Tie Company Inc: [www.strongtie.com/#sle](http://www.strongtie.com/#sle).
- e. Substitutions: See Section 016000 - Product Requirements.
- 3. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.
- 4. Concrete: Use preset concrete inserts, expansion anchors, or screw anchors.
- 5. Solid or Grout-Filled Masonry: Use expansion anchors or screw anchors.
- 6. Hollow Masonry: Use toggle bolts.
- 7. Hollow Stud Walls: Use toggle bolts.
- 8. Steel: Use beam clamps, machine bolts, or welded threaded studs.
- 9. Sheet Metal: Use sheet metal screws.
- 10. Plastic and lead anchors are not permitted.
- 11. Preset Concrete Inserts: Continuous metal channel (strut) and spot inserts specifically designed to be cast in concrete ceilings, walls, and floors.
  - a. Comply with MFMA-4.
  - b. Channel Material: Use galvanized steel.
  - c. Minimum Channel Thickness: Steel sheet, 12 gage, 0.1046 inch (2.66 mm) minimum base metal thickness.
  - d. Manufacturer: Same as manufacturer of metal channel (strut) framing system.
- 12. Post-Installed Concrete and Masonry Anchors: Evaluated and recognized by ICC Evaluation Service, LLC (ICC-ES) for compliance with applicable building code.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify that field measurements are as indicated.
- B. Verify that mounting surfaces are ready to receive support and attachment components.
- C. Verify that conditions are satisfactory for installation prior to starting work.

#### **3.02 INSTALLATION**

- A. Install products in accordance with manufacturer's instructions.
- B. Install anchors and fasteners in accordance with ICC Evaluation Services, LLC (ICC-ES) evaluation report conditions of use where applicable.
- C. Provide independent support from building structure. Do not provide support from piping, ductwork, conduit, or other systems.
- D. Unless specifically indicated or approved by Engineer/Architect, do not provide support from suspended ceiling support system or ceiling grid.
- E. Unless specifically indicated or approved by Engineer/Architect, do not provide support from roof deck.
- F. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.
- G. Equipment Support and Attachment:
  - 1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.
  - 2. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
  - 3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
  - 4. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.
- H. Preset Concrete Inserts: Use manufacturer provided closure strips to inhibit concrete seepage during concrete pour.

- I. Secure fasteners according to manufacturer's recommended torque settings.
- J. Remove temporary supports.

**3.03 FIELD QUALITY CONTROL**

- A. See Section 014000 - Quality Requirements, for additional requirements.
- B. Inspect support and attachment components for damage and defects.
- C. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.
- D. Correct deficiencies and replace damaged or defective support and attachment components.

**END OF SECTION**

**SECTION 230548  
VIBRATION AND SEISMIC CONTROLS FOR HVAC**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Vibration isolation requirements.
- B. Vibration isolators.
- C. Vibration-isolated and/or seismically engineered roof curbs.

**1.02 RELATED REQUIREMENTS**

- A. Section 033000 - Cast-in-Place Concrete.

**1.03 REFERENCE STANDARDS**

- A. ASHRAE (HVACA) - ASHRAE Handbook - HVAC Applications; Most Recent Edition Cited by Referring Code or Reference Standard.

**1.04 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:
  - 1. Coordinate selection and arrangement of vibration isolation and/or seismic control components with the actual equipment to be installed.
  - 2. Coordinate the work with other trades to provide additional framing and materials required for installation.
  - 3. Coordinate compatibility of support and attachment components with mounting surfaces at the installed locations.
  - 4. Notify Engineer/Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- B. Sequencing:
  - 1. Do not install products on or provide attachment to concrete surfaces until concrete has fully cured in accordance with Section 033000.

**1.05 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for products, including materials, fabrication details, dimensions, and finishes.
  - 1. Vibration Isolators: Include rated load capacities and deflections; include information on color coding or other identification method for spring element load capacities.
- C. Shop Drawings - Vibration Isolation Systems:
  - 1. Include dimensioned plan views and sections indicating proposed arrangement of vibration isolators; indicate equipment weights and static deflections.
- D. Manufacturer's 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.

**1.06 QUALITY ASSURANCE**

- A. Comply with applicable building code.
- B. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of experience.
- C. Installer Qualifications: Company specializing in performing the work of this section with minimum three years of experience.

**1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

**PART 2 PRODUCTS****2.01 VIBRATION ISOLATION REQUIREMENTS**

- A. Design and provide vibration isolation systems to reduce vibration transmission to supporting structure from vibration-producing HVAC equipment and/or HVAC connections to vibration-isolated equipment.
- B. Comply with applicable general recommendations of ASHRAE (HVACA), where not in conflict with other specified requirements:
- C. General Requirements:
  - 1. Select vibration isolators to provide required static deflection.
  - 2. Select vibration isolators for uniform deflection based on distributed operating weight of actual installed equipment.
  - 3. Select vibration isolators for outdoor equipment to comply with wind design requirements.
  - 4. Select vibration-isolated equipment support bases and associated vibration isolators to provide minimum 2 inch (50 mm) operating clearance beneath base unless otherwise indicated.
- D. Equipment Isolation: As indicated on drawings.
- E. Piping Isolation:
  - 1. Provide vibration isolators for piping supports:
    - a. Located in equipment rooms.
  - 2. Minimum Static Deflection:
    - a. First Three Supports Closest to Isolated Equipment: Same as static deflection of equipment; maximum of 2 inch (50 mm) deflection required.
  - 3. Suspended Piping, Non-Seismic Applications: Use resilient material isolator hangers.
  - 4. Floor-Mounted Piping, Non-Seismic Applications: Use open (unhoused) spring isolators.
  - 5. Use modular seal or approved resilient material where vibration-isolated piping penetrates building elements (e.g. walls, floors) arranged to prevent vibration transmission to structure.

**2.02 MANUFACTURERS**

- A. Kinetics Noise Control, Inc: [www.kineticsnoise.com](http://www.kineticsnoise.com).
- B. Mason Industries: [www.mason-ind.com](http://www.mason-ind.com).

**2.03 VIBRATION ISOLATORS**

- A. Manufacturers:
  - 1. Vibration Isolators:
    - a. Kinetics Noise Control, Inc: [www.kineticsnoise.com/#sle](http://www.kineticsnoise.com/#sle).
    - b. Mason Industries: [www.mason-ind.com/#sle](http://www.mason-ind.com/#sle).
  - 2. Source Limitations: Furnish vibration-isolators and associated accessories produced by a single manufacturer and obtained from a single supplier.
- B. General Requirements:
  - 1. Resilient Materials for Vibration Isolators: Oil, ozone, and oxidant resistant.
  - 2. Spring Elements for Spring Isolators:
    - a. Color code or otherwise identify springs to indicate load capacity.
    - b. Lateral Stability: Minimum lateral stiffness to vertical stiffness ratio of 0.8.
    - c. Designed to operate in the linear portion of their load versus deflection curve over deflection range of not less than 50 percent above specified deflection.
    - d. Designed to provide additional travel to solid of not less than 50 percent of rated deflection at rated load.
    - e. Selected to provide designed deflection of not less than 75 percent of specified deflection.

- f. Selected to function without undue stress or overloading.

## **2.04 VIBRATION-ISOLATED AND/OR SEISMICALLY ENGINEERED ROOF CURBS**

- A. Manufacturers:
  - 1. Vibration-Isolated and/or Seismically Engineered Roof Curbs:
    - a. Kinetics Noise Control, Inc; \_\_\_\_\_: [www.kineticsnoise.com/#sle](http://www.kineticsnoise.com/#sle).
    - b. Substitutions: See Section 016000 - Product Requirements.
  - 2. Source Limitations: Furnish vibration-isolated roof curbs and associated accessories produced by the same manufacturer as the vibration isolators and obtained from a single supplier.
- B. Vibration Isolation Curbs:
  - 1. Non-Seismic Curb Rail:
    - a. Construction: Steel.
  - 2. Non-Seismic Curb:
    - a. Location: Between structure and rooftop equipment.
    - b. Construction: Steel.
    - c. Weather exposed components consist of corrosion resistant materials.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that field measurements are as shown on the drawings.
- B. Verify that mounting surfaces are ready to receive vibration isolation and/or seismic control components and associated attachments.
- C. Verify that conditions are satisfactory for installation prior to starting work.

### **3.02 INSTALLATION**

- A. Install products in accordance with manufacturer's instructions.
- B. Install anchors and fasteners in accordance with ICC Evaluation Services, LLC (ICC-ES) evaluation report conditions of use where applicable.
- C. Secure fasteners according to manufacturer's recommended torque settings.
- D. Install flexible piping connections to provide sufficient slack for vibration isolation and/or seismic relative displacements as indicated or as required.
- E. Vibration Isolation Systems:
  - 1. Spring Isolators:
    - a. Position equipment at operating height; provide temporary blocking as required.
    - b. Lift equipment free of isolators prior to lateral repositioning to avoid damage to isolators.
    - c. Level equipment by adjusting isolators gradually in sequence to raise equipment uniformly such that excessive weight or stress is not placed on any single isolator.
  - 2. Isolator Hangers:
    - a. Use precompressed isolator hangers where required to facilitate installation and prevent damage to equipment utility connection provisions.
    - b. Locate isolator hangers at top of hanger rods in accordance with manufacturer's instructions.
  - 3. Clean debris from beneath vibration-isolated equipment that could cause short circuiting of isolation.
  - 4. Use elastomeric grommets for attachments where required to prevent short circuiting of isolation.
  - 5. Adjust isolators to be free of isolation short circuits during normal operation.
  - 6. Do not overtighten fasteners such that resilient material isolator pads are compressed beyond manufacturer's maximum recommended deflection.

### **3.03 FIELD QUALITY CONTROL**

- A. See Section 014000 - Quality Requirements, for additional requirements.
- B. Inspect vibration isolation and/or seismic control components for damage and defects.
- C. Vibration Isolation Systems:
  - 1. Verify isolator static deflections.
  - 2. Verify required clearance beneath vibration-isolated equipment support bases.
  - 3. Verify vibration isolation performance during normal operation; investigate sources of isolation short circuits.
- D. Correct deficiencies and replace damaged or defective vibration isolation and/or seismic control components.

**END OF SECTION**



**SECTION 230553  
IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Nameplates.
- B. Tags.
- C. Adhesive-backed duct markers.
- D. Pipe markers.

**1.02 RELATED REQUIREMENTS**

- A. Section 099123 - Interior Painting: Identification painting.

**1.03 REFERENCE STANDARDS**

- A. ASME A13.1 - Scheme for the Identification of Piping Systems; 2023.
- B. ASTM D709 - Standard Specification for Laminated Thermosetting Materials; 2017.

**1.04 SUBMITTALS**

- A. See Section 013000 - 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.
- E. Project Record Documents: Record actual locations of tagged valves.

**PART 2 PRODUCTS**

**2.01 IDENTIFICATION APPLICATIONS**

- A. Air Handling Units: Nameplates.
- B. Air Terminal Units: Tags.
- C. Automatic Controls: Tags. Key to control schematic.
- D. Control Panels: Nameplates.
- E. Ductwork: Duct Markers.
- F. Instrumentation: Tags.
- G. Major Control Components: Nameplates.
- H. Piping: Pipe markers.
- I. Pumps: Nameplates.
- J. Small-sized Equipment: Tags.
- K. Tanks: Nameplates.
- L. Thermostats: Nameplates.
- M. Valves: Tags.

**2.02 NAMEPLATES**

- A. Manufacturers:
  - 1. Advanced Graphic Engraving, LLC: [www.advancedgraphicengraving.com/#sle](http://www.advancedgraphicengraving.com/#sle).
  - 2. Brimar Industries, Inc.: [www.pipemarker.com](http://www.pipemarker.com).
  - 3. Kolbi Pipe Marker Co: [www.kolbipipemarkers.com/#sle](http://www.kolbipipemarkers.com/#sle).
  - 4. Seton Identification Products, a Tricor Direct Company: [www.seton.com/#sle](http://www.seton.com/#sle).

- 5. Substitutions: See Section 016000 - Product Requirements.
- B. Letter Color: White.
- C. Letter Height: 1/4 inch (6 mm).
- D. Background Color: Black.
- E. Plastic: Comply with ASTM D709.

## 2.03 TAGS

- A. Manufacturers:
  - 1. Advanced Graphic Engraving: [www.advancedgraphicengraving.com/#sle](http://www.advancedgraphicengraving.com/#sle).
  - 2. Brady Corporation: [www.bradycorp.com/#sle](http://www.bradycorp.com/#sle).
  - 3. Brimar Industries, Inc.: [www.pipemarker.com](http://www.pipemarker.com).
  - 4. Kolbi Pipe Marker Co: [www.kolbipipemarkers.com/#sle](http://www.kolbipipemarkers.com/#sle).
  - 5. Seton Identification Products, a Tricor Company: [www.seton.com/#sle](http://www.seton.com/#sle).
  - 6. Substitutions: See Section 016000 - Product Requirements.
- B. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inch (40 mm) diameter with smooth edges.
- C. Valve Tag Chart: Typewritten letter size list in anodized aluminum frame.

## 2.04 ADHESIVE-BACKED DUCT MARKERS

- A. Manufacturers:
  - 1. Brimar Industries, Inc.: [www.pipemarker.com](http://www.pipemarker.com).
  - 2. Substitutions: See Section 016000 - Product Requirements.
- B. Material: High gloss acrylic adhesive-backed vinyl film 0.0032 inch (0.76 mm); printed with UV and chemical resistant inks.

## 2.05 PIPE MARKERS

- A. Manufacturers:
  - 1. Brady Corporation: [www.bradycorp.com/#sle](http://www.bradycorp.com/#sle).
  - 2. Brimar Industries, Inc.: [www.pipemarker.com](http://www.pipemarker.com).
  - 3. Kolbi Pipe Marker Co: [www.kolbipipemarkers.com/#sle](http://www.kolbipipemarkers.com/#sle).
  - 4. MIFAB, Inc: [www.mifab.com/#sle](http://www.mifab.com/#sle).
  - 5. Seton Identification Products, a Tricor Company: [www.seton.com/#sle](http://www.seton.com/#sle).
  - 6. Substitutions: See Section 016000 - Product Requirements.
- B. Color: 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. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.
- E. 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.
- F. Color code as follows:
  - 1. Heating, Cooling, and Boiler Feedwater: Green with white letters.

## PART 3 EXECUTION

### 3.01 PREPARATION

- A. Degrease and clean surfaces to receive adhesive for identification materials.

### **3.02 INSTALLATION**

- A. Install 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. Apply stencil painting in accordance with Section 099123.
- D. Install plastic pipe markers in accordance with manufacturer's instructions.
- E. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.
- F. Install underground plastic pipe markers 6 to 8 inches (150 to 200 mm) below finished grade, directly above buried pipe.
- G. Use tags on piping 3/4 inch (20 mm) diameter and smaller.
- H. Identify service, flow direction, and pressure.
- I. Install in clear view and align with axis of piping.
- J. 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.
- K. Install ductwork with duct markers. Identify with air handling unit identification number and area served. Locate identification at air handling unit, at each side of penetration of structure or enclosure, and at each obstruction.

**END OF SECTION**



**SECTION 230593**  
**TESTING, ADJUSTING, AND BALANCING FOR HVAC**

**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Testing, adjustment, and balancing of air systems.
- B. Field quality-control testing of Laboratory fume hoods.
- C. Measurement of final operating condition of HVAC systems.

**1.02 RELATED REQUIREMENTS**

- A. Section 014000 - Quality Requirements: Employment of testing agency and payment for services.

**1.03 REFERENCE STANDARDS**

- A. AABC (NSTSB) - AABC National Standards for Total System Balance, 7th Edition; 2016.
- B. ASHRAE Std 111 - Measurement, Testing, Adjusting, and Balancing of Building HVAC Systems; 2008, with Errata (2019).
- C. SMACNA (TAB) - HVAC Systems Testing, Adjusting and Balancing; 2002.

**1.04 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Installer Qualifications: Submit name of adjusting and balancing agency and TAB supervisor for approval within 30 days after award of Contract.
- C. TAB Plan: Submit a written plan indicating the testing, adjusting, and balancing standard to be followed and the specific approach for each system and component.
  - 1. Submit to Engineer/Architect.
  - 2. Submit six weeks prior to starting the testing, adjusting, and balancing work.
  - 3. Include certification that the plan developer has reviewed Contract Documents, the equipment and systems, and the control system with the Engineer/Architect and other installers to sufficiently understand the design intent for each system.
  - 4. Include at least the following in the plan:
    - a. Preface: An explanation of the intended use of the control system.
    - b. List of all air flow, water flow, sound level, system capacity and efficiency measurements to be performed and a description of specific test procedures, parameters, formulas to be used.
    - c. Copy of field checkout sheets and logs to be used, listing each piece of equipment to be tested, adjusted and balanced with the data cells to be gathered for each.
    - d. Identification and types of measurement instruments to be used and their most recent calibration date.
    - e. Discussion of what notations and markings will be made on the duct and piping drawings during the process.
    - f. Final test report forms to be used.
    - g. Detailed step-by-step procedures for TAB work for each system and issue, including:
      - 1) Terminal flow calibration (for each terminal type).
      - 2) Diffuser proportioning.
      - 3) Branch/submain proportioning.
      - 4) Total flow calculations.
      - 5) Rechecking.
      - 6) Diversity issues.
    - h. Expected problems and solutions, etc.
    - i. Details of how TOTAL flow will be determined; for example:

- 1) Air: Sum of terminal flows via control system calibrated readings or via hood readings of all terminals, supply (SA) and return air (RA) pitot traverse, SA or RA flow stations.
  - 2) Water: Pump curves, circuit setter, flow station, ultrasonic, etc.
  - j. Specific procedures that will ensure that both air and water side are operating at the lowest possible pressures and methods to verify this.
  - k. Confirmation of understanding of the outside air ventilation criteria under all conditions.
  - l. Method of verifying and setting minimum outside air flow rate will be verified and set and for what level (total building, zone, etc.).
  - m. Method of checking building static and exhaust fan and/or relief damper capacity.
  - n. Methods for making coil or other system plant capacity measurements, if specified.
  - o. Time schedule for TAB work to be done in phases (by floor, etc.).
  - p. Time schedule for deferred or seasonal TAB work, if specified.
  - q. False loading of systems to complete TAB work, if specified.
  - r. Exhaust fan balancing and capacity verifications, including any required room pressure differentials.
  - s. Procedures for field technician logs of discrepancies, deficient or uncompleted work by others, contract interpretation requests and lists of completed tests (scope and frequency).
  - t. Procedures for formal progress reports, including scope and frequency.
  - u. Procedures for formal deficiency reports, including scope, frequency and distribution.
- D. Field Quality-control Testing of Laboratory Fume Hoods:
1. Product Data sheets for all equipment proposed for use in on-site as-installed testing.
  2. Sample Test Report.
  3. List of laboratory fume hoods to be tested. Submit a minimum of one week prior to commencement of testing.
- E. Field Logs: Submit at least once a week to the Construction Manager.
- F. Control System Coordination Reports: Communicate in writing to the controls installer all setpoint and parameter changes made or problems and discrepancies identified during TAB that affect, or could affect, the control system setup and operation.
- G. Progress Reports.
- H. Final Report: Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.
1. Submit under provisions of Section 014000.
  2. Submit to the the Construction Manager and HVAC controls contractor within two weeks after completion of testing, adjusting, and balancing.
  3. Revise TAB plan to reflect actual procedures and submit as part of final report.
  4. Submit draft copies of report for review prior to final acceptance of Project. Provide final copies for Engineer/Architect and for inclusion in operating and maintenance manuals.
  5. Provide reports in electronic format, complete with index page and indexing tabs, with cover identification. Include set of reduced drawings with air outlets and equipment identified to correspond with data sheets, and indicating thermostat locations.
  6. Include actual instrument list, with manufacturer name, serial number, and date of calibration.
  7. Form of Test Reports: Where the TAB standard being followed recommends a report format use that; otherwise, follow ASHRAE Std 111.
  8. Units of Measure: Report data in I-P (inch-pound) units only.
  9. 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 Engineer/Architect.
- g. Project Engineer.
- h. Project Contractor.
- i. Report date.

- I. Project Record Documents: Record actual locations of balancing valves and rough setting.

## **PART 2 PRODUCTS - NOT USED**

## **PART 3 EXECUTION**

### **3.01 GENERAL REQUIREMENTS**

- A. Perform total system balance in accordance with one of the following:
  1. AABC (NSTSB), AABC National Standards for Total System Balance.
  2. ASHRAE Std 111, Practices for Measurement, Testing, Adjusting and Balancing of Building Heating, Ventilation, Air-Conditioning, and Refrigeration Systems.
  3. SMACNA (TAB).
- B. Begin work after completion of systems to be tested, adjusted, or balanced and complete work prior to Substantial Completion of the project.
- C. Where HVAC systems and/or components interface with life safety systems, including fire and smoke detection, alarm, and control, coordinate scheduling and testing and inspection procedures with the authorities having jurisdiction.
- D. TAB Agency Qualifications:
  1. Company specializing in the testing, adjusting, and balancing of systems specified in this section.
  2. Having minimum of three years documented experience.
  3. Certified by one of the following:
    - a. AABC, Associated Air Balance Council: [www.aabc.com/#sle](http://www.aabc.com/#sle); upon completion submit AABC National Performance Guaranty.
    - b. NEBB, National Environmental Balancing Bureau: [www.nebb.org/#sle](http://www.nebb.org/#sle).
    - c. TABB, The Testing, Adjusting, and Balancing Bureau of National Energy Management Institute: [www.tabbcertified.org/#sle](http://www.tabbcertified.org/#sle).
- E. TAB Supervisor and Technician Qualifications: Certified by same organization as TAB agency.

### **3.02 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.
  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. Fire and volume dampers are in place and open.
  8. Air coil fins are cleaned and combed.
  9. Access doors are closed and duct end caps are in place.
  10. Air outlets are installed and connected.
  11. Duct system leakage is minimized.
  12. Hydronic systems are flushed, filled, and vented.
  13. Pumps are rotating correctly.

14. Proper strainer baskets are clean and in place.
  15. Service and balance valves are open.
- B. Submit field reports. Report defects and deficiencies that will or could prevent proper system balance.
  - C. Beginning of work means acceptance of existing conditions.

### **3.03 PREPARATION**

- A. Hold a pre-balancing meeting at least one week prior to starting TAB work.
  1. Require attendance by all installers whose work will be tested, adjusted, or balanced.
- B. Provide instruments required for testing, adjusting, and balancing operations. Make instruments available to Engineer/Architect to facilitate spot checks during testing.
- C. Provide additional balancing devices as required.

### **3.04 ADJUSTMENT TOLERANCES**

- A. Air Handling Systems: Adjust to within plus or minus 5 percent of design for supply systems and plus or minus 5 percent of design for return and exhaust systems.
- B. Air Outlets and Inlets: Adjust total to within plus 5 percent and minus 5 percent of design to space. Adjust outlets and inlets in space to within plus or minus 10 percent of design.
- C. Hydronic Systems: Adjust to within plus or minus 5 percent of design.

### **3.05 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.
  3. Contract interpretation requests.
  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. Mark on drawings the locations where traverse and other critical measurements were taken and cross reference the location in the final report.
- E. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.
- F. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.

### **3.06 FUME HOOD TESTING (ON SITE)**

- A. General: Test fume hoods as installed to assess airflow velocity, airflow visualization, and level of containment. Perform tests with static mode (set sash position) and dynamic mode (sash movement effect) conditions. Conduct testing as outlined below for 100% of the hoods provided in the Project.
- B. Preparation: Visit the project site to confirm that construction activities related to the fume hood system(s) and equipment are complete. Review design documents and Contractor's submittals. Verify that mechanical ventilation systems serving the space are functioning and operating in the normal mode. Notify Owner in writing, if conditions exist which preclude proper fume hood testing. Starting of testing constitutes acceptance of site conditions.
- C. Testing Requirements:
  1. Perform the following tests, in order:
    - a. Airflow Velocity Test.
    - b. Airflow Visualization Test.



- c. Tracer Gas Containment Test.
2. If more than one test procedure is selected, proceed to the next test only if any unsafe condition discovered during current test has been successfully rectified.
3. Airflow Velocity Test: Comply with Section 9 of NEBB (FHT) Fume Hood Testing Standard - current edition.
4. Airflow Visualization Test: Comply with Section 10 of NEBB (FHT) Fume Hood Testing Standard - current edition.
5. Tracer Gas Containment Test:
  - a. Comply with Section 11 of NEBB Fume Hood Testing Standard - current edition.
6. Reporting Requirements: Comply with Section 5 of NEBB (FHT) Fume Hood Testing Standard - current edition. Organize and include, at a minimum, the following information:
  - a. Report Title.
  - b. Report Certification.
  - c. Table of Contents.
  - d. Report Summary/ Remarks.
  - e. Appropriate Forms.
  - f. Instrument Calibration.
  - g. List of Abbreviations Used.
  - h. A room layout drawing for each tested item. Identify: walls; doors; fume hood(s); other present environmental enclosures (e.g. biological safety cabinet(s), laminar flow hood(s), canopy hood(s), etc.); location and airflow pattern of all air supply, return, and exhaust grilles, registers and diffusers.

### 3.07 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.
- G. Provide system schematic with required and actual air quantities recorded at each outlet or inlet.
- H. Measure static air pressure conditions on air supply units, including filter and coil pressure drops, and total pressure across the fan. Make allowances for 50 percent loading of filters.
- I. Adjust outside air automatic dampers, outside air, return air, and exhaust dampers for design conditions.
- J. Measure temperature conditions across outside air, return air, and exhaust dampers to check leakage.
- K. Where modulating dampers are provided, take measurements and balance at extreme conditions. Balance variable volume systems at maximum air flow rate, full cooling, and at minimum air flow rate, full heating.
- L. For variable air volume system powered units set volume controller to air flow setting indicated. Confirm connections properly made and confirm proper operation for automatic variable air volume temperature control.

**3.08 SCOPE**

- A. Test, adjust, and balance the following:
  - 1. Plumbing Pumps.
  - 2. Air Cooled Refrigerant Condensers.
  - 3. Packaged Roof Top Heating/Cooling Units.
  - 4. Air Coils.
  - 5. Air Handling Units.
  - 6. Fans.
  - 7. Air Terminal Units.
  - 8. Air Inlets and Outlets.

**3.09 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.
  - 6. Service factor.
  - 7. Starter size, rating, heater elements.
  - 8. Sheave Make/Size/Bore.
- B. V-Belt Drives:
  - 1. Identification/location.
  - 2. Required driven RPM.
  - 3. Driven sheave, diameter and RPM.
  - 4. Belt, size and quantity.
  - 5. Motor sheave diameter and RPM.
  - 6. Center to center distance, maximum, minimum, and actual.
- C. Pumps:
  - 1. Identification/number.
  - 2. Manufacturer.
  - 3. Size/model.
  - 4. Impeller.
  - 5. Service.
  - 6. Design flow rate, pressure drop, BHP.
  - 7. Actual flow rate, pressure drop, BHP.
  - 8. Discharge pressure.
  - 9. Suction pressure.
  - 10. Total operating head pressure.
  - 11. Shut off, discharge and suction pressures.
  - 12. Shut off, total head pressure.
- D. Air Cooled Condensers:
  - 1. Identification/number.
  - 2. Location.
  - 3. Manufacturer.
  - 4. Model number.
  - 5. Serial number.
  - 6. Entering DB air temperature, design and actual.
  - 7. Leaving DB air temperature, design and actual.
  - 8. Number of compressors.

- E. Cooling Coils:
  - 1. Identification/number.
  - 2. Location.
  - 3. Service.
  - 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. Water flow, design and actual.
  - 11. Water pressure drop, design and actual.
  - 12. Entering water temperature, design and actual.
  - 13. Leaving water temperature, design and actual.
  - 14. Air pressure drop, design and actual.
- F. Heating Coils:
  - 1. Identification/number.
  - 2. Location.
  - 3. Service.
  - 4. Manufacturer.
  - 5. Air flow, design and actual.
  - 6. Water flow, design and actual.
  - 7. Water pressure drop, design and actual.
  - 8. Entering water temperature, design and actual.
  - 9. Leaving water temperature, design and actual.
  - 10. Entering air temperature, design and actual.
  - 11. Leaving air temperature, design and actual.
  - 12. Air pressure drop, design and actual.
- G. 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.
  - 12. Sheave Make/Size/Bore.
  - 13. Number of Belts/Make/Size.
  - 14. Fan RPM.
- H. 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.
  8. Return air temperature.
  9. Outside air temperature.
  10. Required air temperature
  11. Actual air temperature
- I. Exhaust Fans:
1. Location.
  2. Manufacturer.
  3. Model number.
  4. Serial number.
  5. Air flow, specified and actual.
  6. Total static pressure (total external), specified and actual.
  7. Inlet pressure.
  8. Discharge pressure.
  9. Sheave Make/Size/Bore.
  10. Number of Belts/Make/Size.
  11. Fan RPM.
- J. Duct Traverses:
1. System zone/branch.
  2. Duct size.
  3. Area.
  4. Design velocity.
  5. Design air flow.
  6. Test velocity.
  7. Test air flow.
  8. Duct static pressure.
  9. Air temperature.
  10. Air correction factor.
- K. Terminal Unit Data:
1. Manufacturer.
  2. Type, constant, variable, single, dual duct.
  3. Identification/number.
  4. Location.
  5. Model number.
  6. Size.
  7. Minimum static pressure.
  8. Minimum design air flow.
  9. Maximum design air flow.
  10. Maximum actual air flow.
  11. Inlet static pressure.
- L. Air Distribution Tests:
1. Air terminal number.
  2. Room number/location.
  3. Terminal type.
  4. Terminal size.
  5. Design air flow.
  6. Test (final) air flow.
  7. Percent of design air flow.

**END OF SECTION**

**SECTION 230713  
DUCT INSULATION****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Duct insulation.
- B. Duct liner.
- C. Insulation jackets.

**1.02 REFERENCE STANDARDS**

- A. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2021.
- B. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications; 2013 (Reapproved 2019).
- C. ASTM C916 - Standard Specification for Adhesives for Duct Thermal Insulation; 2020.
- D. ASTM C1071 - Standard Specification for Fibrous Glass Duct Lining Insulation (Thermal and Sound Absorbing Material); 2019.
- E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023.
- F. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2022a, with Editorial Revision (2023).
- G. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015, with Editorial Revision (2021).
- H. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2005 (Revised 2009).
- I. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

**1.03 SUBMITTALS**

- A. See Section 013000 - 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.

**1.04 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section with not less than three years of experience.
- B. Applicator Qualifications: Company specializing in performing the type of work specified in this section, with minimum three years of experience.

**1.05 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.

**1.06 FIELD CONDITIONS**

- A. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.

- B. Maintain temperature during and after installation for minimum period of 24 hours.

## **PART 2 PRODUCTS**

### **2.01 REGULATORY REQUIREMENTS**

- A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or ASTM E84.

### **2.02 GLASS FIBER, FLEXIBLE**

- A. Manufacturer:
1. Knauf Insulation: [www.knaufinsulation.com](http://www.knaufinsulation.com).
  2. Johns Manville: [www.jm.com](http://www.jm.com).
  3. Owens Corning Corporation: [www.ocbuildingspec.com](http://www.ocbuildingspec.com).
  4. CertainTeed Corporation: [www.certainteed.com](http://www.certainteed.com).
  5. Substitutions: See Section 016000 - Product Requirements.
- 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.
  2. Maximum Service Temperature: 250 degrees F (121 degrees C).
  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.
- D. Vapor Barrier Tape:
1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive rubber based adhesive.
- E. Tie Wire: Annealed steel, 16 gage, 0.0508 inch diameter (1.29 mm diameter).

### **2.03 JACKETS**

- A. 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:
    - a. Compatible with insulation.

### **2.04 DUCT LINER**

- A. Manufacturers:
1. Knauf Insulation: [www.knaufinsulation.com](http://www.knaufinsulation.com).
  2. Johns Manville: [www.jm.com](http://www.jm.com).
  3. Owens Corning Corporation: [www.ocbuildingspec.com/#sle](http://www.ocbuildingspec.com/#sle).
  4. CertainTeed Corporation: [www.certainteed.com](http://www.certainteed.com).
  5. Substitutions: See Section 016000 - Product Requirements.
- B. Note: Choose the liner type - Elastomeric Foam or Glass Fiber.
- C. Insulation: Non-corrosive, incombustible glass fiber complying with ASTM C1071; rigid 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.

- D. Adhesive: Waterproof, fire-retardant type, ASTM C916.
- E. Liner Fasteners: Galvanized steel, self-adhesive pad with integral head.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify that ducts have been tested before applying insulation materials.
- B. Verify that surfaces are clean, foreign material removed, and dry.

#### **3.02 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Install in accordance with NAIMA National Insulation Standards.
- C. 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.
- D. Insulated ducts conveying air above ambient temperature:
  - 1. Provide with or without standard vapor barrier jacket.
  - 2. Insulate fittings and joints. Where service access is required, bevel and seal ends of insulation.
- E. Ducts Exposed in Mechanical Equipment Rooms or Finished Spaces (below 10 feet above finished floor) ((below 3 meters above finished floor)): Finish with canvas jacket sized for finish painting.
- F. External Duct Insulation Application:
  - 1. Secure insulation with vapor barrier with wires and seal jacket joints with vapor barrier adhesive or tape to match jacket.
  - 2. Secure insulation without vapor barrier with staples, tape, or wires.
  - 3. Install without sag on underside of duct. Use adhesive or mechanical fasteners where necessary to prevent sagging. Lift duct off trapeze hangers and insert spacers.
  - 4. Seal vapor barrier penetrations by mechanical fasteners with vapor barrier adhesive.
  - 5. Stop and point insulation around access doors and damper operators to allow operation without disturbing wrapping.
- G. Duct and Plenum Liner Application:
  - 1. Adhere insulation with adhesive for 100 percent coverage.
  - 2. Secure insulation with mechanical liner fasteners. Refer to SMACNA (DCS) for spacing.
  - 3. Seal and smooth joints. Seal and coat transverse joints.
  - 4. Seal liner surface penetrations with adhesive.
  - 5. Duct dimensions indicated are net inside dimensions required for air flow. Increase duct size to allow for insulation thickness.

**END OF SECTION**





**SECTION 232300  
REFRIGERANT PIPING****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Piping.
- B. Refrigerant.
- C. Moisture and liquid indicators.
- D. Valves.
- E. Strainers.
- F. Filter-driers.

**1.02 REFERENCE STANDARDS**

- A. ASHRAE Std 15 - Safety Standard for Refrigeration Systems; 2022, with Errata (2023).
- B. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; 2021.
- C. ASME B31.5 - Refrigeration Piping and Heat Transfer Components; 2022.
- D. ASME B31.9 - Building Services Piping; 2020.
- E. ASTM B280 - Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service; 2023.
- F. AWS A5.8M/A5.8 - Specification for Filler Metals for Brazing and Braze Welding; 2019.
- G. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2018, with Amendment (2019).
- H. UL 429 - Electrically Operated Valves; Current Edition, Including All Revisions.

**1.03 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. Use line size on leaving side of liquid solenoid valves.
- D. Strainers:
  - 1. Use line size strainer upstream of each automatic valve.
- E. Filter-Driers:
  - 1. Use a filter-drier immediately ahead of liquid-line controls, such as thermostatic expansion valves, solenoid valves, and moisture indicators.
  - 2. Use replaceable core filter-driers in lines of 1/2 inch (13 mm) outside diameter or greater.
  - 3. Use filter-driers for each solenoid valve.
- F. Solenoid Valves:
  - 1. Use in liquid line of systems operating with single pump-out or pump-down compressor control.

**1.04 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.

- B. Product Data: Provide general assembly of specialties, including manufacturers catalogue information. Provide manufacturers catalog data including load capacity.
- C. Project Record Documents: Record exact locations of equipment and refrigeration accessories on record drawings.

### **1.05 QUALITY ASSURANCE**

- A. Installer Qualifications: Company specializing in performing the type of work specified in this section, with minimum three years of experience.

### **1.06 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**

### **2.01 REGULATORY REQUIREMENTS**

- A. Comply with ASME B31.9 for installation of piping system.
- B. Products Requiring Electrical Connection: Listed and classified by UL, as suitable for the purpose indicated.
- C. Copper Tube: ASTM B280, H58 hard drawn or O60 soft annealed.
  - 1. Fittings: ASME B16.22 wrought copper.
  - 2. Joints: Braze, AWS A5.8M/A5.8 BCuP silver/phosphorus/copper alloy.
- D. Copper Tube to 7/8 inch (22 mm) OD: ASTM B88 (ASTM B88M), Type K (A), annealed.
- E. 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. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
  - 4. Wall Support for Pipe Sizes to 3 Inches (75 mm): Cast iron hook.
  - 5. Vertical Support: Steel riser clamp.
  - 6. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
  - 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.

### **2.02 MOISTURE AND LIQUID INDICATORS**

- A. Manufacturers:
  - 1. Henry Technologies: [www.henrytech.com/#sle](http://www.henrytech.com/#sle).
  - 2. Parker Hannifin/Refrigeration and Air Conditioning: [www.parker.com/#sle](http://www.parker.com/#sle).
  - 3. Sporlan, a Division of Parker Hannifin: [www.parker.com/#sle](http://www.parker.com/#sle).
  - 4. Substitutions: See Section 016000 - Product Requirements.
- 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).

### 2.03 VALVES

- A. Manufacturers:
  - 1. Hansen Technologies Corporation: [www.hantech.com/#sle](http://www.hantech.com/#sle).
  - 2. Henry Technologies: [www.henrytech.com/#sle](http://www.henrytech.com/#sle).
  - 3. Flomatic Valves: [www.flomatic.com/#sle](http://www.flomatic.com/#sle).
  - 4. Substitutions: See Section 016000 - Product Requirements.
- B. Diaphragm Packless Valves:
  - 1. UL listed, globe or angle pattern, forged brass body and bonnet, phosphor bronze and stainless steel diaphragms, 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).

### 2.04 STRAINERS

- A. Manufacturers:
  - 1. Hansen Technologies Corporation: [www.hantech.com/#sle](http://www.hantech.com/#sle).
  - 2. Parker Hannifin/Refrigeration and Air Conditioning: [www.parker.com/#sle](http://www.parker.com/#sle).
  - 3. Sporlan, a Division of Parker Hannifin: [www.parker.com/#sle](http://www.parker.com/#sle).
  - 4. Substitutions: See Section 016000 - Product Requirements.
- B. Straight Line or Angle Line Type:

### 2.05 CHECK VALVES

- A. Manufacturers:
  - 1. Hansen Technologies Corporation: [www.hantech.com/#sle](http://www.hantech.com/#sle).
  - 2. Parker Hannifin/Refrigeration and Air Conditioning: [www.parker.com/#sle](http://www.parker.com/#sle).
  - 3. Sporlan, a Division of Parker Hannifin: [www.parker.com/#sle](http://www.parker.com/#sle).
  - 4. Substitutions: See Section 016000 - Product Requirements.
- B. Globe Type:
  - 1. Cast bronze or forged brass body, forged brass cap with neoprene seal, brass guide and disc holder, phosphor-bronze or stainless steel spring, teflon seat disc; for maximum temperature of 300 degrees F (149 degrees C) and maximum working pressure of 425 psi (2930 kPa).
- C. Straight Through Type:
  - 1. Brass body and disc, phosphor-bronze or stainless steel spring, neoprene seat; for maximum working pressure of 500 psi (3450 kPa) and maximum temperature of 200 degrees F (93 degrees C).

**2.06 FILTER-DRIERS**

- A. Manufacturers:
  - 1. Flow Controls Division of Emerson Electric: [www.emersonflowcontrols.com/#sle](http://www.emersonflowcontrols.com/#sle).
  - 2. Parker Hannifin/Refrigeration and Air Conditioning: [www.parker.com/#sle](http://www.parker.com/#sle).
  - 3. Sporlan, a Division of Parker Hannifin: [www.parker.com/#sle](http://www.parker.com/#sle).
  - 4. Substitutions: See Section 016000 - Product Requirements.
  - 5. Replaceable Core Type: Steel shell with removable cap.
  - 6. Sealed Type: Copper shell.

**2.07 SOLENOID VALVES**

- A. Manufacturers:
  - 1. Flow Controls Division of Emerson Electric: [www.emersonflowcontrols.com/#sle](http://www.emersonflowcontrols.com/#sle).
  - 2. Parker Hannifin/Refrigeration and Air Conditioning: [www.parker.com/#sle](http://www.parker.com/#sle).
  - 3. Sporlan, a Division of Parker Hannifin: [www.parker.com/#sle](http://www.parker.com/#sle).
  - 4. Substitutions: See Section 016000 - Product Requirements.
- B. Valve: AHRI 760 I-P, pilot operated, copper, brass or steel body and internal parts, synthetic seat, stainless steel stem and plunger assembly (permitting manual operation in case of coil failure), integral strainer, with flared, solder, or threaded ends; for maximum working pressure of 500 psi (3450 kPa).
- C. Coil Assembly: UL 429 UL listed, replaceable with molded electromagnetic coil, moisture and fungus proof, with surge protector and color coded lead wires, integral junction box with pilot light.

**2.08 EXPANSION VALVES**

- A. Manufacturers:
  - 1. Flow Controls Division of Emerson Electric: [www.emersonflowcontrols.com/#sle](http://www.emersonflowcontrols.com/#sle).
  - 2. Parker Hannifin/Refrigeration and Air Conditioning: [www.parker.com/#sle](http://www.parker.com/#sle).
  - 3. Sporlan, a Division of Parker Hannifin: [www.parker.com/#sle](http://www.parker.com/#sle).
  - 4. Substitutions: See Section 016000 - Product Requirements.
- 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****3.01 PREPARATION**

- A. Ream pipe and tube ends. Remove burrs.
- B. Remove scale and dirt on inside and outside before assembly.
- C. Prepare piping connections to equipment with flanges or unions.

**3.02 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. Group piping whenever practical at common elevations and locations. Slope piping one percent in direction of oil return.

- E. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- 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 inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut recessed into and grouted flush with slab.
- G. Pipe Hangers and Supports:
  - 1. Install in accordance with ASME B31.5.
  - 2. Support horizontal piping as indicated.
  - 3. Install hangers to provide minimum 1/2 inch (13 mm) space between finished covering and adjacent work.
  - 4. Place hangers within 12 inches (300 mm) of each horizontal elbow.
  - 5. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
  - 6. Provide copper plated hangers and supports for copper piping.
- H. Arrange piping to return oil to compressor. Provide traps and loops in piping, and provide double risers as required. Slope horizontal piping 0.40 percent in direction of flow.
- I. Provide clearance for installation of insulation and access to valves and fittings.
- J. Provide access to concealed valves and fittings. Coordinate size and location of access doors with Section 08 3100.
- K. Flood piping system with nitrogen when brazing.
- L. Where pipe support members are welded to structural building frame, brush clean, and apply one coat of zinc rich primer to welding.
- M. Insulate piping and equipment; refer to Section and Section 230716.
- N. Follow ASHRAE Std 15 procedures for charging and purging of systems and for disposal of refrigerant.
- O. Provide replaceable cartridge filter-driers, with isolation valves and valved bypass.
- P. Locate expansion valve sensing bulb immediately downstream of evaporator on suction line.
- Q. Fully charge completed system with refrigerant after testing.

### 3.03 FIELD QUALITY CONTROL

- A. See Section 014000 - 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.

### 3.04 SCHEDULES

- A. Hanger Spacing for Copper Tubing.
  - 1. 1/2 inch (13 mm), 5/8 inch (16 mm), and 7/8 inch (22 mm) OD: Maximum span, 5 feet (1500 mm); minimum rod size, 1/4 inch (6.3 mm).
  - 2. 1-1/8 inch (29 mm) OD: Maximum span, 6 feet (1800 mm); minimum rod size, 1/4 inch (6.3 mm).
  - 3. 1-3/8 inch (35 mm) OD: Maximum span, 7 feet (2100 mm); minimum rod size, 3/8 inch (9.5 mm).
  - 4. 1-5/8 inch (41 mm) OD: Maximum span, 8 feet (2400 mm); minimum rod size, 3/8 inch (9.5 mm).

5. 2-1/8 inch (54 mm) OD: Maximum span, 8 feet (2400 mm); minimum rod size, 3/8 inch (9.5 mm).
6. 2-5/8 inch (67 mm) OD: Maximum span, 9 feet (2700 mm); minimum rod size, 3/8 inch (9.5 mm).

**END OF SECTION**

**SECTION 233100  
HVAC DUCTS AND CASINGS****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Metal ductwork.
- B. Nonmetal ductwork.

**1.02 REFERENCE STANDARDS**

- A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- B. ASTM A480/A480M - Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip; 2023b.
- C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2019a.
- D. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable; 2023.
- E. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2023.
- F. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
- G. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric); 2014.
- H. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023.
- I. ICC-ES AC193 - Acceptance Criteria for Mechanical Anchors in Concrete Elements; 2017, with Editorial Revision (2020).
- J. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2024.
- K. NFPA 96 - Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations; 2024.
- L. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2005 (Revised 2009).
- M. SMACNA (KVS) - Kitchen Ventilation Systems and Food Service Equipment Fabrication and Installation Guidelines; 2001.

**1.03 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data for duct materials and duct liner.
- C. Shop Drawings: Indicate duct fittings, particulars such as gages, sizes, welds, and configuration prior to start of work for all duct systems.
- D. Project Record Documents: Record actual locations of ducts and duct fittings. Record changes in fitting location and type. Show additional fittings used.

**1.04 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.

- B. Installer Qualifications: Company specializing in performing the type of work specified in this section, with minimum 3 years of documented experience.

### 1.05 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

### 2.01 DUCT ASSEMBLIES

- A. Regulatory Requirements: Construct ductwork to comply with NFPA 90A standards.
- B. Ducts: Galvanized steel (bright or paint grip as indicated), unless otherwise indicated.
- C. Low Pressure Supply (System with Cooling Coils): 2 inch w.g. (500 Pa) pressure class, galvanized steel.
- D. Medium and High Pressure Supply: 6 inch w.g. (\_\_\_ Pa) pressure class, galvanized steel.
- E. Return and Relief: 2 inch w.g. (\_\_\_ Pa) pressure class, galvanized steel.
- F. General Exhaust: 2 inch w.g. (\_\_\_ Pa) pressure class, galvanized steel.
- G. Dryer Exhaust: 2 inch w.g. (500 Pa) pressure class, aluminum.
  - 1. Construct of 16 gage, 0.0598 inch (1.52 mm) sheet steel using continuous external welded joints in rectangular sections.
- H. Fume Hood Exhaust: 2 inch w.g. (500 Pa) pressure class, CPVC.
- I. Outside Air Intake: 2 inch w.g. (\_\_\_ Pa) pressure class, galvanized steel.
- J. Combustion Air: 1/2 inch w.g. (125 Pa) pressure class, galvanized steel.

### 2.02 MATERIALS

- A. Galvanized Steel for Ducts: Hot-dipped galvanized steel sheet, ASTM A653/A653M FS Type B, with G60/Z180 coating.
- B. Aluminum for Ducts: ASTM B209 (ASTM B209M); aluminum sheet, alloy 3003-H14. Aluminum Connectors and Bar Stock: Alloy 6061-T651 or of equivalent strength.
- C. 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. Surface Burning Characteristics: Flame spread index of zero and smoke developed index of zero, when tested in accordance with ASTM E84.
  - 3. For Use With Flexible Ducts: UL labeled.
  - 4. Manufacturers:
    - a. Carlisle HVAC Products; Hardcast Iron-Grip 601 Water Based Duct Sealant: [www.carlislehvac.com/#sle](http://www.carlislehvac.com/#sle).
    - b. Substitutions: See Section 016000 - Product Requirements.
- D. Hanger Rod: ASTM A36/A36M; steel, galvanized; threaded both ends, threaded one end, or continuously threaded.
- E. Hanger Fasteners: Attach hangers to structure using appropriate fasteners, as follows:
  - 1. Concrete Wedge Expansion Anchors: Complying with ICC-ES AC193.
  - 2. Masonry Wedge Expansion Anchors: Complying with ICC-ES AC01.
  - 3. Concrete Screw Type Anchors: Complying with ICC-ES AC193.
  - 4. Masonry Screw Type Anchors: Complying with ICC-ES AC106.
  - 5. Concrete Adhesive Type Anchors: Complying with ICC-ES AC308.



6. Other Types: As required.
7. Manufacturers:
  - a. Powers Fasteners, Inc: [www.powers.com/#sle](http://www.powers.com/#sle).
  - b. Substitutions: See Section 016000 - Product Requirements.

### 2.03 DUCTWORK FABRICATION

- A. Fabricate and support in accordance with SMACNA (DCS) and as indicated.
- B. No variation of duct configuration or size permitted except by written permission. Size round duct installed in place of rectangular ducts in accordance with ASHRAE (FUND) Handbook - Fundamentals.
- C. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.
- D. Construct T's, bends, and elbows with radius of not less than 1-1/2 times width of duct on centerline. Where not possible and where rectangular elbows must be used, provide air foil turning vanes of perforated metal with glass fiber insulation.
- E. Provide turning vanes of perforated metal with glass fiber insulation when acoustical lining is indicated.
- F. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.
- G. Fabricate continuously welded round and oval duct fittings in accordance with SMACNA (DCS).

### 2.04 MANUFACTURED DUCTWORK AND FITTINGS

- A. Flat Oval Ducts: Machine made from round spiral lockseam duct.
  1. Manufacture in accordance with SMACNA (DCS).
  2. Fittings: Manufacture at least two gages heavier metal than duct.
  3. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.
- B. Double Wall Insulated Flat Oval Ducts: Machine made from round spiral lockseam duct.
  1. Manufacture in accordance with SMACNA (DCS).
  2. Fittings: Manufacture with solid inner wall.
  3. Inner wall: Perforated galvanized steel.
- C. Double Wall Insulated Round Ducts: Round spiral lockseam duct with galvanized steel outer wall, perforated galvanized steel inner wall; fitting with perforated inner wall.
  1. Manufacture in accordance with SMACNA (DCS).
  2. Insulation:
    - a. Thickness: 1 inch (25 mm).
    - b. Material: Fiberglass.
- D. Spiral Ducts: Round spiral lockseam duct with galvanized steel outer wall.
  1. Manufacture in accordance with SMACNA (DCS).
- E. Round Ducts: Round lockseam duct with galvanized steel outer wall.
  1. Manufacture in accordance with SMACNA (DCS).
- F. Flexible Ducts: Two ply vinyl film supported by helically wound spring steel wire.
  1. Insulation: Fiberglass insulation with aluminized vapor barrier film.
  2. Pressure Rating: 2 inches WG (\_\_\_ kPa) positive and 2 inches WG (\_\_\_ Pa) negative.
  3. Maximum Velocity: 4000 fpm (20.3 m/sec).
  4. Temperature Range: Minus 10 degrees F to 160 degrees F (Minus 23 degrees C to 71 degrees C).
  5. Manufacturers:
    - a. Hart & Cooley, Inc: [www.hartandcooley.com/#sle](http://www.hartandcooley.com/#sle).
    - b. Substitutions: See Section 016000 - Product Requirements.

## **PART 3 EXECUTION**

### **3.01 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. Flexible Ducts: Connect to metal ducts with adhesive, draw bands, and tape.
- E. Duct sizes indicated are inside clear dimensions. For lined ducts, maintain sizes inside lining.
- F. 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.
- G. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.
- H. 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.
- I. Use double nuts and lock washers on threaded rod supports.
- J. 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.
- K. Connect diffusers to low pressure ducts directly or with 6 feet maximum length of flexible duct held in place with strap or clamp.
- L. At exterior wall louvers, seal duct to louver frame.

### **3.02 CLEANING**

**END OF SECTION**

**SECTION 233300  
AIR DUCT ACCESSORIES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Air turning devices/extractors.
- B. Combination fire and smoke dampers.
- C. Duct access doors.
- D. Duct test holes.
- E. Flexible duct connections.
- F. Volume control dampers.
- G. Miscellaneous products:
  - 1. Internal strut end plugs.
  - 2. Duct opening closure film.

**1.02 REFERENCE STANDARDS**

- A. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2024.
- B. NFPA 96 - Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations; 2024.
- C. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2005 (Revised 2009).

**1.03 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide for shop fabricated assemblies including volume control dampers, duct access doors, duct test holes, and hardware used. Include electrical characteristics and connection requirements.
- C. Shop Drawings: Indicate for shop fabricated assemblies including volume control dampers, duct access doors, and duct test holes.
- D. Manufacturer's Installation Instructions: Provide instructions for fire dampers and combination fire and smoke dampers.
- E. Project Record Drawings: Record actual locations of access doors and test holes.

**1.04 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of experience.
- B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

**1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Protect dampers from damage to operating linkages and blades.

**PART 2 PRODUCTS**

**2.01 AIR TURNING DEVICES/EXTRACTORS**

- A. Manufacturers:
  - 1. Carlisle HVAC Products: [www.carlislehvac.com/#sle](http://www.carlislehvac.com/#sle).
  - 2. Elgen Manufacturing: [www.elgenmfg.com](http://www.elgenmfg.com).
  - 3. Krueger: [www.krueger-hvac.com](http://www.krueger-hvac.com).
  - 4. Ruskin Company: [www.ruskin.com](http://www.ruskin.com).

5. Titus: [www.titus-hvac.com](http://www.titus-hvac.com).
  6. Ward Industries by Commercial Products Group of Hart & Cooley, Inc: [www.wardind.com](http://www.wardind.com).
  7. Substitutions: See Section 016000 - Product Requirements.
- B. Multi-blade device with blades aligned in short dimension; steel construction; with individually adjustable blades, mounting straps.

## 2.02 DUCT ACCESS DOORS

- A. Manufacturers:
1. Acudor Products Inc: [www.acudor.com](http://www.acudor.com).
  2. Elgen Manufacturing: [www.elgenmfg.com](http://www.elgenmfg.com).
  3. Nailor Industries Inc: [www.nailor.com](http://www.nailor.com).
  4. Ruskin Company: [www.ruskin.com](http://www.ruskin.com).
  5. SEMCO Incorporated: [www.semcohvac.com](http://www.semcohvac.com).
  6. Ward Industries by Commercial Products Group of Hart & Cooley, Inc: [www.wardind.com](http://www.wardind.com).
  7. Substitutions: See Section 016000 - Product Requirements.
- B. Fabrication: Rigid and close-fitting of galvanized steel with sealing gaskets and quick fastening locking devices. For insulated ducts, install minimum 1 inch (25 mm) thick insulation with sheet metal cover.
1. Less Than 12 inches (300 mm) Square: Secure with sash locks.
  2. Up to 18 inches (450 mm) Square: Provide two hinges and two sash locks.
  3. Up to 24 by 48 inches (600 by 1200 mm): Three hinges and two compression latches with outside and inside handles.
  4. Larger Sizes: Provide an additional hinge.
- C. Access doors with sheet metal screw fasteners are not acceptable.

## 2.03 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.
- B. Permanent Test Holes: Factory fabricated, air tight flanged fittings with screw cap. Provide extended neck fittings to clear insulation.
1. Manufacturers:
  2. Carlisle HVAC Products: [www.carlislehvac.com/#sle](http://www.carlislehvac.com/#sle).

## 2.04 FLEXIBLE DUCT CONNECTIONS

- A. Manufacturers:
1. Carlisle HVAC Products: [www.carlislehvac.com/#sle](http://www.carlislehvac.com/#sle).
  2. Elgen Manufacturing: [www.elgenmfg.com/#sle](http://www.elgenmfg.com/#sle).
  3. Substitutions: See Section 016000 - Product Requirements.
- B. Fabricate in accordance with SMACNA (DCS) and as indicated.
- C. 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).
    - a. Net Fabric Width: Approximately 3 inches (75 mm) wide.
  2. Metal: 3 inches (75 mm) wide, 24 gage, 0.0239 inch (0.61 mm) thick galvanized steel.
- D. Leaded Vinyl Sheet: Minimum 0.55 inch (14 mm) thick, 0.87 lbs per sq ft (4.2 kg/sq m), 10 dB attenuation in 10 to 10,000 Hz range.
- E. Maximum Installed Length: 14 inch (356 mm).

## 2.05 VOLUME CONTROL DAMPERS

- A. Manufacturers:
1. Louvers & Dampers, Inc: [www.louvers-dampers.com/#sle](http://www.louvers-dampers.com/#sle).

2. Nailor Industries Inc: [www.nailor.com/#sle](http://www.nailor.com/#sle).
  3. Ruskin Company: [www.ruskin.com/#sle](http://www.ruskin.com/#sle).
  4. Greenheck.
  5. Substitutions: See Section 016000 - Product Requirements.
- B. Fabricate in accordance with SMACNA (DCS) and as indicated.
- C. 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.
1. Blade: 18 gage, 0.0478 inch (1.21 mm), minimum.
- D. End Bearings: Except in round ducts 12 inches (300 mm) and smaller, provide end bearings. On multiple blade dampers, provide oil-impregnated nylon, thermoplastic elastomer, or sintered bronze bearings.
1. Manufacturers:
    - a. Carlisle HVAC Products: [www.carlislehvac.com/#sle](http://www.carlislehvac.com/#sle).
    - b. Elgen Manufacturing Company, Inc; Snap-in Bushing: [www.elgenmfg.com/#sle](http://www.elgenmfg.com/#sle).
    - c. Substitutions: See Section 016000 - Product Requirements.
- E. 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.
  3. Where rod lengths exceed 30 inches (750 mm) provide regulator at both ends.
  4. Manufacturers:
    - a. Carlisle HVAC Products: [www.carlislehvac.com/#sle](http://www.carlislehvac.com/#sle).
    - b. Substitutions: See Section 016000 - Product Requirements.

## 2.06 MISCELLANEOUS PRODUCTS

- A. Internal Strut End Plugs: Combination end-mounting and sealing plugs for metal conduit used as internal reinforcement struts for metal ducts; plug crimped inside conduit with outside gasketed washer seal.
1. Manufacturers:
    - a. Carlisle HVAC Products: [www.carlislehvac.com/#sle](http://www.carlislehvac.com/#sle).
    - b. Substitutions: See Section 016000 - Product Requirements.
- B. Duct Opening Closure Film: Mold-resistant, self-adhesive film to keep debris out of ducts during construction.
1. Thickness: 2 mils (0.6 mm).
  2. High tack water based adhesive.
  3. UV stable light blue color.
  4. Elongation Before Break: 325 percent, minimum.
  5. Manufacturers:
    - a. Carlisle HVAC Products: [www.carlislehvac.com/#sle](http://www.carlislehvac.com/#sle).
    - b. Substitutions: See Section 016000 - Product Requirements.

## PART 3 EXECUTION

### 3.01 PREPARATION

- A. Verify that electric power is available and of the correct characteristics.

### 3.02 INSTALLATION

- A. Install accessories in accordance with manufacturer's instructions, NFPA 90A, and follow SMACNA (DCS). Refer to Section 233100 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 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. At fans and motorized equipment associated with ducts, provide flexible duct connections immediately adjacent to the equipment.
- F. At equipment supported by vibration isolators, provide flexible duct connections immediately adjacent to the equipment.
- G. 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 3 duct widths from duct take-off.
- H. 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**

**SECTION 233423  
HVAC POWER VENTILATORS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Roof exhausters.
- B. Ceiling exhaust fans.

**1.02 REFERENCE STANDARDS**

- A. AMCA 99 - Standards Handbook; 2016.
- B. AMCA 204 - Balance Quality and Vibration Levels for Fans; 2020.
- C. AMCA 210 - Laboratory Methods of Testing Fans for Certified Aerodynamic Performance Rating; 2016.
- D. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2020.
- E. NFPA 96 - Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations; 2024.
- F. UL 705 - Power Ventilators; Current Edition, Including All Revisions.
- G. UL 762 - Outline of Investigation for Power Roof Ventilators for Restaurant Exhaust Appliances; Current Edition, Including All Revisions.

**1.03 ADMINISTRATIVE REQUIREMENTS**

- A. Sequencing: Ensure that utility connections are achieved in an orderly and expeditious manner.

**1.04 SUBMITTALS**

- A. See Section 013000 - 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.

**1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

**1.06 FIELD CONDITIONS**

- A. Permanent ventilators may not be used for ventilation during construction.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

- A. Greenheck: [www.greenheck.com](http://www.greenheck.com).
- B. Loren Cook Company: [www.lorencook.com](http://www.lorencook.com).
- C. PennBarry: [www.pennbarry.com](http://www.pennbarry.com).

**2.02 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. Fabrication: Comply with AMCA 99.
- D. UL Compliance: UL listed and labeled, designed, manufactured, and tested in accordance with UL 705.
- E. Electrical Components: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.
- F. Enclosed Safety Switches: Comply with NEMA 250.

### **2.03 ROOF EXHAUSTERS**

- A. Roof Curb: 12 inch (300 mm) high self-flashing of galvanized steel with continuously welded seams, built-in cant strips.
- B. Disconnect Switch: Factory wired, non-fusible, in housing for thermal overload protected motor .
- C. 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.
- D. 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.

## **PART 3 EXECUTION**

### **3.01 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**



**SECTION 238126.13**  
**SMALL-CAPACITY SPLIT-SYSTEM AIR CONDITIONERS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Air cooled condensing units.
- B. Indoor air handler (fan & coil) units for duct connection.
- C. Controls.

**1.02 REFERENCE STANDARDS**

- A. AHRI 210/240 - Performance Rating of Unitary Air-Conditioning and Air-Source Heat Pump Equipment; 2023.
- B. AHRI 520 - Performance Rating of Positive Displacement Condensing Units; 2004.
- C. ASHRAE Std 15 - Safety Standard for Refrigeration Systems; 2022, with Errata (2023).
- D. ASHRAE Std 23.1 - Methods for Performance Testing Positive Displacement Refrigerant Compressors and Condensing Units that Operate at Subcritical Pressures of the Refrigerant; 2019.
- E. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2024.
- F. NFPA 90B - Standard for the Installation of Warm Air Heating and Air-Conditioning Systems; 2024.
- G. UL 207 - Standard for Refrigerant-Containing Components and Accessories, Nonelectrical; Current Edition, Including All Revisions.

**1.03 SUBMITTALS**

- A. See Section 013000 - 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. Design Data: Indicate refrigerant pipe sizing.
- E. Manufacturer's Instructions: Indicate rigging, assembly, and installation instructions.
- F. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, installation instructions, maintenance and repair data, and parts listing.
- G. Warranty: Submit manufacturers warranty and ensure forms have been filled out in Owner's name and registered with manufacturer.
- H. Project Record Documents: Record actual locations of components and connections.

**1.04 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of experience.
- B. Installer Qualifications: Company specializing in performing the work of this section with minimum three years of experience.

**1.05 WARRANTY**

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.
- B. Provide five year manufacturers warranty for heat exchangers, condensing units, and compressors.

**PART 2 PRODUCTS****2.01 MANUFACTURERS**

- A. Trane Inc; \_\_\_\_\_: [www.trane.com/#sle](http://www.trane.com/#sle).
- B. Lennox
- C. Daikin.
- D. Substitutions: See Section 016000 - Product Requirements.

**2.02 SYSTEM DESIGN**

- A. Split-System Heating and Cooling Units: Self-contained, packaged, matched factory-engineered and assembled, pre-wired indoor and outdoor units; UL listed.
  - 1. Heating: Propane gas fired.
  - 2. Cooling: Outdoor electric condensing unit with evaporator coils in multiple ductless indoor units ("mini-split").
  - 3. Provide refrigerant lines internal to units and between indoor and outdoor units, factory cleaned, dried, pressurized and sealed, with insulated suction line.
- B. Performance Requirements: See Drawings for additional requirements.

**2.03 INDOOR UNITS FOR DUCTED SYSTEMS**

- A. Indoor Units: Self-contained, packaged, factory assembled, pre-wired unit consisting of cabinet, supply fan, heating and cooling element(s), controls, and accessories; wired for single power connection with control transformer.
- B. Supply Fan: Centrifugal type rubber mounted with direct or belt drive with adjustable variable pitch motor pulley.
- C. Air Filters: 1 inch (25 mm) thick glass fiber, disposable type arranged for easy replacement.

**2.04 OUTDOOR UNITS**

- A. Outdoor Units: Self-contained, packaged, pre-wired unit consisting of cabinet, with compressor and condenser.
  - 1. Comply with AHRI 210/240.
  - 2. Cabinet: Galvanized steel with baked enamel finish, easily removed and secured access doors with safety interlock switches, glass fiber insulation with reflective liner.
  - 3. Construction and Ratings: In accordance with AHRI 210/240 with testing in accordance with ASHRAE Std 23.1 and UL 207.
- B. Air Cooled Condenser: Aluminum fin and copper tube coil, AHRI 520 with direct drive axial propeller fan resiliently mounted, galvanized fan guard.
  - 1. Condenser Fans: Direct-drive propeller type.
  - 2. Condenser Fan Motor: Enclosed, 1-phase type, permanently lubricated.
- C. Coil: Air-cooled, aluminum fins bonded to copper tubes.
- D. Accessories: Filter drier, high pressure switch (manual reset), low pressure switch (automatic reset), service valves and gauge ports, thermometer well (in liquid line).
  - 1. Provide thermostatic expansion valves.
- E. Operating Controls:
  - 1. Control by room thermostat to maintain room temperature setting.
  - 2. Low Ambient Kit: Provide refrigerant pressure switch to cycle condenser fan on when condenser refrigerant pressure is above 285 psig (1965 kPa) and off when pressure drops below 140 psig (965 kPa) for operation to 0 degrees F (-18 degrees C).

**PART 3 EXECUTION**

**3.01 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 in correct location.
- C. Verify that proper fuel supply is available for connection.

**3.02 INSTALLATION**

- A. Install in accordance with manufacturer's instructions and requirements of local authorities having jurisdiction.
- B. Install in accordance with NFPA 90A and NFPA 90B.
- C. Install refrigeration systems in accordance with ASHRAE Std 15.

**END OF SECTION**



**SECTION 260010  
BASIC ELECTRICAL REQUIREMENTS****PART 1 GENERAL****1.01 DESCRIPTION**

- A. This section is an extension of the General Requirements and certain items of a common or administrative nature that pertain to all electrical work.
- B. The work of this section consists of furnishing materials, equipment, constant competent supervision, special tools, test equipment, technicians, and labor necessary for installation of a complete working electrical system as indicated herein and on the Drawings.
- C. The work shall include but not necessarily be limited to the following:
  - 1. Temporary electrical service for construction.
  - 2. All Electrical Construction.
- D. Lighting System.
- E. Power System.
- F. Fire Alarm System
- G. Telecommunication System.
- H. Grounding system.

**1.02 QUALITY ASSURANCE**

- A. The electrical installation shall conform to the requirements of the latest edition of the National Electrical Code (NEC). Notify Architect/Engineer of conflicts before performance.
- B. Electrical material shall be built and tested in accordance with the applicable standards of the (NEMA), (ANSI), (ASTM), and (IEEE).
- C. Electrical materials shall be new and unused and shall be listed and labeled for the service intended by Underwriters' Laboratories, Inc., where such labeling service is available.

**1.03 REGULATORY REQUIREMENTS**

- A. Permits: Obtain and pay for all necessary permits, inspections, connection charges, fees, insurance, bond, licenses, and comply with all governing laws, ordinances, rules and regulations.
- B. Certificates of Inspection: Upon completion and before the date of substantial completion of each designated Phase, furnish a certificate of inspection issued by Ingalls to the effect that the installation is in full conformity with all Ingalls requirements.

**1.04 COORDINATION**

- A. Contractor shall be responsible for coordination of all work with other disciplines.
- B. Arrange work in a neat, well organized manner with exposed conduit and similar services running parallel with primary lines of the building construction, high as possible with a minimum of 8'-0" overhead clearance or as directed by the Engineer.
- C. Where the method of installation is not certain, ask for details. Lack of details, not requested, will not be an excuse for improper installation, and any such work must be corrected at contractor's cost.
- D. Coordination Drawings: For locations where several elements of electrical or combined mechanical and electrical work must be sequenced and positioned with precision in order to fit into the available space, prepare coordination drawings showing the actual physical dimensions (at accurate scale, minimum 1/4") required for the installation. Prepare and submit coordination drawings prior to purchase-fabrication-installation of any of the elements involved in the coordination.

- E. All Bidders shall be responsible to insure that equipment selected, switchboards, panel boards, etc., fit in spaces selected, along with NEC compliance. If standard equipment does not fit, Contractor shall be required to utilize custom equipment as required.

#### **1.05 DRAWINGS AND SPECIFICATIONS**

- A. Contract Documents (Drawings and Specifications) are intended to convey the scope of work and indicate general arrangements of equipment, fixtures and piping, and approximate sizes and locations of equipment and outlets. Follow these documents in laying out the work, check all Drawings to become familiar with all conditions affecting the work, and verify spaces in which the work will be installed.
- B. The contractor shall fully coordinate installation of electrical system with other disciplines. The Drawings show approximate locations only of selected feeders, branch circuits, outlets, etc., except where specific routing or dimensions are indicated. The Engineer reserves the right to make reasonable changes in locations indicated before roughing-in without additional cost to the Owner.
  - 1. Contractor shall investigate the structural and finish conditions affecting Division 26 work and shall arrange such work accordingly, furnishing fittings, bends, junction boxes, pull boxes, access panels, and accessories required to meet such conditions.
  - 2. These Specifications, together with the accompanying Drawings, contemplate apparatus fully erected, and in satisfactory operating condition with the Contractor furnishing and installing everything that may be necessary to complete the job.
  - 3. Contractor shall install circuits, breakers, equipment, etc. as indicated and label the above as noted. Contractor shall not deviate from equipment/circuit identification unless approved by Owner/Engineer.

#### **1.06 SUBMITTALS**

- A. Shop Drawings:
  - 1. Listed below are shop drawings required for transmittal. Refer to Phasing Plan for scheduling of submittal. No time delays will be allowed for failure to be so informed.
    - a. Lighting Fixtures (Interior and Exterior under the same submittal)
    - b. Lighting Controls (Submit under the Lighting Submittal)
    - c. Lamps
    - d. Raceways
    - e. Connectors
    - f. Safety Switches
    - g. Fuses
    - h. Circuit Breakers
    - i. Wiring Devices
    - j. Motor Controls
    - k. Panel boards
    - l. Conductors
    - m. Relays and Contactors
  - 2. Grounding products
  - 3. Further descriptions or information required with shop drawings shall be included with the description of materials specified herein as follows:
    - a. Grounding Products: Include a complete grounding system diagram with materials and ground conductor sizes.
    - b. Miscellaneous Electrical Controls and Control Wiring: Include control wiring diagrams for all miscellaneous electrical controls.
    - c. Housekeeping Pads: Include location and dimensions of housekeeping pads, including blockouts and anchor bolts.
  - 4. Firestops: Include all firestop materials for the project, indicating intended use and UL fire rating where applicable.

- a. Provide "SpecSeal" products or equal. Provide SSB series firestop pillows (or equal) around the cable tray where cable trays make penetration in the walls, etc. Provide "LC150" series sealant (or equal) to seal the penetrations made by conduits.
5. Contractor prepared, new, detailed, dimensioned shop Drawings for the installation of the work in the electrical equipment rooms areas shall be prepared and submitted for review. In preparing shop Drawings, establish lines and levels for the work specified and check the drawings to avoid interference with structural features and the work of other trades. Immediately call out the attention of the Engineering in writing any interferences for clarification.
6. Corrections or comments made on shop Drawings during the review do not relieve the Contractor from compliance with requirements of the contract documents. Review of shop Drawings shall not permit any deviation from Drawings and Specifications. Shop Drawings must be accompanied by signed statement from contractor, stating that he has reviewed the submittal and checked it for compliance. Contractor shall make note on the submittals if they deviate from the contract documents.
7. Contractor shall provide products as specified if submittals for review of materials are not received within thirty (30) days after award of the Contract.

#### **1.07 PROJECT/SITE CONDITIONS**

- A. Visit the site before bidding to become familiar with conditions under which the work will be performed.
- B. No additional compensation will be allowed for failure to be so informed.

#### **1.08 CUTTING AND PATCHING**

- A. Do all cutting, patching, fitting, and all other work that may be required to make the several parts come together and fit.
- B. Provide, everything required for the work or to conceal any of the work, in any part of the structure.
- C. Fireproofing:
  1. Plastic sleeves/pipe shall not be used within the building when penetrating a fire-resistant-rated wall, ceiling, partition, or floor.

#### **1.09 RECORD DRAWINGS**

- A. Upon completion of the project, provide a complete set of detailed electronic as-built drawings in AutoCAD 2005 format with all information required. Contractor shall also produce (2) sets of as-built drawings with modifications to construction documents in red ink. Contractor shall maintain a current set of as-built drawings on site at all times. As-built drawings shall include, but not be limited to detailed dimensions of all conduits, ductbank, etc. install in slab or below grade.
- B. Equipment Manuals:
  1. Before the date of substantial completion, Contractor shall furnish to the Engineer three (3) bound sets of descriptive, dimensional and parts data on all major items of electrical equipment and material including those items listed above under "Shop Drawings:".

#### **1.10 WARRANTY/GUARANTEE**

- A. Except where longer periods of warranty are specified, guarantee all labor and materials for a period of twelve (12) months from the date of substantial completion of the particular phase of the work. Repair all defective materials and work; replace with new materials and/or equipment, any material and/or equipment failing to give satisfactory service.
- B. During the period of guarantee, promptly correct any defects in equipment, materials or workmanship without cost to the Owner.
- C. Guarantee includes equipment capacity and performance ratings specified without excessive noise levels. Any deficiencies in equipment specified shall be promptly corrected.

- D. Contractor's warranty shall include an inspection of the system one (1) week before the end of the one (1) year warranty period. Replace or repair any items found to be defective at this time.

### **1.11 TESTS AND BALANCING**

- A. At such times as the Engineer directs, conduct operating tests to demonstrate that the electrical systems are installed and will operate properly and in accordance with the requirements of this Specification. Tests shall be performed in the presence of the Engineer's representative. Furnish instruments and personnel required for such tests.
- B. Any work and materials tested and found varying from the requirements of the Drawings and Specifications shall be replaced without additional cost to the Owner.
- C. This section does not relieve the Contractor from testing equipment installed under this Division but not listed in this section. Contractor is required to test all equipment, feeders, etc., installed under this Division.

## **PART 2 PRODUCTS**

### **2.01 GENERAL**

- A. Refer to DIVISION 1 sections for general requirements on products, materials and equipment. Refer to other DIVISION 26 sections for additional requirements.
- B. Provide products which are compatible with other products of the electrical work, and with other work requiring interface with the electrical work, including electrical connections and control devices. Determine in advance of purchase that equipment and materials proposed for installation will fit into the confines indicated, leaving adequate clearance as required by applicable codes, and for adjustment, repair, or replacement.

### **2.02 MANUFACTURERS' NAMEPLATES**

- A. Each major component of the equipment shall have the manufacturer's name, address, model number, and rating on a plate securely affixed in a conspicuous place.

## **PART 3 EXECUTION**

### **3.01 GENERAL**

- A. Visit the building site before bidding to determine existing conditions and assume all responsibility and bear all expenses in allowing for these conditions in the bid.
- B. Obtain all necessary permits, pay all legal fees and charges.
- C. No work shall be concealed until approved by the engineer and all regulations are adhered to. Provide certificate of completion.
- D. Cooperate with other trades in installing work in order that there will be no conflict of space required by conduit, piping, ducts, outlets, etc.
- E. Verify dimensions with certified shop Drawings of the materials actually approved and purchased.

### **3.02 TEMPORARY WIRING, LIGHTING AND POWER AT THE SITE**

- A. Furnish and install provisions for temporary electrical service and construction light and power during the construction period.
- B. Furnish, install, and maintain all temporary service equipment as required until permanent service is installed, switch-over temporary systems to the permanent service when latter is ready for same.
- C. Furnish, install, maintain, and switch on and off on all regular work days a complete temporary light system, for the building while under construction.
- D. Provide any and/or all relocations of temporary electric facilities as necessary to avoid the permanent installations of all trades.



### **3.03 WIRING FOR EQUIPMENT BY OTHERS**

- A. Electrical service for all equipment furnished under this Specification and/or indicated on the Drawings shall be roughed-in and connected under this Section.
- B. Electrical work for equipment specified in Division 25 - Mechanical shall be as specified.
- C. Electrical work for Performing Arts Theatrical and AV - Electrical Contractor shall refer to the Theatrical and AV drawings for wiring requirements.
- D. Raceways, outlets, backboards, cabinets, grounding connections, handholes, underground distribution system, and other roughing-in indicated shall be provided as work of this division for intercom system, telecommunication system, fire alarm system and HVAC Control 120V power (Contractor to provide cable as well).

### **3.04 WORKMANSHIP**

- A. Install all materials and electrical components of the work in accordance with instructions of manufacturer following the best modern construction practices and conforming with the Contract Documents. Workmanship shall be first class, in both function and appearance, whether finally concealed or exposed and shall be performed by experienced workmen skilled in the type of work. As practicable, the lines of all components of the system shall be perpendicular or parallel. In general, workmanship shall conform to guidelines set forth in N.E.C.A. manuals.

### **3.05 MOUNTING HEIGHTS**

- A. Upon approval of the Engineer mounting heights may be adjusted.

**END OF SECTION**



**SECTION 260051  
ELECTRICAL RELATED WORK****PART 1 GENERAL****1.01 DESCRIPTION**

- A. Extent of electrical related work required by this section is indicated on Drawings and/or specified in other Division 26 sections.

**1.02 PROJECT/SITE CONDITIONS**

- A. Protect property from damage which might result from excavating and backfilling.
- B. Protect persons from injury at excavations by barricades, warnings and illumination.
- C. Coordinate excavations with weather conditions, to minimize possibility of washouts, settlements and other damages and hazards.

**PART 2 PRODUCTS****2.01 ACCESS TO ELECTRICAL WORK**

- A. Provide removable access doors of types and sizes needed for access requirements of Electrical Equipment.

**PART 3 EXECUTION****3.01 EXCAVATION, TRENCHING AND BACKFILLING**

- A. Perform all excavation of every description and of whatever substances encountered to the depths indicated on the Drawings or as otherwise specified or as required based on field condition. All excavated materials not required or not suitable for backfill shall be removed.
- B. Sheeting and shoring shall be done as necessary for the protection of the work and for the safety of personnel.
- C. No excavation or trenches shall be cut near or under footings without first consulting the Engineer.
- D. Provide uniform circumferential support to lower third of each conduit or pipe. Each conduit or pipe shall be laid true to line and grade to prevent sudden offset to flow line. As work progresses, interior of conduit or pipe shall be cleared of dirt and superfluous materials of every description.
- E. Provide proper supporting material as required based on field condition.
  - 1. Trenches for utilities shall be of a depth that will provide the following minimum depth of cover from existing grade or from indicated finish grade, whichever is lower, unless otherwise specifically shown:
    - a. 30-Inch Minimum Cover - Electrical Conduits/Cables over 600 volts
    - b. 24-inch Minimum (See NEC 300-5) - Electrical Cables/Conduits under 600 volts.
  - 2. Backfill shall be installed in layers 6" deep, adequately wetted and tamped using materials as noted above. Refer to Division 2 for compaction densities.
  - 3. Restore all hard finished surfaces such as roadways, sidewalks, grass, shrubbery, etc., removed for installation of utilities (and not shown on Drawings or specified to be reworked under other sections of the work) to their original condition. Restore to near original condition acceptable to Architect/Engineer.
  - 4. Carefully plan all work to avoid existing utilities and other interferences. The Drawings do not indicate all existing underground utilities. Existing utility lines to be retained that are shown on the Drawings or the locations of which are made known to the Contractor prior to excavation, as well as all utility lines uncovered during excavation operations, shall be protected from damage during excavation and backfilling and, if damaged, shall be repaired by Contractor at his expense. Prior to doing any excavation with power tools, carefully investigate and locate any exiting conduit, pipes, and other lines.

### **3.02 FOUNDATIONS AND SUPPORTS**

- A. Provide concrete pedestals, bases, pads, curbs, anchor blocks, anchor bolts, slab inserts, hangers channels, cradles, saddles, etc. for installation of floor mounted equipment.
- B. Concrete pads for floor mounted electrical equipment shall be 3.5 inches high, unless otherwise indicated, poured integral with the floor slab wherever practical. Wherever integral slab poured pads are not practicable, construct 3.5 inch high housekeeping pads, reinforced with No. 3 steel wire mesh 6 X 6 inches, fastened to structural slabs with 1/2 inch diameter bolts embedded in structural slabs with expansion bolts at all corners (inset 3 inches) and no further apart than 18 inches. Score structural slab thoroughly to assure concrete bonding between structural slab and housekeeping pad. Construct in full accordance with "concrete" specifications for 2500 psi minimum compressive strength. Finish tops of housekeeping pads smooth and level within 1 percent of span. Pads shall be extended at least 4" (10 cm) beyond the equipment outline on all four sides with chamfered edges.

### **3.03 PAINTING**

- A. Factory painted equipment shall have finish restored to Manufacturer's finish if scratched or damaged before acceptance or use by Owner.

**END OF SECTION**

**SECTION 260170  
CIRCUIT AND MOTOR DISCONNECTS**

**PART 1 GENERAL**

**1.01 DESCRIPTION OF WORK**

- A. The work of this section consists of providing labor, materials, tools, appliances and miscellaneous accessories associated with the circuit and motor disconnect switch work indicated herein and on Drawings and schedules.
- B. Types of circuit and motor disconnect switches in this section include the following:
  - 1. Equipment disconnects.
  - 2. Appliance disconnects.

**PART 2 PRODUCTS**

**2.01 ACCEPTABLE MANUFACTURER**

- A. Square D.

**2.02 FABRICATED SWITCHES**

- A. Provide Heavy Duty safety switches and the best possible quality which yields the most protection for equipment and personnel for the intended use. If there is conflict between the drawings and the specifications, the contractor shall use the one that yields the most stringent protection requirements.
  - 1. Fused switches shall include the following:
  - 2. All fusible switches shall accept Class R fuses and have provision for field installation of U.L. listed rejection feature.
  - 3. The U.L. listed short circuit rating shall be 100,000 symmetrical amperes when Class R fuses and fuse kits are installed.
- B. Type of Enclosure for the Different Locations:
  - 1. Recess panel board.
  - 2. NEMA Type 1: Indoor use.
  - 3. NEMA Type 12/3R: Outdoor use.
- C. All switches shall /be listed per U.L. Standard 98; comply with Federal Specifications W-S-865; comply with NEMA KS-1.

**PART 3 EXECUTION**

**3.01 INSTALLATION OF CIRCUIT DISCONNECT SWITCHES**

- A. Install disconnect switches where indicated, complying with manufacturer's written instructions, applicable requirements of NEC, NEMA, and NECA's "Standard of Installation", and in accordance with recognized industry practices to ensure that products fulfill requirements.
- B. Provide and install fuses where applicable and/or shown on the Drawings.
- C. Install label nameplate as required.

**END OF SECTION**



**SECTION 260519**  
**LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES**

**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Single conductor building wire.
- B. Service entrance cable.
- C. Metal-clad cable.
- D. Wiring connectors.
- E. Electrical tape.
- F. Heat shrink tubing.
- G. Oxide inhibiting compound.
- H. Wire pulling lubricant.
- I. Cable ties.

**1.02 RELATED REQUIREMENTS**

- A. Section 078400 - Firestopping.
- B. Section 260526 - Grounding and Bonding for Electrical Systems: Additional requirements for grounding conductors and grounding connectors.
- C. Section 260553 - Identification for Electrical Systems: Identification products and requirements.
- D. Section 262100 - Low-Voltage Electrical Service Entrance: Additional requirements for electrical service conductors.

**1.03 REFERENCE STANDARDS**

- A. ASTM B3 - Standard Specification for Soft or Annealed Copper Wire; 2013 (Reapproved 2018).
- B. ASTM B8 - Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft; 2023.
- C. ASTM B33 - Standard Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes; 2010, with Editorial Revision (2020).
- D. ASTM B787/B787M - Standard Specification for 19 Wire Combination Unilay-Stranded Copper Conductors for Subsequent Insulation; 2004 (Reapproved 2020).
- E. ASTM D3005 - Standard Specification for Low-Temperature Resistant Vinyl Chloride Plastic Pressure-Sensitive Electrical Insulating Tape; 2017.
- F. ASTM D4388 - Standard Specification for Nonmetallic Semi-Conducting and Electrically Insulating Rubber Tapes; 2020.
- G. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- H. NECA 120 - Standard for Installing Armored Cable (AC) and Type Metal-Clad (MC) Cable; 2018.
- I. NEMA WC 70 - Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy; 2021.
- J. NETA ATS - Standard For Acceptance Testing Specifications For Electrical Power Equipment And Systems; 2021.
- K. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- L. UL 44 - Thermoset-Insulated Wires and Cables; Current Edition, Including All Revisions.
- M. UL 83 - Thermoplastic-Insulated Wires and Cables; Current Edition, Including All Revisions.

- N. UL 486A-486B - Wire Connectors; Current Edition, Including All Revisions.
- O. UL 486C - Splicing Wire Connectors; Current Edition, Including All Revisions.
- P. UL 486D - Sealed Wire Connector Systems; Current Edition, Including All Revisions.
- Q. UL 510 - Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape; Current Edition, Including All Revisions.
- R. UL 854 - Service-Entrance Cables; Current Edition, Including All Revisions.
- S. UL 1569 - Metal-Clad Cables; Current Edition, Including All Revisions.

#### **1.04 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:
  - 1. Coordinate sizes of raceways, boxes, and equipment enclosures installed under other sections with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
  - 2. Coordinate with electrical equipment installed under other sections to provide terminations suitable for use with the conductors to be installed.
  - 3. Notify Engineer/Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

#### **1.05 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for conductors and cables, including detailed information on materials, construction, ratings, listings, and available sizes, configurations, and stranding.
- 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.
- D. Project Record Documents: Record actual installed circuiting arrangements. Record actual routing for underground circuits.

#### **1.06 QUALITY ASSURANCE**

- A. Comply with requirements of NFPA 70.
- B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- D. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

#### **1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Receive, inspect, handle, and store conductors and cables in accordance with manufacturer's instructions.

#### **1.08 FIELD CONDITIONS**

- A. Do not install or otherwise handle thermoplastic-insulated conductors at temperatures lower than 14 degrees F (-10 degrees C), unless otherwise permitted by manufacturer's instructions. When installation below this temperature is unavoidable, notify Engineer/Architect and obtain direction before proceeding with work.



**PART 2 PRODUCTS****2.01 CONDUCTOR AND CABLE APPLICATIONS**

- A. Do not use conductors and cables for applications other than as permitted by NFPA 70 and product listing.
- B. Provide single conductor building wire installed in suitable raceway unless otherwise indicated, permitted, or required.
- C. Nonmetallic-sheathed cable is not permitted.
- D. Metal-clad cable is permitted only as follows:
  - 1. Where not otherwise restricted, may be used:
    - a. Where concealed above accessible ceilings for final connections from junction boxes to luminaires.
      - 1) Maximum Length: 6 feet (1.8 m).

**2.02 CONDUCTOR AND CABLE GENERAL REQUIREMENTS**

- A. Provide products that comply with requirements of NFPA 70.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Provide new conductors and cables manufactured not more than one year prior to installation.
- D. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, etc. as required for a complete operating system.
- E. Comply with NEMA WC 70.
- F. Thermoplastic-Insulated Conductors and Cables: Listed and labeled as complying with UL 83.
- G. Thermoset-Insulated Conductors and Cables: Listed and labeled as complying with UL 44.
- H. Conductors for Grounding and Bonding: Also comply with Section 260526.
- I. Conductors and Cables Installed Exposed in Spaces Used for Environmental Air (only where specifically permitted): Plenum rated, listed and labeled as suitable for use in return air plenums.
- J. Conductor Material:
  - 1. Provide copper conductors only. Aluminum conductors are not acceptable for this project. Conductor sizes indicated are based on copper.
  - 2. Copper Conductors: Soft drawn annealed, 98 percent conductivity, uncoated copper conductors complying with ASTM B3, ASTM B8, or ASTM B787/B787M unless otherwise indicated.
  - 3. Tinned Copper Conductors: Comply with ASTM B33.
- K. Minimum Conductor Size:
  - 1. Branch Circuits: 12 AWG.
    - a. Exceptions:
      - 1) 20 A, 120 V circuits longer than 75 feet (23 m): 10 AWG, for voltage drop.
      - 2) 20 A, 120 V circuits longer than 150 feet (46 m): 8 AWG, for voltage drop.
      - 3) 20 A, 277 V circuits longer than 150 feet (46 m): 10 AWG, for voltage drop.
- L. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
- M. Conductor Color Coding:
  - 1. Color code conductors as indicated unless otherwise required by the authority having jurisdiction. Maintain consistent color coding throughout project.
  - 2. Color Coding Method: Integrally colored insulation.
    - a. Conductors size 4 AWG and larger may have black insulation color coded using vinyl color coding electrical tape.

3. Color Code:
  - a. 208Y/120 V, 3 Phase, 4 Wire System:
    - 1) Phase A: Black.
    - 2) Phase B: Red.
    - 3) Phase C: Blue.
    - 4) Neutral/Grounded: White.
  - b. Equipment Ground, All Systems: Green.
  - c. Travelers for 3-Way and 4-Way Switching: Pink.

### 2.03 SINGLE CONDUCTOR BUILDING WIRE

- A. Manufacturers:
  1. Copper Building Wire:
    - a. Cerro Wire LLC: [www.cerrowire.com/#sle](http://www.cerrowire.com/#sle).
    - b. Encore Wire Corporation: [www.encorewire.com/#sle](http://www.encorewire.com/#sle).
    - c. General Cable Technologies Corporation; \_\_\_\_\_: [www.generalcable.com/#sle](http://www.generalcable.com/#sle).
    - d. Southwire Company: [www.southwire.com/#sle](http://www.southwire.com/#sle).
    - e. Or Approve Equal.
- B. Description: Single conductor insulated wire.
- C. Conductor Stranding:
  1. Feeders and Branch Circuits:
    - a. Size 10 AWG and Smaller: Stranded.
    - b. Size 8 AWG and Larger: Stranded.
  2. Control Circuits: Stranded.
- D. Insulation Voltage Rating: 600 V.
- E. Insulation:
  1. Copper Building Wire: Type THHN/THWN or THHN/THWN-2, except as indicated below.
    - a. Fixture Wiring Within Luminaires: Type TFFN/TFN for luminaires with labeled maximum temperature of 90 degrees C; Approved suitable type for luminaires with labeled maximum temperature greater than 90 degrees C.

### 2.04 SERVICE ENTRANCE CABLE

- A. Manufacturers:
  1. Copper Service Entrance Cable:
    - a. Cerro Wire LLC: [www.cerrowire.com/#sle](http://www.cerrowire.com/#sle).
    - b. Encore Wire Corporation: [www.encorewire.com/#sle](http://www.encorewire.com/#sle).
    - c. Southwire Company: [www.southwire.com/#sle](http://www.southwire.com/#sle).
- B. Service Entrance Cable for Underground Use: NFPA 70, Type USE single-conductor cable listed and labeled as complying with UL 854, Type USE-2 and with UL 44 Type RHH/RHW-2.
- C. Conductor Stranding: Stranded.
- D. Insulation Voltage Rating: 600 V.

### 2.05 METAL-CLAD CABLE

- A. Description: NFPA 70, Type MC cable listed and labeled as complying with UL 1569, and listed for use in classified firestop systems to be used.
- B. Conductor Stranding:
  1. Size 10 AWG and Smaller: Solid.
  2. Size 8 AWG and Larger: Stranded.
- C. Insulation Voltage Rating: 600 V.
- D. Insulation: Type THHN, THHN/THWN, or THHN/THWN-2.

- E. Grounding: Full-size integral equipment grounding conductor.
- F. Armor: Steel, interlocked tape.

## 2.06 WIRING CONNECTORS

- A. Description: Wiring connectors appropriate for the application, suitable for use with the conductors to be connected, and listed as complying with UL 486A-486B or UL 486C as applicable.
- B. Connectors for Grounding and Bonding: Comply with Section 260526.
- C. Wiring Connectors for Splices and Taps:
  - 1. Copper Conductors Size 8 AWG and Smaller: Use Barrel Crimp Sleeves or Barrel Crimp Sleeves.
  - 2. Copper Conductors Size 6 AWG and Larger: Use Barrel Crimp Sleeves or Barrel Crimp Sleeves.
- D. Wiring Connectors for Terminations:
  - 1. Provide terminal lugs for connecting conductors to equipment furnished with terminations designed for terminal lugs.
  - 2. Provide compression adapters for connecting conductors to equipment furnished with mechanical lugs when only compression connectors are specified.
  - 3. Where over-sized conductors are larger than the equipment terminations can accommodate, provide connectors suitable for reducing to appropriate size, but not less than required for the rating of the overcurrent protective device.
  - 4. Provide motor pigtail connectors for connecting motor leads in order to facilitate disconnection.
  - 5. Copper Conductors Size 8 AWG and Larger: Use compression connectors where connectors are required.
- E. Do not use insulation-piercing or insulation-displacement connectors designed for use with conductors without stripping insulation.
- F. Do not use push-in wire connectors as a substitute for Barrel Crimp connectors.
- G. Mechanical or twist on Connectors: Provide bolted type or set-screw type.
  - 1. Manufacturers:
    - a. Burndy LLC; \_\_\_\_\_: [www.burndy.com/#sle](http://www.burndy.com/#sle).
    - b. IlSCO: [www.ilSCO.com/#sle](http://www.ilSCO.com/#sle).
    - c. Thomas & Betts Corporation: [www.tnb.com/#sle](http://www.tnb.com/#sle).
    - d. Or Approved Equal.
- H. Compression Connectors: Provide circumferential type or hex type crimp configuration.
  - 1. Manufacturers:
    - a. Burndy LLC; \_\_\_\_\_: [www.burndy.com/#sle](http://www.burndy.com/#sle).
    - b. IlSCO: [www.ilSCO.com/#sle](http://www.ilSCO.com/#sle).
    - c. Thomas & Betts Corporation: [www.tnb.com/#sle](http://www.tnb.com/#sle).
    - d. Or Approved Equal.

## 2.07 ACCESSORIES

- A. Electrical Tape:
  - 1. Manufacturers:
    - a. 3M: [www.3m.com/#sle](http://www.3m.com/#sle).
    - b. Plymouth Rubber Europa: [www.plymouthrubber.com/#sle](http://www.plymouthrubber.com/#sle).
  - 2. Vinyl Color Coding Electrical Tape: Integrally colored to match color code indicated; listed as complying with UL 510; minimum thickness of 7 mil (0.18 mm); resistant to abrasion, corrosion, and sunlight; suitable for continuous temperature environment up to 221 degrees F (105 degrees C).

3. Vinyl Insulating Electrical Tape: Complying with ASTM D3005 and listed as complying with UL 510; minimum thickness of 7 mil (0.18 mm); resistant to abrasion, corrosion, and sunlight; conformable for application down to 0 degrees F (-18 degrees C) and suitable for continuous temperature environment up to 221 degrees F (105 degrees C).
  4. Rubber Splicing Electrical Tape: Ethylene Propylene Rubber (EPR) tape, complying with ASTM D4388; minimum thickness of 30 mil (0.76 mm); suitable for continuous temperature environment up to 194 degrees F (90 degrees C) and short-term 266 degrees F (130 degrees C) overload service.
  5. Electrical Filler Tape: Rubber-based insulating moldable putty, minimum thickness of 125 mil (3.2 mm); suitable for continuous temperature environment up to 176 degrees F (80 degrees C).
  6. Varnished Cambric Electrical Tape: Cotton cambric fabric tape, with or without adhesive, oil-primed and coated with high-grade insulating varnish; minimum thickness of 7 mil (0.18 mm); suitable for continuous temperature environment up to 221 degrees F (105 degrees C).
  7. Moisture Sealing Electrical Tape: Insulating mastic compound laminated to flexible, all-weather vinyl backing; minimum thickness of 90 mil (2.3 mm).
- B. Heat Shrink Tubing: Heavy-wall, split-resistant, with factory-applied adhesive; rated 600 V; suitable for direct burial applications; listed as complying with UL 486D.
  - C. Oxide Inhibiting Compound: Listed; suitable for use with the conductors or cables to be installed.
  - D. Wire Pulling Lubricant: Listed; suitable for use with the conductors or cables to be installed and suitable for use at the installation temperature.
  - E. Cable Ties: Material and tensile strength rating suitable for application.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that interior of building has been protected from weather.
- B. Verify that work likely to damage wire and cable has been completed.
- C. Verify that raceways, boxes, and equipment enclosures are installed and are properly sized to accommodate conductors and cables in accordance with NFPA 70 and these specifications.
- D. Verify that field measurements are as indicated.
- E. Verify that conditions are satisfactory for installation prior to starting work.

### **3.02 PREPARATION**

- A. Clean raceways thoroughly to remove foreign materials before installing conductors and cables.

### **3.03 INSTALLATION**

- A. Circuiting Requirements:
  1. Unless dimensioned, circuit routing indicated is diagrammatic.
  2. When circuit destination is indicated without specific routing, determine exact routing required.
  3. Arrange circuiting to minimize splices.
  4. Include circuit lengths required to install connected devices within 10 ft (3.0 m) of location indicated.
  5. Maintain separation of Class 1, Class 2, and Class 3 remote-control, signaling, and power-limited circuits in accordance with NFPA 70.
  6. Maintain separation of wiring for emergency systems in accordance with NFPA 70.
  7. Circuiting Adjustments: Unless otherwise indicated, when branch circuits are indicated as separate, combining them together in a single raceway is not permitted.

- a. Provide no more than six current-carrying conductors in a single raceway. Dedicated neutral conductors are considered current-carrying conductors.
  - b. Increase size of conductors as required to account for ampacity derating.
  - c. Size raceways, boxes, etc. to accommodate conductors.
8. Common Neutrals: Unless otherwise indicated, sharing of neutral/grounded conductors among up to three single phase branch circuits of different phases installed in the same raceway is not permitted. Provide dedicated neutral/grounded conductor for each individual branch circuit.
- B. Install products in accordance with manufacturer's instructions.
- C. No conductor shall bear more than eight percent (80%) of its rated ampacity.
- D. The system shall be properly grounded and continuously polarized throughout following the color coding specified.
- E. Do not use mechanical means to pull wire No. 8 AWG. or smaller.
- F. Type AC or MC cable is not allowed except as allowed in this spec.
- G. Perform work in accordance with NECA 1 (general workmanship).
- H. Install metal-clad cable (Type MC) in accordance with NECA 120.
- I. Installation in Raceway:
1. Tape ends of conductors and cables to prevent infiltration of moisture and other contaminants.
  2. Pull all conductors and cables together into raceway at same time.
  3. Do not damage conductors and cables or exceed manufacturer's recommended maximum pulling tension and sidewall pressure.
  4. Use suitable wire pulling lubricant where necessary, except when lubricant is not recommended by the manufacturer.
- J. Paralleled Conductors: Install conductors of the same length and terminate in the same manner.
- K. Secure and support conductors and cables in accordance with NFPA 70 using suitable supports and methods approved by the authority having jurisdiction. Provide independent support from building structure. Do not provide support from raceways, piping, ductwork, or other systems.
- L. Terminate cables using suitable fittings.
1. Metal-Clad Cable (Type MC):
    - a. Use listed fittings.
    - b. Cut cable armor only using specialized tools to prevent damaging conductors or insulation. Do not use hacksaw or wire cutters to cut armor.
- M. Install conductors with a minimum of 12 inches (300 mm) of slack at each outlet.
- N. Where conductors are installed in enclosures for future termination by others, provide a minimum of 5 feet (1.5 m) of slack.
- O. Neatly train and bundle conductors inside boxes, wireways, panelboards and other equipment enclosures.
- P. Group or otherwise identify neutral/grounded conductors with associated ungrounded conductors inside enclosures in accordance with NFPA 70.
- Q. Make wiring connections using specified wiring connectors.
1. Make splices and taps only in accessible boxes. Do not pull splices into raceways or make splices in conduit bodies or wiring gutters.
  2. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors.
  3. Do not remove conductor strands to facilitate insertion into connector.

4. Clean contact surfaces on conductors and connectors to suitably remove corrosion, oxides, and other contaminants. Do not use wire brush on plated connector surfaces.
  5. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
  6. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.
- R. Insulate splices and taps that are made with uninsulated connectors using methods suitable for the application, with insulation and mechanical strength at least equivalent to unspliced conductors.
1. Dry Locations: Use insulating covers specifically designed for the connectors, electrical tape, or heat shrink tubing.
    - a. For taped connections, first apply adequate amount of rubber splicing electrical tape or electrical filler tape, followed by outer covering of vinyl insulating electrical tape.
    - b. For taped connections likely to require re-entering, including motor leads, first apply varnished cambric electrical tape, followed by adequate amount of rubber splicing electrical tape, followed by outer covering of vinyl insulating electrical tape.
  2. Damp Locations: Use insulating covers specifically designed for the connectors, electrical tape, or heat shrink tubing.
    - a. For connections with insulating covers, apply outer covering of moisture sealing electrical tape.
    - b. For taped connections, follow same procedure as for dry locations but apply outer covering of moisture sealing electrical tape.
  3. Wet Locations: Use heat shrink tubing.
- S. Insulate ends of spare conductors using vinyl insulating electrical tape.
- T. Field-Applied Color Coding: Where vinyl color coding electrical tape is used in lieu of integrally colored insulation as permitted in Part 2 under "Color Coding", apply half overlapping turns of tape at each termination and at each location conductors are accessible.
- U. Identify conductors and cables in accordance with Section 260553.
- V. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 078400.
- W. Unless specifically indicated to be excluded, provide final connections to all equipment and devices, including those furnished by others, as required for a complete operating system.

### **3.04 FIELD QUALITY CONTROL**

- A. See Section 014000 - Quality Requirements, for additional requirements.
- B. prior to energization, test cable and wire for continuity of circuitry, and also for short circuits.
- C. Perform inspections and tests listed in NETA ATS, Section 7.3.2. The insulation resistance test is required for all conductors. The resistance test for parallel conductors listed as optional is not required.
  1. Disconnect surge protective devices (SPDs) prior to performing any high potential testing. Replace SPDs damaged by performing high potential testing with SPDs connected.
- D. Correct deficiencies and replace damaged or defective conductors and cables.

**END OF SECTION**

**SECTION 260526  
GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Grounding and bonding requirements.
- B. Conductors for grounding and bonding.
- C. Connectors for grounding and bonding.
- D. Ground bars.
- E. Ground rod electrodes.

**1.02 RELATED REQUIREMENTS**

- A. Section 260519 - Low-Voltage Electrical Power Conductors and Cables: Additional requirements for conductors for grounding and bonding, including conductor color coding.
  - 1. Includes oxide inhibiting compound.
- B. Section 260553 - Identification for Electrical Systems: Identification products and requirements.

**1.03 REFERENCE STANDARDS**

- A. IEEE 81 - IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System; 2012.
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- C. NEMA GR 1 - Grounding Rod Electrodes and Grounding Rod Electrode Couplings; 2022.
- D. NETA ATS - Standard For Acceptance Testing Specifications For Electrical Power Equipment And Systems; 2021.
- E. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- F. UL 467 - Grounding and Bonding Equipment; Current Edition, Including All Revisions.

**1.04 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:
  - 1. Verify exact locations of underground metal water service pipe entrances to building.
  - 2. Coordinate the work with other trades to provide steel reinforcement complying with specified requirements for concrete-encased electrode.
  - 3. Notify Engineer/Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- B. Sequencing:
  - 1. Do not install ground rod electrodes until final backfill and compaction is complete.

**1.05 SUBMITTALS**

- A. Product Data: Provide manufacturer's standard catalog pages and data sheets for grounding and bonding system components.
- B. Shop Drawings:
- C. Manufacturer's 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.
- D. Field quality control test reports.
- E. Project Record Documents: Record actual locations of grounding electrode system components and connections.

**1.06 QUALITY ASSURANCE**

- A. Comply with requirements of NFPA 70.
- B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- D. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

**1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

**1.08 DESCRIPTION OF WORK**

- A. The work of this section consist of providing labor, materials, tools, appliances and miscellaneous accessories associated with grounding of the electrical system as required by and as indicated herein and/or on the drawings.
- B. Main electrical service equipment, raceways, motors, panelboards and other electrical equipment shall be effectively and permanently grounded to the grounding electrode system. This electrode shall be the nearest available effectively grounded structural metal member of the structure or the nearest available effectively grounded metal water pipe and also a driven rod. Grounding connections and conductor sizes shall be in accordance with the requirements of the National Electrical Code, Article 250, local ordinances, and as described herein.
- C. A separate grounding conductor, sized in accordance with NEC Table 250-122 shall be provided in the conduit with the circuit conductors for all feeder and branch circuits. The grounding conductor may be bare or insulated copper; however, if this conductor is insulated, the insulating covering shall be green in color. Where bare copper grounding conductors are used, mark the conductor ends with green tape. Conduit runs shall be increased in size where necessary to accommodate the grounding conductor in addition to circuit conductors. The electrical continuity of all conduit runs shall be verified and corrected where necessary.
- D. Isolated Ground Connectors shall be insulated. Additional grounding conductors and conduit shall be provided as specified herein or shown on the drawings. All conduit for grounding system conductors, not run in conduit with circuit conductors, shall be rigid steel conduit.
- E. All electrical equipment enclosures and conductor enclosures shall be grounded. This includes but is not limited to metal raceways, outlet boxes, cabinets, switch boxes, work stations, motor frames, transformer cases and metallic enclosure for all electrical equipment.
- F. Under no circumstances shall neutral conductors again be grounded after they have been grounded once at the transformer secondary except at a separately derived system.
- G. Panelboards shall be equipped with a neutral bar which is insulated from the enclosure, and a grounding bar which is bonded to the enclosure. The grounding bar shall provide for terminating the green equipment grounding conductors in the panelboard or motor control center cabinets. Neutral busses shall be isolated from ground except at the main bonding jumper.
- H. Types of grounding in this section includes the following:
  - 1. Underground metal water piping.
  - 2. Grounding electrodes
  - 3. Service Equipment
  - 4. Enclosures
  - 5. Systems
  - 6. Equipment



7. Fencing
- I. Requirements of this section apply to electrical grounding work specified elsewhere in these specifications.
- J. Provide bonding jumper across water meter. The bonding jumper shall be the same size as the grounding electrode conductor and long enough to allow the meter to be removed without disconnecting the bonding jumper.

## **PART 2 PRODUCTS**

### **2.01 GROUNDING AND BONDING REQUIREMENTS**

- A. Existing Work: Where existing grounding and bonding system components are indicated to be reused, they may be reused only where they are free from corrosion, integrity and continuity are verified, and where acceptable to the authority having jurisdiction.
- B. Do not use products for applications other than as permitted by NFPA 70 and product listing.
- C. Unless specifically indicated to be excluded, provide all required components, conductors, connectors, conduit, boxes, fittings, supports, accessories, etc. as necessary for a complete grounding and bonding system.
- D. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
- E. Grounding System Resistance:
  1. Achieve specified grounding system resistance under normally dry conditions unless otherwise approved by Engineer/Architect. Precipitation within the previous 48 hours does not constitute normally dry conditions.
- F. Grounding Electrode System:
  1. Provide connection to required and supplemental grounding electrodes indicated to form grounding electrode system.
    - a. Provide continuous grounding electrode conductors without splice or joint.
    - b. Install grounding electrode conductors in raceway where exposed to physical damage. Bond grounding electrode conductor to metallic raceways at each end with bonding jumper.
  2. Metal Underground Water Pipe(s):
    - a. Provide connection to underground metal domestic and fire protection (where present) water service pipe(s) that are in direct contact with earth for at least 10 feet (3.0 m) at an accessible location not more than 5 feet (1.5 m) from the point of entrance to the building.
    - b. Provide bonding jumper(s) around insulating joints/pipes as required to make pipe electrically continuous.
    - c. Provide bonding jumper around water meter of sufficient length to permit removal of meter without disconnecting jumper.
  3. Metal In-Ground Support Structure:
    - a. Provide connection to metal in-ground support structure that is in direct contact with earth in accordance with NFPA 70.
  4. Concrete-Encased Electrode:
    - a. Provide connection to concrete-encased electrode consisting of not less than 20 feet (6.0 m) of either steel reinforcing bars or bare copper conductor not smaller than 4 AWG embedded within concrete foundation or footing that is in direct contact with earth in accordance with NFPA 70.
  5. Ground Rod Electrode(s):
    - a. Provide three electrodes in an equilateral triangle configuration unless otherwise indicated or required.
    - b. Space electrodes not less than 10 feet (3.0 m) from each other and any other ground electrode.

- c. Where location is not indicated, locate electrode(s) at least 5 feet (1.5 m) outside building perimeter foundation as near as possible to electrical service entrance; where possible, locate in softscape (uncovered) area.
  6. Ground Bar: Provide ground bar, separate from service equipment enclosure, for common connection point of grounding electrode system bonding jumpers as permitted in NFPA 70. Connect grounding electrode conductor provided for service-supplied system grounding to this ground bar.
    - a. Ground Bar Size: as shown on drawings unless otherwise indicated or required.
    - b. Ground Bar Mounting Height: 18 inches (450 mm) above finished floor unless otherwise indicated.
- G. Separately Derived System Grounding:
  1. Separately derived systems include, but are not limited to:
    - a. Transformers (except autotransformers such as buck-boost transformers).
  2. Provide grounding electrode conductor to connect derived system grounded conductor to nearest effectively grounded metal building frame. Unless otherwise indicated, make connection at neutral (grounded) bus in source enclosure.
  3. Provide bonding jumper to connect derived system grounded conductor to nearest metal building frame and nearest metal water piping in the area served by the derived system, where not already used as a grounding electrode for the derived system. Make connection at same location as grounding electrode conductor connection.
  4. Where common grounding electrode conductor ground riser is used for tap connections to multiple separately derived systems, provide bonding jumper to connect the metal building frame and metal water piping in the area served by the derived system to the common grounding electrode conductor.
  5. Provide system bonding jumper to connect system grounded conductor to equipment ground bus. Make connection at same location as grounding electrode conductor connection. Do not make any other connections between neutral (grounded) conductors and ground on load side of separately derived system disconnect.
  6. Where the source and first disconnecting means are in separate enclosures, provide supply-side bonding jumper between source and first disconnecting means.
- H. Bonding and Equipment Grounding:
  1. Provide bonding for equipment grounding conductors, equipment ground busses, metallic equipment enclosures, metallic raceways and boxes, device grounding terminals, and other normally non-current-carrying conductive materials enclosing electrical conductors/equipment or likely to become energized as indicated and in accordance with NFPA 70.
  2. Provide insulated equipment grounding conductor in each feeder and branch circuit raceway. Do not use raceways as sole equipment grounding conductor.
  3. Where circuit conductor sizes are increased for voltage drop, increase size of equipment grounding conductor proportionally in accordance with NFPA 70.
  4. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
  5. Terminate branch circuit equipment grounding conductors on solidly bonded equipment ground bus only. Do not terminate on neutral (grounded) or isolated/insulated ground bus.
  6. Provide bonding jumper across expansion or expansion/deflection fittings provided to accommodate conduit movement.
  7. Provide bonding for interior metal piping systems in accordance with NFPA 70. This includes, but is not limited to:
    - a. Metal water piping where not already effectively bonded to metal underground water pipe used as grounding electrode.
    - b. Metal gas piping.
  8. Provide bonding for interior metal air ducts.
  9. Provide bonding for metal building frame.

10. Provide bonding for metal siding not effectively bonded through attachment to metal building frame.
- I. Telecommunications Systems Grounding and Bonding:
  1. Provide intersystem bonding termination at service equipment or metering equipment enclosure and at disconnecting means for any additional buildings or structures in accordance with NFPA 70.
  2. Provide bonding jumper in raceway from intersystem bonding termination to each communications room or backboard and provide ground bar for termination.
    - a. Bonding Jumper Size: 6 AWG, unless otherwise indicated or required.
    - b. Raceway Size: 3/4 inch (21 mm) trade size unless otherwise indicated or required.
    - c. Ground Bar Size: 1/4 by 2 by 12 inches (6 by 50 by 300 mm) unless otherwise indicated or required.
    - d. Ground Bar Mounting Height: 18 inches (450 mm) above finished floor unless otherwise indicated.

## 2.02 GROUNDING AND BONDING COMPONENTS

- A. General Requirements:
  1. Provide products listed, classified, and labeled as suitable for the purpose intended.
  2. Provide products listed and labeled as complying with UL 467 where applicable.
- B. Conductors for Grounding and Bonding, in Addition to Requirements of Section 260526:
  1. Use insulated copper conductors unless otherwise indicated.
    - a. Exceptions:
      - 1) Use bare copper conductors where installed underground in direct contact with earth.
- C. Connectors for Grounding and Bonding:
  1. Description: Connectors appropriate for the application and suitable for the conductors and items to be connected; listed and labeled as complying with UL 467.
  2. Unless otherwise indicated, use exothermic welded connections for underground, concealed and other inaccessible connections.
  3. Unless otherwise indicated, use mechanical connectors, compression connectors, or exothermic welded connections for accessible connections.
- D. Ground Bars:
  1. Description: Copper rectangular ground bars with mounting brackets and insulators.
  2. Size: As indicated.
  3. Holes for Connections: As indicated or as required for connections to be made.
- E. Ground Rod Electrodes:
  1. Comply with NEMA GR 1.
  2. Material: Copper-bonded (copper-clad) steel.
  3. Size: 3/4 inch (19 mm) diameter by 10 feet (3.0 m) length, unless otherwise indicated.
  4. Where rod lengths of greater than 10 feet (3.0 m) are indicated or otherwise required, sectionalized ground rods may be used.

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Verify that work likely to damage grounding and bonding system components has been completed.
- B. Verify that field measurements are as indicated.
- C. Verify that conditions are satisfactory for installation prior to starting work.

### 3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.

- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Weld grounding conductors to underground grounding electrodes/grounding ring. The building equipment grounding system shall consist of the ground wire and electrically continuous metallic conduit system. Every item of equipment served by the electrical system shall be bonded to the building equipment ground. Metallic piping and duct systems which are electrically isolated shall be bonded to the equipment grounding system with a flexible bonding jumper.
- D. The neutral shall be grounded to the grounding electrode system at the service entrance only, and shall be kept isolated from the building grounding system throughout the building. The neutral of separately derived systems shall be grounded at one point as specified herein below.
- E. Continuity of the building equipment grounding system shall be maintained throughout the project. Grounding jumpers shall be installed across conduit expansion fittings, all liquid-tight flexible metal and flexible metal conduit, light fixture pigtails in excess of 6' and all other non-electrically continuous raceway fittings.
- F. All main grounding conductors shall be stranded copper conductors, sized as shown and/or required, and run in a suitable raceway. All main grounding conductors shall be continuous without joints or splices over their entire length.
- G. Ground telecommunication service equipment as required by local utility.
- H. Flexible conduit longer than 6' shall not be considered a ground path.
- I. Ground all grounding-type receptacles with a separate ground wire.
- J. Grounding of all motors or equipment connected to terminal box with flexible conduit shall be made with a separate grounding conductor between motor frame or equipment cabinet and rigid conduit system. Grounding conductor shall be sized in accordance with table 250-122 of the NEC.
- K. All grounding conductors shall be amply protected from mechanical injury and shall be supported in an approved manner. Where conductors are located in concrete, they shall be installed in conduit. Where ground conductors enter or emerge from slabs bearing directly on fill or soil, the voids between the conductor and the surrounding conduit shall be filled with compound to provide an effective water seal.
- L. Grounding conductors shall be not smaller than #12 AWG. Conductors shall be high conductivity copper, and sizes larger than #12 shall be stranded.
- M. Insulated bushings shall be installed on all raceways at transformers, switchboards, motor control centers, dry-type transformers, as well as switches used as service equipment.
- N. Install braided type bonding jumpers with clamps on water meter piping to electrically bypass the water meter.
- O. Install clamp-on connectors only on thoroughly cleaned metal contact surfaces, to ensure electrical conductivity and circuit integrity.
- P. Ground each steel structural column to the grounding electrode system. "Cadweld" grounding conductor to steel column.
- Q. Ground Rod Electrodes: Unless otherwise indicated, install ground rod electrodes vertically. Where encountered rock prohibits vertical installation, install at 45 degree angle or bury horizontally in trench at least 30 inches (750 mm) deep in accordance with NFPA 70 or install at 45 degree angle or bury horizontally in trench at least 30 inches (750 mm) deep in accordance with NFPA 70.
  - 1. Outdoor Installations: Unless otherwise indicated, install with top of rod 12 inches below finished grade.
- R. Make grounding and bonding connections using specified connectors.

1. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors. Do not remove conductor strands to facilitate insertion into connector.
  2. Remove nonconductive paint, enamel, or similar coating at threads, contact points, and contact surfaces.
  3. Exothermic Welds: Make connections using molds and weld material suitable for the items to be connected in accordance with manufacturer's recommendations.
  4. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
  5. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.
- S. Identify grounding and bonding system components in accordance with Section 260553.

**3.03 FIELD QUALITY CONTROL**

- A. See Section 014000 - Quality Requirements, for additional requirements.
- B. Inspect and test in accordance with NETA ATS except Section 4.
- C. Perform inspections and tests listed in NETA ATS, Section 7.13.
- D. Perform ground electrode resistance tests under normally dry conditions. Precipitation within the previous 48 hours does not constitute normally dry conditions.
- E. Investigate and correct deficiencies where measured ground resistances do not comply with specified requirements.
- F. Submit detailed reports indicating inspection and testing results and corrective actions taken.

**END OF SECTION**



**SECTION 260529  
HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS**

**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Support and attachment requirements and components for equipment, conduit, cable, boxes, and other electrical work.

**1.02 RELATED REQUIREMENTS**

- A. Section 260533.13 - Conduit for Electrical Systems: Additional support and attachment requirements for conduits.
- B. Section 260533.16 - Boxes for Electrical Systems: Additional support and attachment requirements for boxes.
- C. Section 265100 - Interior Lighting: Additional support and attachment requirements for interior luminaires.
- D. Section 265600 - Exterior Lighting: Additional support and attachment requirements for exterior luminaires.

**1.03 REFERENCE STANDARDS**

- A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.
- C. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2023.
- D. MFMA-4 - Metal Framing Standards Publication; 2004.
- E. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- G. UL 5B - Strut-Type Channel Raceways and Fittings; Current Edition, Including All Revisions.

**1.04 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:
  - 1. Coordinate sizes and arrangement of supports and bases with the actual equipment and components to be installed.
  - 2. Coordinate the work with other trades to provide additional framing and materials required for installation.
  - 3. Coordinate compatibility of support and attachment components with mounting surfaces at the installed locations.
  - 4. Coordinate the arrangement of supports with ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
  - 5. Notify Engineer/Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

**1.05 SUBMITTALS**

- A. Product Data: Provide manufacturer's standard catalog pages and data sheets for channel (strut) framing systems, non-penetrating rooftop supports, and post-installed concrete and masonry anchors.
- B. Shop Drawings: Include details for fabricated hangers and supports where materials or methods other than those indicated are proposed for substitution.

- C. Evaluation Reports: For products specified as requiring evaluation and recognition by ICC Evaluation Service, LLC (ICC-ES), provide current ICC-ES evaluation reports upon request.
- D. Installer's Qualification Statement: Include evidence of compliance with specified requirements.
- E. Manufacturer's 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.

#### **1.06 QUALITY ASSURANCE**

- A. Comply with NFPA 70.
- B. Comply with applicable building code.
- C. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- D. Installer Qualifications for Powder-Actuated Fasteners (when specified): Certified by fastener system manufacturer with current operator's license.
- E. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

#### **1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

### **PART 2 PRODUCTS**

#### **2.01 MANUFACTURED SUPPORTING DEVICES**

- A. General: Provide supporting devices complying with manufacturer's standard materials, design and construction in accordance with published product information, and as required for a complete installation and as herein specified. Where more than one type of device meets indicated requirements, selection is Installer's option.
- B. Support: Provide supporting devices of types, sizes and materials as required and having the following construction features:
  - 1. Clevis Hangers: For supporting 2" rigid metal conduit, galvanized steel with 1/2" diameter hole for round galvanized or stainless steel rod, approximately 54 pounds per 100 units.
  - 2. Riser Clamps: For supporting 5" rigid metal conduit, galvanized steel with 2 bolts and nuts and 4" ears, approximately 510 pounds per 100 units.
  - 3. Reducing Couplings: Steel rod reducing coupling, 1/2" x 5/8" galvanized or stainless steel approximately 16 pounds per 100.
  - 4. C-Clamps: Malleable iron, 1/2" rod size, approximately 70 pounds per 100 units.
  - 5. I-Beam Clamps: Steel, 1-1/4" x 3/16" stock, 3/8" cross bolt, flange width 2", approximately 52 pounds per 100 units.
  - 6. One-Hole Conduit Straps: For supporting 3/4" rigid metal conduit, galvanized steel, approximately 7 pounds per 100 units. Include with backing plates.
  - 7. Two-Hole Conduit Straps: For supporting 3/4" rigid metal conduit, galvanized steel, 3/4" strap width, and 2-1/8" between center of screw holes.
  - 8. Round Steel Rod: Hot dipped galvanized or Stainless Steel, 1/2" diameter, approximately 67 pounds per 100 feet.
  - 9. Hexagon Nuts: For 1/2" rod size, galvanized steel, approximately 4 pounds per 100 units.
  - 10. Offset Conduit Clamps: For supporting 2" rigid metal conduit, steel approximately 200 pounds per 100 units.
- C. Anchors: Provide anchors of types, sizes and materials as required and having the following construction features:
  - 1. Lead Expansion Anchors: 1/2", approximately 38 pounds over 100 units.
  - 2. Toggle Bolts: Springhead, 3/16" x 4", approximately 5 pounds per 100 units.



3. Available Manufacturers: Subject to compliance with requirements, manufacturers offering anchors which may be incorporated into the work include, but are not limited to the following:
  - a. Abbeon Cal Inc.
  - b. Ackerman Johnson Fastening System Inc.
  - c. Elcen Metal Products Co.
  - d. Ideal Industries, Inc.
  - e. Josyln Mfg. and Supply Co.
  - f. McGraw Edison Co.
  - g. Rawplug Co. Inc.
  - h. Star Expansion Bolt Co.
- D. U-Channel Strut System:
  1. Provide U-Channel strut system for supporting electrical equipment, 16-gage hot dip galvanized steel or stainless steel, of types and sizes required: construct with 9/16" diameter holes, 8" on center on top surface, and with the following fittings which mate and match with U-channel:
    - a. Fixture Hangers
    - b. Channel Hangers
    - c. End caps
    - d. Beam clamps
    - e. Wiring stud
    - f. Thinwall conduit clamps
    - g. Rigid conduit clamps
    - h. Conduit hangers
    - i. U-bolts
  2. Available Manufacturers: Subject to compliance with requirements, manufacturers offering channel system which may be incorporated in the work include, but are not limited to, the following:
    - a. B-Line System, Inc.
    - b. Elcen metal Products Co.
    - c. Greenfield Mfg Co., Inc.
    - d. Midland-Ross Corp.
    - e. Power-Strut Div., Van Huffel Tube Corp.
    - f. Unistrut Div, GTE Products Corp.
- E. General Requirements:
  1. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of electrical work.
  2. Provide products listed, classified, and labeled as suitable for the purpose intended, where applicable.
  3. Do not use products for applications other than as permitted by NFPA 70 and product listing.
  4. Do not use wire, chain, perforated pipe strap, or wood for permanent supports unless specifically indicated or permitted.
  5. Steel Components: Use corrosion resistant materials suitable for the environment where installed.
    - a. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
    - b. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.
- F. Outlet Box Supports: Hangers, brackets, etc. suitable for the boxes to be supported.

## **2.02 FABRICATED SUPPORTING DEVICES**

- A. Pipe Sleeves: Provide pipe sleeves of one of the following:

1. Sheet-Metal: Fabricate from galvanized sheet metal round tube closed with snaplock joint, welded spiral seams, or welded longitudinal joint. Fabricate from the following gages: 3" and smaller, 20 gage; 4" or 6", 16 gage; over 6", 14 gage.
  2. Steel-Pipe: Fabricate from Schedule 40 galvanized steel pipe; remove burrs.
  3. Iron-Pipe: Fabricate from cast-iron or ductile-iron pipe; remove burrs.
  4. Plastic-Pipe: Fabricate from Schedule 80 PVC plastic pipe; remove burrs.
- B. Sleeve Seals: Provide Lead and Oakum sleeve seals, caulked between sleeve and pipe for sleeves located in foundation walls below grade or in exterior walls.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that field measurements are as indicated.
- B. Verify that mounting surfaces are ready to receive support and attachment components.
- C. Verify that conditions are satisfactory for installation prior to starting work.

### **3.02 INSTALLATION**

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Install anchors and fasteners in accordance with ICC Evaluation Services, LLC (ICC-ES) evaluation report conditions of use where applicable.
- D. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
- E. Unless specifically indicated or approved by Engineer/Architect, do not provide support from suspended ceiling support system or ceiling grid.
- F. Unless specifically indicated or approved by Engineer/Architect, do not provide support from roof deck.
- G. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.
- H. Equipment Support and Attachment:
  1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.
  2. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
  3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
  4. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.
- I. Secure fasteners according to manufacturer's recommended torque settings.
- J. Remove temporary supports.
- K. Tighten sleeve seal nuts until sealing grommets have expanded to form a watertight seal.
- L. Coordinate all conduit penetrations into the building from the exterior with Division 1.

### **3.03 FIELD QUALITY CONTROL**

- A. Inspect support and attachment components for damage and defects.
- B. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.
- C. Correct deficiencies and replace damaged or defective support and attachment components.

**END OF SECTION**

**SECTION 260533.13  
CONDUIT FOR ELECTRICAL SYSTEMS****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Galvanized steel rigid metal conduit (RMC).
- B. Flexible metal conduit (FMC).
- C. Liquidtight flexible metal conduit (LFMC).
- D. Electrical metallic tubing (EMT).
- E. Underground PVC Conduit (PVC)
- F. Conduit fittings.
- G. Accessories.

**1.02 RELATED REQUIREMENTS**

- A. Section 078400 - Firestopping.
- B. Section 260526 - Grounding and Bonding for Electrical Systems.
  - 1. Includes additional requirements for fittings for grounding and bonding.
- C. Section 260529 - Hangers and Supports for Electrical Systems.
- D. Section 260553 - Identification for Electrical Systems: Identification products and requirements.
- E. Section 262100 - Low-Voltage Electrical Service Entrance: Additional requirements for electrical service conduits.

**1.03 REFERENCE STANDARDS**

- A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC); 2020.
- B. ANSI C80.3 - American National Standard for Electrical Metallic Tubing -- Steel (EMT-S); 2020.
- C. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- D. NECA 101 - Standard for Installing Steel Conduits (Rigid, IMC, EMT); 2020.
- E. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; 2014.
- F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- G. UL 1 - Flexible Metal Conduit; Current Edition, Including All Revisions.
- H. UL 6 - Electrical Rigid Metal Conduit-Steel; Current Edition, Including All Revisions.
- I. UL 360 - Liquid-Tight Flexible Metal Conduit; Current Edition, Including All Revisions.
- J. UL 514B - Conduit, Tubing, and Cable Fittings; Current Edition, Including All Revisions.
- K. UL 797 - Electrical Metallic Tubing-Steel; Current Edition, Including All Revisions.

**1.04 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:
  - 1. Coordinate minimum sizes of conduits with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
  - 2. Coordinate the arrangement of conduits with structural members, ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
  - 3. Verify exact conduit termination locations required for boxes, enclosures, and equipment installed under other sections or by others.
  - 4. Coordinate the work with other trades to provide roof penetrations that preserve the integrity of the roofing system and do not void the roof warranty.

5. Notify Engineer/Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- B. Sequencing:
  1. Do not begin installation of conductors and cables until installation of conduit is complete between outlet, junction and splicing points.

### 1.05 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittals procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for conduits and fittings.
- C. Shop Drawings:
  1. Indicate proposed arrangement for conduits to be installed within structural concrete slabs, where permitted.
  2. Include proposed locations of roof penetrations and proposed methods for sealing.
- D. Project Record Documents: Record actual routing for conduits 3/4" trade size and larger, conduits 3/4" trade size and larger, and conduits 3/4" trade size and larger.

### 1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

### 1.07 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store conduit and fittings in accordance with manufacturer's instructions.

## PART 2 PRODUCTS

### 2.01 CONDUIT APPLICATIONS

- A. Do not use conduit and associated fittings for applications other than as permitted by NFPA 70 and product listing.
- B. Unless otherwise indicated and where not otherwise restricted, use the conduit types indicated for the specified applications. Where more than one listed application applies, comply with the most restrictive requirements. Where conduit type for a particular application is not specified, use galvanized steel rigid metal conduit.
- C. Underground:
  1. Exterior, Direct-Buried: Use Rigid PVC Conduit
  2. Where rigid pvc conduit is provided, transition to galvanized steel rigid metal conduit where emerging from underground.
  3. Where rigid polyvinyl (PVC) conduit larger than 2 inch (53 mm) trade size is provided, use galvanized steel rigid metal conduit elbows for bends.
- D. Concealed Within Masonry Walls: Use electrical metallic tubing (EMT).
- E. Concealed Within Hollow Stud Walls: Use electrical metallic tubing (EMT).
- F. Concealed Above Accessible Ceilings: Use electrical metallic tubing (EMT).
- G. Interior, Damp or Wet Locations: Use galvanized steel rigid metal conduit.
- H. Exposed, Interior, Not Subject to Physical Damage: Use galvanized steel rigid metal conduit.
- I. Exposed, Interior, Subject to Physical Damage: Use galvanized steel rigid metal conduit.

- J. Exposed, Exterior: Use galvanized steel rigid metal conduit.
- K. Connections to Luminaires Above Accessible Ceilings: Use flexible metal conduit.
  - 1. Maximum Length: 6 feet (1.8 m).
- L. Connections to Vibrating Equipment:
  - 1. Dry Locations: Use flexible metal conduit.
  - 2. Damp, Wet, or Corrosive Locations: Use liquidtight flexible metal conduit.
  - 3. Maximum Length: 6 feet (1.8 m) unless otherwise indicated.
  - 4. Vibrating equipment includes, but is not limited to:
    - a. Motors.

## 2.02 CONDUIT REQUIREMENTS

- A. Existing Work: Where existing conduits are indicated to be reused, they may be reused only where they comply with specified requirements, are free from corrosion, and integrity is verified by pulling a mandrel through them.
- B. Electrical Service Conduits: Also comply with Section 262100.
- C. Fittings for Grounding and Bonding: Also comply with Section 260526.
- D. Provide all conduit, fittings, supports, and accessories required for a complete raceway system.
- E. Provide products listed, classified, and labeled as suitable for the purpose intended.
- F. Minimum Conduit Size, Unless Otherwise Indicated:
  - 1. Branch Circuits: 3/4 inch (21 mm) trade size.
  - 2. Branch Circuit Homeruns: 3/4 inch (21 mm) trade size.
  - 3. Control Circuits: 1/2 inch (16 mm) trade size.
- G. Where conduit size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

## 2.03 GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

- A. Manufacturers:
  - 1. Allied Tube & Conduit: [www.alliedeg.com/#sle](http://www.alliedeg.com/#sle).
  - 2. Republic Conduit: [www.republic-conduit.com/#sle](http://www.republic-conduit.com/#sle).
  - 3. Wheatland Tube, a Division of Zekelman Industries: [www.wheatland.com/#sle](http://www.wheatland.com/#sle).
  - 4. Or Approved Equal.
- B. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6.
- C. Fittings:
  - 1. Manufacturers:
    - a. Bridgeport Fittings Inc: [www.bptfittings.com/#sle](http://www.bptfittings.com/#sle).
    - b. O-Z/Gedney, a brand of Emerson Electric Co: [www.emerson.com/#sle](http://www.emerson.com/#sle).
    - c. Thomas & Betts Corporation: [www.tnb.com/#sle](http://www.tnb.com/#sle).
    - d. Or Approved Equal.
  - 2. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
  - 3. Material: Use steel or malleable iron.
  - 4. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

## 2.04 FLEXIBLE METAL CONDUIT (FMC)

- A. Description: NFPA 70, Type FMC standard wall steel flexible metal conduit listed and labeled as complying with UL 1, and listed for use in classified firestop systems to be used.
- B. Fittings:

1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
2. Material: Use steel or malleable iron.

### **2.05 LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC)**

- A. Description: NFPA 70, Type LFMC polyvinyl chloride (PVC) jacketed steel flexible metal conduit listed and labeled as complying with UL 360.
- B. Fittings:
  1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
  2. Material: Use steel or malleable iron.

### **2.06 ELECTRICAL METALLIC TUBING (EMT)**

- A. Manufacturers:
  1. Allied Tube & Conduit; \_\_\_\_\_: [www.alliedeg.com/#sle](http://www.alliedeg.com/#sle).
  2. Republic Conduit: [www.republic-conduit.com/#sle](http://www.republic-conduit.com/#sle).
  3. Wheatland Tube, a Division of Zekelman Industries; \_\_\_\_\_: [www.wheatland.com/#sle](http://www.wheatland.com/#sle).
- B. Description: NFPA 70, Type EMT steel electrical metallic tubing complying with ANSI C80.3 and listed and labeled as complying with UL 797.
- C. Fittings:
  1. Manufacturers:
    - a. Bridgeport Fittings Inc: [www.bptfittings.com/#sle](http://www.bptfittings.com/#sle).
    - b. O-Z/Gedney, a brand of Emerson Electric Co: [www.emerson.com/#sle](http://www.emerson.com/#sle).
    - c. Thomas & Betts Corporation: [www.tnb.com/#sle](http://www.tnb.com/#sle).
    - d. Or Approved Equal.
  2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
  3. Material: Use steel or malleable iron.
  4. Connectors and Couplings: Use compression (gland) or set-screw type.
    - a. Do not use indenter type connectors and couplings.

### **2.07 ACCESSORIES**

- A. Corrosion Protection Tape: PVC-based, minimum thickness of 20 mil (0.51 mm).
- B. Conduit Joint Compound: Corrosion-resistant, electrically conductive; suitable for use with the conduit to be installed.
- C. Pull Strings: Use nylon cord with average breaking strength of not less than 200 pound-force (890 N).
- D. Sealing Compound for Sealing Fittings: Listed for use with the particular fittings to be installed.
- E. Modular Seals for Conduit Penetrations: Rated for minimum of 40 psig; Suitable for the conduits to be installed.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that field measurements are as indicated.
- B. Verify that mounting surfaces are ready to receive conduits.
- C. Verify that conditions are satisfactory for installation prior to starting work.

### **3.02 INSTALLATION**

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).

- C. Install galvanized steel rigid metal conduit (RMC) in accordance with NECA 101.
- D. Methods of Installation:
1. Cut conduits straight, properly ream, and cut threads for heavy wall conduit deep and clean.
  2. Field-bend conduit with benders designed for purpose so as not to distort nor vary internal diameter.
  3. Size conduits for fill of 40% or less per Chapter 9 tables of NEC, Minimum conduit size shall be 3/4".
  4. Conduits when entering watertight enclosures shall be secured with a myers hub.
  5. Fasten conduit terminations in sheet metal enclosures by 2 locknuts, and terminate with bushing. Install locknuts inside and outside enclosure.
  6. Install conduits as not to damage or run through structural members.
  7. Test every conduit run installed with ball mandrel. Clear and restore/repair and conduit which rejects ball mandrel.
  8. Provide permanent plastic tags at each end of embedded conduit run stating what the conduit is serving and where it is served from including the location.
  9. Label all junction boxes (larger than 6" x 6"); pull boxes, wireways with engraved plastic nameplates.
  10. Run all underground conduit under the slab in the dirt and hunt from the slab except for miscellaneous 3/4" conduits which may be run in the slab (with approval from Structural Engineer) if the below stated conditions are met. The depth shall vary as required to avoid underground plumbing. Run in slab when turning up. Hang conduit to slab with stainless steel rods looped around conduit with stainless steel washer to keep loop closed on one end; the other end is to have a 90 degree bend set into slab or looped around reinforcing rods. Use 1/4" diameter rod for conduit up to 2", 3/8" diameter for conduit 2 1/2" or greater in diameter. Space supports no greater than 4' apart, or as required by the National Electrical Code and local codes.
  11. Install underground conduits minimum of 24" below finished grade. Use 36" radius long fittings only.
  12. Exposed Conduits:
    - a. Install exposed conduits and extensions from concealed conduit systems neatly, parallel with, or at right angles to walls of the building.
- E. Conduit Routing:
1. Unless dimensioned, conduit routing indicated is diagrammatic.
  2. When conduit destination is indicated without specific routing, determine exact routing required.
  3. Conceal all conduits unless specifically indicated to be exposed.
  4. Conduits in the following areas may be exposed, unless otherwise indicated:
    - a. Electrical rooms.
    - b. Mechanical equipment rooms.
    - c. Within joists in areas with no ceiling.
  5. Arrange conduit to maintain adequate headroom, clearances, and access.
  6. Arrange conduit to provide no more than the equivalent of four 90 degree bends between pull points.
  7. Arrange conduit to provide no more than 150 feet (46 m) between pull points.
  8. Route conduits above water and drain piping where possible.
  9. Arrange conduit to prevent moisture traps. Provide drain fittings at low points and at sealing fittings where moisture may collect.
  10. Maintain minimum clearance of 6 inches (150 mm) between conduits and piping for other systems.
  11. Maintain minimum clearance of 12 inches (300 mm) between conduits and hot surfaces. This includes, but is not limited to:

- a. Heaters.
  - b. Hot water piping.
  - c. Flues.
12. Group parallel conduits in the same area together on a common rack.
- F. Conduit Support:
1. Secure and support conduits in accordance with NFPA 70 and Section 260529 using suitable supports and methods approved by the authority having jurisdiction.
  2. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
- G. Connections and Terminations:
1. Use approved zinc-rich paint or conduit joint compound on field-cut threads of galvanized steel conduits prior to making connections.
  2. Where two threaded conduits must be joined and neither can be rotated, use three-piece couplings or split couplings. Do not use running threads.
  3. Use suitable adapters where required to transition from one type of conduit to another.
  4. Provide drip loops for liquidtight flexible conduit connections to prevent drainage of liquid into connectors.
  5. Terminate threaded conduits in boxes and enclosures using threaded hubs or double lock nuts for dry locations and raintight hubs for wet locations.
  6. Provide insulating bushings or insulated throats at all conduit terminations to protect conductors.
  7. Secure joints and connections to provide maximum mechanical strength and electrical continuity.
- H. Penetrations:
1. Do not penetrate or otherwise notch or cut structural members, including footings and grade beams, without approval of Structural Engineer.
  2. Make penetrations perpendicular to surfaces unless otherwise indicated.
  3. Provide sleeves for penetrations as indicated or as required to facilitate installation. Set sleeves flush with exposed surfaces unless otherwise indicated or required.
  4. Conceal bends for conduit risers emerging above ground.
  5. Seal interior of conduits entering the building from underground at first accessible point to prevent entry of moisture and gases.
  6. Where conduits penetrate waterproof membrane, seal as required to maintain integrity of membrane.
  7. Make penetrations for roof-mounted equipment within associated equipment openings and curbs where possible to minimize roofing system penetrations. Where penetrations are necessary, seal as indicated or as required to preserve integrity of roofing system and maintain roof warranty. Include proposed locations of penetrations and methods for sealing with submittals.
  8. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 078400.
- I. Conduit Movement Provisions: Where conduits are subject to movement, provide expansion and expansion/deflection fittings to prevent damage to enclosed conductors or connected equipment. This includes, but is not limited to:
1. Where conduits cross structural joints intended for expansion, contraction, or deflection.
  2. Where conduits are subject to earth movement by settlement or frost.
- J. Condensation Prevention: Where conduits cross barriers between areas of potential substantial temperature differential, provide sealing fitting or approved sealing compound at an accessible point near the penetration to prevent condensation. This includes, but is not limited to:
1. Where conduits pass from outdoors into conditioned interior spaces.



- 2. Where conduits pass from unconditioned interior spaces into conditioned interior spaces.
- K. Provide grounding and bonding in accordance with Section 260526.

**3.03 PROTECTION**

- A. Immediately after installation of conduit, use suitable manufactured plugs to provide protection from entry of moisture and foreign material and do not remove until ready for installation of conductors.

**END OF SECTION**



**SECTION 260533.16**  
**BOXES FOR ELECTRICAL SYSTEMS****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Outlet and device boxes up to 100 cubic inches (1,650 cu cm), including those used as junction and pull boxes.
- B. Cabinets and enclosures, including junction and pull boxes larger than 100 cubic inches (1,650 cu cm).
- C. Boxes and enclosures for integrated power, data, and audio/video.

**1.02 RELATED REQUIREMENTS**

- A. Section 078400 - Firestopping.
- B. Section 083100 - Access Doors and Panels: Panels for maintaining access to concealed boxes.
- C. Section 260526 - Grounding and Bonding for Electrical Systems.
- D. Section 260529 - Hangers and Supports for Electrical Systems.
- E. Section 260533.13 - Conduit for Electrical Systems:
  - 1. Conduit bodies and other fittings.
  - 2. Additional requirements for locating boxes to limit conduit length and/or number of bends between pulling points.
- F. Section 260553 - Identification for Electrical Systems: Identification products and requirements.
- G. Section 262726 - Wiring Devices:
  - 1. Wall plates.
  - 2. Additional requirements for locating boxes for wiring devices.

**1.03 REFERENCE STANDARDS**

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- B. NECA 130 - Standard for Installing and Maintaining Wiring Devices; 2016.
- C. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; 2014.
- D. NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports; 2013 (Reaffirmed 2020).
- E. NEMA OS 2 - Nonmetallic Outlet Boxes, Device Boxes, Covers and Box Supports; 2013 (Reaffirmed 2020).
- F. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2020.
- G. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- H. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.
- I. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.
- J. UL 508A - Industrial Control Panels; Current Edition, Including All Revisions.
- K. UL 514A - Metallic Outlet Boxes; Current Edition, Including All Revisions.
- L. UL 514C - Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers; Current Edition, Including All Revisions.

- M. UL 1203 - Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations; Current Edition, Including All Revisions.

#### **1.04 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:
1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.
  2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
  3. Coordinate minimum sizes of boxes with the actual installed arrangement of conductors, clamps, support fittings, and devices, calculated according to NFPA 70.
  4. Coordinate minimum sizes of pull boxes with the actual installed arrangement of connected conduits, calculated according to NFPA 70.
  5. Coordinate the placement of boxes with millwork, furniture, devices, equipment, etc. installed under other sections or by others.
  6. Coordinate the work with other trades to preserve insulation integrity.
  7. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted boxes where indicated.
  8. Notify Engineer/Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

#### **1.05 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for cabinets and enclosures, boxes for hazardous (classified) locations, floor boxes, and underground boxes/enclosures.
- 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.
- D. Project Record Documents: Record actual locations for outlet and device boxes, pull boxes, cabinets and enclosures, floor boxes, and underground boxes/enclosures.
- E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
1. See Section 016000 - Product Requirements, for additional provisions.
  2. Keys for Lockable Enclosures: Two of each different key.

#### **1.06 QUALITY ASSURANCE**

- A. Comply with requirements of NFPA 70.
- B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

#### **1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

### **PART 2 PRODUCTS**

#### **2.01 BOXES**

- A. General Requirements:
1. Do not use boxes and associated accessories for applications other than as permitted by NFPA 70 and product listing.

2. Provide all boxes, fittings, supports, and accessories required for a complete raceway system and to accommodate devices and equipment to be installed.
  3. Provide products listed, classified, and labeled as suitable for the purpose intended.
  4. Where box size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
  5. Provide grounding terminals within boxes where equipment grounding conductors terminate.
- B. Outlet and Device Boxes Up to 100 cubic inches (1,650 cu cm), Including Those Used as Junction and Pull Boxes:
1. Use sheet-steel boxes for dry locations unless otherwise indicated or required.
  2. Use cast iron boxes or cast aluminum boxes for damp or wet locations unless otherwise indicated or required; furnish with compatible weatherproof gasketed covers.
  3. Use suitable concrete type boxes where flush-mounted in concrete.
  4. Use suitable masonry type boxes where flush-mounted in masonry walls.
  5. Use raised covers suitable for the type of wall construction and device configuration where required.
  6. Use shallow boxes where required by the type of wall construction.
  7. Do not use "through-wall" boxes designed for access from both sides of wall.
  8. Sheet-Steel Boxes: Comply with NEMA OS 1, and list and label as complying with UL 514A.
  9. Cast Metal Boxes: Comply with NEMA FB 1, and list and label as complying with UL 514A; furnish with threaded hubs.
  10. Nonmetallic Boxes: Comply with NEMA OS 2, and list and label as complying with UL 514C.
  11. Boxes for Supporting Luminaires and Ceiling Fans: Listed as suitable for the type and weight of load to be supported; furnished with fixture stud to accommodate mounting of luminaire where required.
  12. Boxes for Ganged Devices: Use multigang boxes of single-piece construction. Do not use field-connected gangable boxes unless specifically indicated or permitted.
  13. Minimum Box Size, Unless Otherwise Indicated:
    - a. Wiring Devices (Other Than Communications Systems Outlets): 4 inch square by 1-1/2 inch deep (100 by 38 mm) trade size.
  14. Wall Plates: Comply with Section 262726.
  15. Manufacturers:
    - a. Cooper Crouse-Hinds, a division of Eaton Corporation:  
[www.cooperindustries.com/#sle](http://www.cooperindustries.com/#sle).
    - b. Hubbell Incorporated; Bell Products; \_\_\_\_\_: [www.hubbell-rtb.com/#sle](http://www.hubbell-rtb.com/#sle).
    - c. Hubbell Incorporated; RACO Products; \_\_\_\_\_: [www.hubbell-rtb.com/#sle](http://www.hubbell-rtb.com/#sle).
    - d. O-Z/Gedney, a brand of Emerson Electric Co; \_\_\_\_\_: [www.emerson.com/#sle](http://www.emerson.com/#sle).
    - e. Thomas & Betts Corporation: [www.tnb.com/#sle](http://www.tnb.com/#sle).
    - f. Or Approved Equal.
- C. Cabinets and Enclosures, Including Junction and Pull Boxes Larger Than 100 cubic inches (1,650 cu cm):
1. Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E, or UL 508A.
  2. NEMA 250 Environment Type, Unless Otherwise Indicated:
    - a. Indoor Clean, Dry Locations: Type 12 painted steel.
    - b. Outdoor Locations: Type 3R, painted steel.
  3. Junction and Pull Boxes Larger Than 100 cubic inches (1,650 cu cm):
    - a. Provide screw-cover or hinged-cover enclosures unless otherwise indicated.
  4. Cabinets and Hinged-Cover Enclosures, Other Than Junction and Pull Boxes:
    - a. Provide lockable hinged covers, all locks keyed alike unless otherwise indicated.

- b. Back Panels: Painted steel, removable.
- c. Terminal Blocks: Provide voltage/current ratings and terminal quantity suitable for purpose indicated, with 25 percent spare terminal capacity.
- 5. Finish for Painted Steel Enclosures: Manufacturer's standard grey unless otherwise indicated.
- 6. Manufacturers:
  - a. Cooper B-Line, a division of Eaton Corporation: [www.cooperindustries.com/#sle](http://www.cooperindustries.com/#sle).
  - b. Hoffman, a brand of Pentair Technical Products: [www.hoffmanonline.com/#sle](http://www.hoffmanonline.com/#sle).
  - c. Hubbell Incorporated; Wiegmann Products: [www.hubbell-wiegmann.com/#sle](http://www.hubbell-wiegmann.com/#sle).
- D. Boxes and Enclosures for Integrated Power, Data, and Audio/Video: Size and configuration as indicated or as required with partitions to separate services; field-connected gangable boxes may be used.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that field measurements are as indicated.
- B. Verify that mounting surfaces are ready to receive boxes.
- C. Verify that conditions are satisfactory for installation prior to starting work.

### **3.02 INSTALLATION**

- A. Install products in accordance with manufacturer's instructions.
- B. Install boxes in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards where mounting heights are not indicated.
- C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- D. Provide separate boxes for emergency power and normal power systems.
- E. Unless otherwise indicated, provide separate boxes for line voltage and low voltage systems.
- F. Flush-mount boxes in finished areas unless specifically indicated to be surface-mounted.
- G. Unless otherwise indicated, boxes may be surface-mounted where exposed conduits are indicated or permitted.
- H. Round boxes are not acceptable where conduit must enter box through side of box.
- I. Provide knockout closures to cap unused knockout holes where blanks have been removed.
- J. Box Locations:
  - 1. Locate boxes to be accessible. Provide access panels in accordance with Section 083100 as required where approved by the Architect.
  - 2. Unless dimensioned, box locations indicated are approximate.
  - 3. Locate boxes as required for devices installed under other sections or by others.
    - a. Switches, Receptacles, and Other Wiring Devices: Comply with Section 262726.
  - 4. Locate boxes so that wall plates do not span different building finishes.
  - 5. Locate boxes so that wall plates do not cross masonry joints.
  - 6. Unless otherwise indicated, where multiple outlet boxes are installed at the same location at different mounting heights, install along a common vertical center line.
  - 7. Do not install flush-mounted boxes on opposite sides of walls back-to-back. Provide minimum 6 inches (150 mm) horizontal separation unless otherwise indicated.
  - 8. Fire Resistance Rated Walls: Install flush-mounted boxes such that the required fire resistance will not be reduced.
    - a. Do not install flush-mounted boxes on opposite sides of walls back-to-back; provide minimum 24 inches (610 mm) separation where wall is constructed with individual

- noncommunicating stud cavities or protect both boxes with listed putty pads.
- b. Do not install flush-mounted boxes with area larger than 16 square inches (0.0103 sq m) or such that the total aggregate area of openings exceeds 100 square inches (0.0645 sq m) for any 100 square feet (9.29 sq m) of wall area.
9. Locate junction and pull boxes as indicated, as required to facilitate installation of conductors, and to limit conduit length and/or number of bends between pulling points in accordance with Section 260533.13.
- K. Box Supports:
1. Secure and support boxes in accordance with NFPA 70 and Section 260529 using suitable supports and methods approved by the authority having jurisdiction.
  2. Provide independent support from building structure except for cast metal boxes (other than boxes used for fixture support) supported by threaded conduit connections in accordance with NFPA 70. Do not provide support from piping, ductwork, or other systems.
  3. Installation Above Suspended Ceilings: Do not provide support from ceiling grid or ceiling support system.
  4. Use far-side support to secure flush-mounted boxes supported from single stud in hollow stud walls. Repair or replace supports for boxes that permit excessive movement.
- L. Install boxes plumb and level.
- M. Flush-Mounted Boxes:
1. Install boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that front edge of box or associated raised cover is not set back from finished surface more than 1/4 inch (6 mm) or does not project beyond finished surface.
  2. Install boxes in combustible materials such as wood so that front edge of box or associated raised cover is flush with finished surface.
  3. Repair rough openings around boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that there are no gaps or open spaces greater than 1/8 inch (3 mm) at the edge of the box.
- N. Install boxes as required to preserve insulation integrity.
- O. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 078400.
- P. Close unused box openings.
- Q. Install blank wall plates on junction boxes and on outlet boxes with no devices or equipment installed or designated for future use.
- R. Provide grounding and bonding in accordance with Section 260526.
- S. Identify boxes in accordance with Section 260553.

### 3.03 CLEANING

- A. Clean interior of boxes to remove dirt, debris, plaster and other foreign material.

### 3.04 PROTECTION

- A. Immediately after installation, protect boxes from entry of moisture and foreign material until ready for installation of conductors.

**END OF SECTION**





**SECTION 260553  
IDENTIFICATION FOR ELECTRICAL SYSTEMS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Exposed conduit color banding
- B. Cable/Conductor Identification
- C. Operation Instructions and Warnings
- D. Danger Signs
- E. Equipment/System Identification Signs
- F. Voltage markers.
- G. Underground warning tape.
- H. Floor marking tape.

**1.02 REFERENCE STANDARDS**

- A. ANSI Z535.2 - American National Standard for Environmental and Facility Safety Signs; 2011 (Reaffirmed 2017).
- B. ANSI Z535.4 - American National Standard for Product Safety Signs and Labels; 2011 (Reaffirmed 2017).
- C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- D. NFPA 70E - Standard for Electrical Safety in the Workplace; 2024.
- E. UL 969 - Marking and Labeling Systems; Current Edition, Including All Revisions.

**1.03 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:
  - 1. Verify final designations for equipment, systems, and components to be identified prior to fabrication of identification products.
- B. Sequencing:
  - 1. Do not conceal items to be identified, in locations such as above suspended ceilings, until identification products have been installed.
  - 2. Do not install identification products until final surface finishes and painting are complete.

**1.04 SUBMITTALS**

- A. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product.
- B. Shop Drawings: Provide schedule of items to be identified indicating proposed designations, materials, legends, and formats.
- C. Manufacturer's 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.

**1.05 QUALITY ASSURANCE**

- A. Conform to requirements of NFPA 70 and NFPA 70E

**1.06 FIELD CONDITIONS**

- A. Do not install adhesive products when ambient temperature is lower than recommended by manufacturer.

**PART 2 PRODUCTS****2.01 ELECTRICAL IDENTIFICATION MATERIALS**

- A. General: Except as otherwise indicated, provide manufacturer's standard products of categories and types required for each application. Where more than single type is specified for an application, selection is Installer's option, but provide single selection for each application.
- B. Color-Coded Conduit Markers: Provide manufacturer's standard pre-printed, flexible or semi-rigid, permanent, plastic-sheet conduit markers. Except as otherwise indicated, provide lettering which indicates voltage of conductor(s) in conduit. Unless otherwise indicated or required by governing regulations, provide orange markers with black letters.
- C. Arc Fault Stickers: Contractor shall provide and install all arc fault stickers as required by NFPA 70E. Contractor shall provide all fault current studies necessary to provide appropriate stickers on all equipment.
- D. Cable/Conductor Identification Bands: Provide manufacturer's standard vinyl-cloth, self-adhesive cable/conductor wire markers or wrap-around type, numbered to show circuit identification.
- E. Self-adhesive Plastic Signs: Provide manufacturer's standard, self-adhesive or pressure-sensitive, pre-printed, flexible vinyl signs for operational instructions or warnings, of sizes suitable for application areas and adequate for visibility. Unless otherwise indicated or required by governing regulations, provide orange signs with black lettering.
- F. Danger Signs: Provide Manufacturer's standard "Danger" signs of baked enamel finish on 20-gage steel, of standard red, black, and white graphics for adequate vision (as examples: "High Voltage", "Keep Away", "Buried Cable", "Do Not Touch Switch").
- G. Engraved Plastic-Laminate Signs: Provide engraved stock melamine plastic-laminate, complying with FS L-P-387 in sizes and thicknesses indicated.
  - 1. Thickness: 1/16", for units up to 20 sq. in. or 8" length, 1/8" for larger units.
  - 2. Fasteners: Self-tapping stainless steel screws, except contact-type permanent adhesive where screws cannot or should not penetrate substrate.
- H. Manufacturers: Subject to compliance with requirements.

**2.02 LETTERING AND GRAPHICS**

- A. Coordinate names, abbreviations, and other designations used in electrical identification work with corresponding designations shown or specified for schedule. Provide numbers, lettering and wording as indicated or, if not otherwise indicated, as recommended by manufacturers or as required for proper identification and operation/maintenance of electrical system and equipment.
- B. Identification for Equipment:
  - 1. Use identification nameplate to identify each piece of electrical distribution and control equipment and associated sections, compartments, and components.
    - a. Panelboards:
      - 1) Identify ampere rating.
      - 2) Identify voltage and phase.
      - 3) Identify power source and circuit number. Include location when not within sight of equipment.
      - 4) Identify main overcurrent protective device. Use identification label for panelboards with a door. For power distribution panelboards without a door, use identification nameplate.
      - 5) Use typewritten circuit directory to identify load(s) served for panelboards with a door. Identify spares and spaces.
    - b. Transfer Switches:

- 1) Identify voltage and phase.
- 2) Identify short circuit current rating based on the specific overcurrent protective device type and settings protecting the transfer switch.
2. Service Equipment:
  - a. Use identification nameplate to identify each service disconnecting means.
3. Use voltage marker to identify highest voltage present for each piece of electrical equipment.
4. Use identification nameplate to identify equipment utilizing series ratings, where permitted, in accordance with NFPA 70.
5. Use identification label to identify overcurrent protective devices for branch circuits serving fire alarm circuits. Identify with text "FIRE ALARM CIRCUIT".
6. Use field-painted floor markings, floor marking tape, or warning labels to identify required equipment working clearances.
  - a. Field-Painted Floor Markings: Alternating black and white stripes, 3 inches (76 mm) wide, painted in accordance with Section 099123 and 099113.
7. Available Fault Current Documentation: Use identification label to identify the available fault current and date calculations were performed at locations requiring documentation by NFPA 70 including but not limited to the following.
  - a. Service equipment.
  - b. Motor control centers.
  - c. Elevator control panels.
8. Arc Flash Hazard Warning Labels: Comply with Section 260573.
9. Use warning signs to identify electrical hazards for entrances to all rooms and other guarded locations that contain exposed live parts operating at 600 V nominal or less with the word message "DANGER; Electrical hazard; Authorized personnel only" or approved equivalent.
- C. Identification for Raceways:
  1. Use identification labels, handwritten text using indelible marker, or plastic marker tags to identify spare conduits at each end. Identify purpose and termination location.
  2. Use underground warning tape to identify underground raceways.
- D. Identification for Devices:
  1. Use engraved wallplate to identify serving branch circuit for all receptacles.

## 2.03 VOLTAGE MARKERS

- A. Markers for Boxes and Equipment Enclosures: Use factory pre-printed self-adhesive vinyl or self-adhesive vinyl cloth type markers.
- B. Minimum Size:
  1. Markers for Equipment: 1 1/8 by 4 1/2 inches (29 by 110 mm).
- C. Legend:
  1. Markers for Voltage Identification: Highest voltage present.
- D. Color: Black text on orange background unless otherwise indicated.

## 2.04 UNDERGROUND WARNING TAPE

- A. Materials: Use non-detectable type polyethylene tape suitable for direct burial, unless otherwise indicated.
- B. Non-detectable Type Tape: 6 inches (152 mm) wide, with minimum thickness of 4 mil (0.1 mm).
- C. Legend: Type of service, continuously repeated over full length of tape.
- D. Color:

## 2.05 FLOOR MARKING TAPE

- A. Floor Marking Tape for Equipment Working Clearance Identification: Self-adhesive vinyl or polyester tape with overlamine, 3 inches (76 mm) wide, with alternating black and white stripes.

## PART 3 EXECUTION

### 3.01 PREPARATION

- A. Clean surfaces to receive adhesive products according to manufacturer's instructions.

### 3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. General Installation Requirements:
  - 1. Coordination: Where identification to be applied to surfaces which require finish, install identification after completion of painting.
  - 2. Regulations: Comply with governing regulations and requests of governing authorities for identification of electrical work.
- C. Conduit Identification:
  - 1. General: Apply color-coded identification on electrical conduit in a manner similar to piping identification. Except as otherwise indicated, use a color that matches surroundings as coded color for conduit.
- D. Cable/Conductor Identification:
  - 1. Apply cable/conductor identification on each box/enclosure/cabinet where wires are present, match identification with marking system used in panelboards, shop drawings, contract documents, and similar previously established identification for project electrical work.
  - 2. All conductors shall be clearly and permanently identified, and color coded per NEC.
  - 3. All control circuit and instrument circuit terminations shall be identified. For conductors #6 and smaller, conductor color-coding shall be color insulation. For conductor color coding of work larger than #6, use self-adhesive wrap around tape markers. Use markers for all panelboards, boxes, outlets, switches, circuit breakers and control centers.
  - 4. Operational Instructions and Warnings: Wherever reasonably required to ensure safe and efficient operation and maintenance of electrical and other related systems, and equipment, including prevention of misuse of electrical facilities by unauthorized personnel, install self-adhesive plastic signs or similar equivalent identification, instructions or warnings on switches, outlets and other control devices and covers of electrical enclosures.
- E. Equipment/System Identification:
  - 1. Install engraved plastic-laminate sign on each major unit of electrical equipment in the building unless unit is specified with its own self-explanatory identification.
  - 2. Provide text matching terminology and numbering of the contract documents and shop drawings. Provide signs for the following categories of electrical work:
    - a. Panelboards, electrical cabinets and enclosures
    - b. Access panel/doors to electrical facilities
    - c. Major electrical substation and switchboard
    - d. Disconnect/safety switches
    - e. Telecommunications switching equipment
    - f. Fire Alarm Master Station

**4.01 FIELD QUALITY CONTROL**

- A. Replace self-adhesive labels and markers that exhibit bubbles, wrinkles, curling or other signs of improper adhesion.

**END OF SECTION**



**SECTION 262416  
PANELBOARDS****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Power distribution panelboards.
- B. Lighting and appliance panelboards.
- C. Overcurrent protective devices for panelboards.

**1.02 RELATED REQUIREMENTS**

- A. Section 033000 - Cast-in-Place Concrete: Concrete equipment pads.
- B. Section 260526 - Grounding and Bonding for Electrical Systems.
- C. Section 260529 - Hangers and Supports for Electrical Systems.
- D. Section 260553 - Identification for Electrical Systems: Identification products and requirements.
- E. Section 260573 - Power System Studies: Additional criteria for the selection and adjustment of equipment and associated protective devices specified in this section.
- F. Section 262200 - Low-Voltage Transformers: Small power centers with integral primary breaker, transformer, and panelboard.

**1.03 REFERENCE STANDARDS**

- A. FS W-C-375 - Circuit Breakers, Molded Case; Branch Circuit and Service; 2013e, with Amendments (2022).
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- C. NECA 407 - Standard for Installing and Maintaining Panelboards; 2015.
- D. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2020.
- E. NEMA PB 1 - Panelboards; 2011.
- F. NEMA PB 1.1 - General Instructions for Proper Installation, Operation and Maintenance of Panelboards Rated 1000 Volts or Less; 2023.
- G. NETA ATS - Standard For Acceptance Testing Specifications For Electrical Power Equipment And Systems; 2021.
- H. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- I. UL 67 - Panelboards; Current Edition, Including All Revisions.
- J. UL 489 - Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures; Current Edition, Including All Revisions.

**1.04 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:
  - 1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.
  - 2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
  - 3. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted panelboards where indicated.
  - 4. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.

5. Notify Engineer/Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

#### **1.05 SUBMITTALS**

- A. Product Data: Provide manufacturer's standard catalog pages and data sheets for panelboards, enclosures, overcurrent protective devices, and other installed components and accessories.
  1. Include characteristic trip curves for each type and rating of overcurrent protective device upon request.
- B. Shop Drawings: Indicate outline and support point dimensions, voltage, main bus ampacity, overcurrent protective device arrangement and sizes, short circuit current ratings, conduit entry locations, conductor terminal information, and installed features and accessories.
  1. Include dimensioned plan and elevation views of panelboards and adjacent equipment with all required clearances indicated.
  2. Include wiring diagrams showing all factory and field connections.
  3. Clearly indicate whether proposed short circuit current ratings are fully rated or, where acceptable, series rated systems.
  4. Include documentation of listed series ratings upon request.
  5. Coordinate Fault Current ratings with Study.
- C. Source Quality Control Test Reports: Include reports for tests designated in NEMA PB 1 as routine tests.
- D. Field Quality Control Test Reports.
- E. 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.
- F. Project Record Documents: Record actual installed locations of panelboards and actual installed circuiting arrangements.
- G. Maintenance Data: Include information on replacement parts and recommended maintenance procedures and intervals.
- H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
  1. Panelboard Keys: Two of each different key.

#### **1.06 QUALITY ASSURANCE**

- A. Comply with requirements of NFPA 70.
- B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- D. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

#### **1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Receive, inspect, handle, and store panelboards in accordance with manufacturer's instructions and NECA 407.
- B. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- C. Handle carefully in accordance with manufacturer's written instructions to avoid damage to panelboard internal components, enclosure, and finish.



**1.08 FIELD CONDITIONS**

- A. Maintain ambient temperature within the following limits during and after installation of panelboards:
  - 1. Panelboards Containing Circuit Breakers: Between 23 degrees F (-5 degrees C) and 104 degrees F (40 degrees C).

**PART 2 PRODUCTS****2.01 MANUFACTURERS**

- A. ABB/GE; \_\_\_\_\_: [www.geindustrial.com/#sle](http://www.geindustrial.com/#sle).
- B. Eaton Corporation; \_\_\_\_\_: [www.eaton.com/#sle](http://www.eaton.com/#sle).
- C. Schneider Electric; Square D Products; \_\_\_\_\_: [www.schneider-electric.us/#sle](http://www.schneider-electric.us/#sle).
- D. Siemens Industry, Inc; \_\_\_\_\_: [www.usa.siemens.com/#sle](http://www.usa.siemens.com/#sle).
- E. Or Approved Equal.
- F. Source Limitations: Furnish panelboards and associated components produced by the same manufacturer as the other electrical distribution equipment used for this project and obtained from a single supplier.

**2.02 PANELBOARDS - GENERAL REQUIREMENTS**

- A. Provide products listed, classified, and labeled as suitable for the purpose intended.
- B. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:
  - 1. Altitude: Less than 6,600 feet (2,000 m).
- C. Short Circuit Current Rating:
  - 1. Provide panelboards with listed short circuit current rating not less than the available fault current at the installed location as determined by short circuit study performed in accordance with Section 260573.
  - 2. Listed series ratings are not acceptable.
- D. Main Breaker: Configure for top or bottom incoming feed as indicated or as required for the installation.
- E. Branch Mounted Main Circuit Breakers are not allowed.
- F. Branch Overcurrent Protective Devices: Replaceable without disturbing adjacent devices.
- G. Bussing: Sized in accordance with UL 67 temperature rise requirements.
  - 1. Provide fully rated neutral bus unless otherwise indicated, with a suitable lug for each feeder or branch circuit requiring a neutral connection.
  - 2. Provide solidly bonded equipment ground bus in each panelboard, with a suitable lug for each feeder and branch circuit equipment grounding conductor.
- H. Conductor Terminations: Suitable for use with the conductors to be installed.
- I. Enclosures: Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E.
  - 1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
    - a. Indoor Clean, Dry Locations: Type 1.
    - b. Outdoor Locations: Type 12/3R.
  - 2. Boxes: Galvanized steel unless otherwise indicated.
    - a. Cabinets shall be of such size as to allow a wiring gutter space of at least 6" all around for power panels, and 4" all around for lighting panels.
    - b. Provide painted steel boxes for surface-mounted panelboards where indicated, finish to match fronts.
  - 3. Fronts:

- a. Fronts for Surface-Mounted Enclosures: Same dimensions as boxes.
- b. Finish for Painted Steel Fronts: Manufacturer's standard grey unless otherwise indicated.
- 4. Lockable Doors: All locks keyed alike unless otherwise indicated.
- J. Future Provisions: Prepare all unused spaces for future installation of devices including bussing, connectors, mounting hardware and all other required provisions.
- K. Each Panelboard shall be complete with main tin plated copper bus run up the center and neutral bars where required and all proper sequence phase connections. Polarized panelboards will not be accepted. Capacities of copper busses and connections shall be based on a maximum density of 1000 amps per sq. in. spacing of busses shall not be less than code requirements.
- L. Busses shall be arranged as indicated on the drawings. Busses shall be provided with suitable phase identification.
- M. Directory holder with metal frame shall be furnished and installed upon the door of each cabinet, with complete typewritten circuit schedule inserted.
- N. The inside and outside of panelboard boxes, doors and trims shall be furnished with at least two coats of manufacturer's standard finish paint over a baked-on prime coat.
- O. Provide ground bus. Provide additional isolated ground bus where specified.
- P. Lighting and Appliance Panels: Panels shall be for use on voltage phase, number of wire system, 60 cycle, solid neutral service, with number and size of bolt-on type circuit breaker branches as shown on the drawings. Circuit breaker's interrupting capacity shall be 10,000 RMS symmetrical amperes unless otherwise noted.
- Q. Power and Distribution Panels:
  - 1. Power and distribution panels shall be the dead-front type, with hinged doors, with fusible circuit breakers in the branches as indicated on the drawings. The panels shall be suitable for 208/120 volt, 3-Phase, 4-wire or 480/277 volt, 3-phase, 4-wire supply as shown.

### 2.03 POWER DISTRIBUTION PANELBOARDS

- A. Description: Panelboards complying with NEMA PB 1, power and feeder distribution type, circuit breaker type, and listed and labeled as complying with UL 67; ratings, configurations and features as indicated on the drawings.
- B. Conductor Terminations:
  - 1. Main and Neutral Lug Material: Copper suitable for terminating copper conductors only.
  - 2. Main and Neutral Lug Type: Mechanical.
- C. Bussing:
  - 1. Phase and Neutral Bus Material: Copper.
  - 2. Ground Bus Material: Copper.
- D. Circuit Breakers:
  - 1. Provide bolt-on type.
  - 2. Provide thermal magnetic circuit breakers unless otherwise indicated.
  - 3. Provide electronic trip circuit breakers where indicated.
- E. Enclosures:
  - 1. Provide surface-mounted enclosures unless otherwise indicated.
  - 2. Nema 1 Indoors, Nema 12/3R outdoors.

### 2.04 LIGHTING AND APPLIANCE PANELBOARDS

- A. Description: Panelboards complying with NEMA PB 1, lighting and appliance branch circuit type, circuit breaker type, and listed and labeled as complying with UL 67; ratings, configurations and features as indicated on the drawings.

- B. Conductor Terminations:
  - 1. Main and Neutral Lug Material: Copper suitable for terminating copper conductors only.
  - 2. Main and Neutral Lug Type: Mechanical.
- C. Bussing:
  - 1. Phase Bus Connections: Arranged for sequential phasing of overcurrent protective devices.
  - 2. Phase and Neutral Bus Material: Copper.
  - 3. Ground Bus Material: Copper.
- D. Circuit Breakers: Thermal magnetic bolt-on type unless otherwise indicated.
- E. Enclosures:
  - 1. Provide surface-mounted enclosures as indicated.
- F. Provide column-width panelboards with accessory column-width cable trough and pullbox where indicated.

## 2.05 OVERCURRENT PROTECTIVE DEVICES

- A. Molded Case Circuit Breakers:
  - 1. Description: Quick-make, quick-break, over center toggle, trip-free, trip-indicating circuit breakers listed and labeled as complying with UL 489, and complying with FS W-C-375 where applicable; ratings, configurations, and features as indicated on the drawings.
  - 2. Interrupting Capacity:
    - a. Provide circuit breakers with interrupting capacity as required to provide the short circuit current rating indicated, but not less than:
      - 1) 10,000 rms symmetrical amperes at 240 VAC or 208 VAC.
      - 2) 14,000 rms symmetrical amperes at 480 VAC.
    - b. Fully Rated Systems: Provide circuit breakers with interrupting capacity not less than the short circuit current rating indicated.
  - 3. Conductor Terminations:
    - a. Provide mechanical lugs unless otherwise indicated.
    - b. Provide compression lugs where indicated.
    - c. Lug Material: Copper suitable for terminating copper conductors only.
  - 4. Thermal Magnetic Circuit Breakers: For each pole, furnish thermal inverse time tripping element for overload protection and magnetic instantaneous tripping element for short circuit protection.
    - a. Provide field-adjustable magnetic instantaneous trip setting for circuit breaker frame sizes 225 amperes and larger.
  - 5. Multi-Pole Circuit Breakers: Furnish with common trip for all poles.
  - 6. Provide the following circuit breaker types where indicated:
    - a. Ground Fault Circuit Interrupter (GFCI) Circuit Breakers: Listed as complying with UL 943, class A for protection of personnel.
    - b. Ground Fault Equipment Protection Circuit Breakers: Designed to trip at 30 mA for protection of equipment.
    - c. 100 Percent Rated Circuit Breakers: Listed for application within the panelboard where installed at 100 percent of the continuous current rating.
    - d. Current Limiting Circuit Breakers: Without using fusible elements, designed to limit the let-through energy to a value less than the energy of a one-half cycle wave of the symmetrical prospective current when operating within its current limiting range.
  - 7. Provide listed switching duty rated circuit breakers with SWD marking for all branch circuits serving fluorescent lighting.
  - 8. Provide listed high intensity discharge lighting rated circuit breakers with HID marking for all branch circuits serving HID lighting.
  - 9. Do not use tandem circuit breakers.

10. Do not use handle ties in lieu of multi-pole circuit breakers.
11. Provide multi-pole circuit breakers for multi-wire branch circuits as required by NFPA 70.
12. Provide the following features and accessories where indicated or where required to complete installation:
  - a. Shunt Trip: Provide coil voltage as required for connection to indicated trip actuator.
  - b. Handle Pad-Lock Provision: For locking circuit breaker handle in OFF position.

## **2.06 SOURCE QUALITY CONTROL**

- A. Factory test panelboards according to NEMA PB 1.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that field measurements are as indicated.
- B. Verify that the ratings and configurations of the panelboards and associated components are consistent with the indicated requirements.
- C. Verify that mounting surfaces are ready to receive panelboards.
- D. Verify that conditions are satisfactory for installation prior to starting work.

### **3.02 INSTALLATION**

- A. Perform work in accordance with NECA 1 (general workmanship).
- B. Install products in accordance with manufacturer's instructions.
- C. Install panelboards in accordance with NECA 407 and NEMA PB 1.1.
- D. Secure all panelboards to building structure/walls to comply with tightening torques specified to UL stds. 486A and B.
- E. Panelboard loads shall be balanced between phases.
- F. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- G. Install panelboards plumb.
- H. Mount panelboards such that the highest position of any operating handle for circuit breakers or switches does not exceed 79 inches (2000 mm) above the floor or working platform.
- I. Mount floor-mounted power distribution panelboards on properly sized 3 inch (80 mm) high concrete pad constructed in accordance with Section 033000.
- J. Provide grounding and bonding in accordance with Section 260526.
  1. Terminate branch circuit equipment grounding conductors on solidly bonded equipment ground bus only. Do not terminate on isolated/insulated ground bus.
- K. Install all field-installed branch devices, components, and accessories.
- L. Multi-Wire Branch Circuits: Group grounded and ungrounded conductors together in the panelboard as required by NFPA 70.
- M. Set field-adjustable circuit breaker tripping function settings per load study.
- N. Provide filler plates to cover unused spaces in panelboards.
- O. Provide circuit breaker lock-on devices to prevent unauthorized personnel from de-energizing essential loads for the following:
  1. Fire detection and alarm circuits.
  2. Communications equipment circuits.

### **3.03 FIELD QUALITY CONTROL**

- A. See Section 014000 - Quality Requirements, for additional requirements.
- B. Inspect and test in accordance with NETA ATS, except Section 4.

- C. Test GFCI circuit breakers to verify proper operation.
- D. Test shunt trips to verify proper operation.
- E. Procure services of a qualified manufacturer's representative to observe installation and assist in inspection, testing, and adjusting. Include manufacturer's reports with field quality control submittals.
- F. Correct deficiencies and replace damaged or defective panelboards or associated components.

**3.04 ADJUSTING**

- A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.
- B. Adjust alignment of panelboard fronts.
- C. Load Balancing: For each panelboard, rearrange circuits such that the difference between each measured steady state phase load does not exceed 20 percent and adjust circuit directories accordingly. Maintain proper phasing for multi-wire branch circuits.

**3.05 CLEANING**

- A. Clean dirt and debris from panelboard enclosures and components according to manufacturer's instructions.
- B. Repair scratched or marred exterior surfaces to match original factory finish.

**END OF SECTION**



**SECTION 262726  
WIRING DEVICES****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Wall switches.
- B. Receptacles.
- C. Wall plates.

**1.02 RELATED REQUIREMENTS**

- A. Section 260519 - Low-Voltage Electrical Power Conductors and Cables: Manufactured wiring systems for use with access floor boxes with compatible pre-wired connectors.
- B. Section 260526 - Grounding and Bonding for Electrical Systems.
- C. Section 260533.16 - Boxes for Electrical Systems.
- D. Section {id\#874} - Boxes for Electrical Systems.
- E. Section 260553 - Identification for Electrical Systems: Identification products and requirements.

**1.03 REFERENCE STANDARDS**

- A. FS W-C-596 - Connector, Electrical, Power, General Specification for; 2014h, with Amendments (2017).
- B. FS W-S-896 - Switches, Toggle (Toggle and Lock), Flush Mounted (General Specification); 2014g, with Amendment (2017).
- C. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- D. NECA 130 - Standard for Installing and Maintaining Wiring Devices; 2016.
- E. NEMA WD 1 - General Color Requirements for Wiring Devices; 1999 (Reaffirmed 2020).
- F. NEMA WD 6 - Wiring Devices - Dimensional Specifications; 2021.
- G. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- H. UL 20 - General-Use Snap Switches; Current Edition, Including All Revisions.
- I. UL 498 - Attachment Plugs and Receptacles; Current Edition, Including All Revisions.
- J. UL 514D - Cover Plates for Flush-Mounted Wiring Devices; Current Edition, Including All Revisions.
- K. UL 943 - Ground-Fault Circuit-Interrupters; Current Edition, Including All Revisions.
- L. UL 1310 - Class 2 Power Units; Current Edition, Including All Revisions.

**1.04 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:
  - 1. Coordinate the placement of outlet boxes with millwork, furniture, equipment, etc. installed under other sections or by others.
  - 2. Coordinate wiring device ratings and configurations with the electrical requirements of actual equipment to be installed.
  - 3. Coordinate the placement of outlet boxes for wall switches with actual installed door swings.
  - 4. Coordinate the installation and preparation of uneven surfaces, such as split face block, to provide suitable surface for installation of wiring devices.
  - 5. Coordinate the core drilling of holes for poke-through assemblies with the work covered under other sections.

6. Notify Engineer/Architect of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.
- B. Sequencing:
  1. Do not install wiring devices until final surface finishes and painting are complete.

### **1.05 SUBMITTALS**

- A. Product Data: Provide manufacturer's catalog information showing dimensions, colors, and configurations.
- B. Samples: One for each type and color of device and wall plate specified.
- C. Field Quality Control Test Reports.
- D. 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.
- E. Operation and Maintenance Data:
  1. GFCI Receptacles: Include information on status indicators.
- F. Project Record Documents: Record actual installed locations of wiring devices.

### **1.06 QUALITY ASSURANCE**

- A. Comply with requirements of NFPA 70.
- B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- D. Products: Listed, classified, and labeled as suitable for the purpose intended.
- E. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

### **1.07 DELIVERY, STORAGE, AND PROTECTION**

- A. Store in a clean, dry space in original manufacturer's packaging until ready for installation.

## **PART 2 PRODUCTS**

### **2.01 GENERAL**

- A. Provide factory-fabricated wiring devices, in types, colors, and electrical ratings for applications indicated and complying with NEMA stds. Pub. No. WD or as required. Unless otherwise noted device cover plates shall be high abuse nylon or stainless steel in industrial locations.

### **2.02 WIRING DEVICE APPLICATIONS**

- A. Provide wiring devices suitable for intended use and with ratings adequate for load served.
- B. For single receptacles installed on an individual branch circuit, provide receptacle with 20 ampere rating minimum and not less than that of the branch circuit.
- C. Provide weather resistant GFCI receptacles with specified weatherproof covers for receptacles installed outdoors or in damp or wet locations.
- D. Provide GFCI protection for receptacles installed within 6 feet (1.8 m) of sinks.
- E. Provide GFCI protection for receptacles installed in kitchens.
- F. Provide GFI protection for all receptacles serving electric drinking fountains. Use GFCI Breaker for GFI protection.
- G. Unless noted otherwise, do not use combination switch/receptacle devices.



**2.03 WIRING DEVICE FINISHES**

- A. Provide wiring device finishes as described below unless otherwise indicated.
- B. Wiring Devices Installed in Finished Spaces: White with stainless steel wall plate.
- C. Wiring Devices Installed in Unfinished Spaces: White with stainless steel wall plate.
- D. Wiring Devices Installed in Wet or Damp Locations: White with specified weatherproof cover.

**2.04 WALL SWITCHES**

- A. Manufacturers:
  - 1. Leviton Manufacturing Company, Inc: [www.leviton.com/#sle](http://www.leviton.com/#sle).
  - 2. Pass & Seymour, a brand of Legrand North America, Inc: [www.legrand.us/#sle](http://www.legrand.us/#sle).
  - 3. Or Approved Equal.
- B. Wall Switches - General Requirements: AC only, quiet operating, general-use snap switches with silver alloy contacts, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 20 and where applicable FS W-S-896; types as indicated on the drawings.
  - 1. Wiring Provisions: Terminal screws for side wiring and screw actuated binding clamp for back wiring with separate ground terminal screw.
- C. Standard Wall Switches: Industrial specification grade, 20 A, 120/277 V with standard toggle type switch actuator and maintained contacts; single pole single throw, double pole single throw, three way, or four way as indicated on the drawings.

**2.05 RECEPTACLES**

- A. Manufacturers:
  - 1. Leviton Manufacturing Company, Inc: [www.leviton.com/#sle](http://www.leviton.com/#sle).
  - 2. Lutron Electronics Company, Inc; Designer Style: [www.lutron.com/#sle](http://www.lutron.com/#sle).
  - 3. Pass & Seymour, a brand of Legrand North America, Inc: [www.legrand.us/#sle](http://www.legrand.us/#sle).
  - 4. Or Approved Equal.
- B. Receptacles - General Requirements: Self-grounding, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 498 and where applicable FS W-C-596; types as indicated on the drawings.
  - 1. Wiring Provisions: Terminal screws for side wiring or screw actuated binding clamp for back wiring with separate ground terminal screw.
  - 2. NEMA configurations specified are according to NEMA WD 6.
- C. Convenience Receptacles:
  - 1. Standard Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R; single or duplex as indicated on the drawings.
  - 2. Weather Resistant Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R, listed and labeled as weather resistant type complying with UL 498 Supplement SE suitable for installation in damp or wet locations; single or duplex as indicated on the drawings.
  - 3. Tamper Resistant Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R, listed and labeled as tamper resistant type; single or duplex as indicated on the drawings.
- D. GFCI Receptacles:
  - 1. GFCI Receptacles - General Requirements: Self-testing, with feed-through protection and light to indicate ground fault tripped condition and loss of protection; listed as complying with UL 943, class A.
    - a. Provide test and reset buttons of same color as device.
  - 2. Standard GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style.

3. Weather Resistant GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style, listed and labeled as weather resistant type complying with UL 498 Supplement SE suitable for installation in damp or wet locations.
- E. USB Charging Devices:
  1. USB Charging Devices - General Requirements: Listed as complying with UL 1310.
    - a. Charging Capacity - Two-Port Devices: 2.1 A, minimum.
  2. USB Charging/Tamper Resistant Receptacle Combination Devices: Two-port (Type A) USB charging device and receptacle, commercial specification grade, duplex, 20A, 125V, NEMA 5-20R, listed and labeled as tamper resistant type; rectangular decorator style.

## 2.06 WALL PLATES

- A. Manufacturers:
  1. Hubbell Incorporated: [www.hubbell-wiring.com/#sle](http://www.hubbell-wiring.com/#sle).
  2. Leviton Manufacturing Company, Inc: [www.leviton.com/#sle](http://www.leviton.com/#sle).
  3. Lutron Electronics Company, Inc; \_\_\_\_\_: [www.lutron.com/#sle](http://www.lutron.com/#sle).
  4. Pass & Seymour, a brand of Legrand North America, Inc: [www.legrand.us/#sle](http://www.legrand.us/#sle).
  5. Or Approved Equal.
- B. Wall Plates: Comply with UL 514D.
  1. Configuration: One piece cover as required for quantity and types of corresponding wiring devices.
  2. Size: Standard; \_\_\_\_\_.
  3. Screws: Metal with tamper-resistant heads finished to match wall plate finish.
- C. Stainless Steel Wall Plates: Brushed satin finish, Type 302 stainless steel.
- D. Weatherproof Covers for Damp Locations: Gasketed, cast aluminum, with self-closing hinged cover and corrosion-resistant screws; listed as suitable for use in wet locations with cover closed.
- E. Weatherproof Covers for Wet Locations: Gasketed, cast aluminum, with hinged lockable cover and corrosion-resistant screws; listed as suitable for use in wet locations while in use with attachment plugs connected and identified as extra-duty type.

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. 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.
- C. Verify that wall openings are neatly cut and will be completely covered by wall plates.
- D. Verify that final surface finishes are complete, including painting.
- E. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.
- F. Verify that conditions are satisfactory for installation prior to starting work.

### 3.02 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.

### 3.03 INSTALLATION

- A. Perform work in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated.
- B. Coordinate locations of outlet boxes provided under Section 260533.16 as required for installation of wiring devices provided under this section.

1. Mounting Heights: Unless otherwise indicated, as follows:
    - a. Wall Switches: 48 inches (1200 mm) above finished floor.
    - b. Receptacles: 18 inches (450 mm) above finished floor or 6 inches (150 mm) above counter.
  2. Orient outlet boxes for vertical installation of wiring devices unless otherwise indicated.
  3. Where multiple receptacles, wall switches, or wall dimmers are installed at the same location and at the same mounting height, gang devices together under a common wall plate.
  4. Locate wall switches on strike side of door with edge of wall plate 3 inches (80 mm) from edge of door frame. Where locations are indicated otherwise, notify Engineer/Architect to obtain direction prior to proceeding with work.
  5. Locate receptacles for electric drinking fountains concealed behind drinking fountain according to manufacturer's instructions.
- C. Install wiring devices in accordance with manufacturer's instructions.
- D. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.
- E. Where required, connect wiring devices using pigtails not less than 6 inches (150 mm) long. Do not connect more than one conductor to wiring device terminals.
- F. 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.
- G. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
- H. Provide GFCI receptacles with integral GFCI protection at each location indicated. Do not use feed-through wiring to protect downstream devices.
- I. Where split-wired duplex receptacles are indicated, remove tabs connecting top and bottom receptacles.
- J. Install wiring devices plumb and level with mounting yoke held rigidly in place.
- K. Install wall switches with OFF position down.
- L. Install vertically mounted receptacles with grounding pole on top and horizontally mounted receptacles with grounding pole on left.
- M. Install wall plates to fit completely flush to wall with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.
- N. Install blank wall plates on junction boxes and on outlet boxes with no wiring devices installed or designated for future use.
- O. Identify wiring devices in accordance with Section 260553.

### **3.04 FIELD QUALITY CONTROL**

- A. See Section 014000 - Quality Requirements, for additional requirements.
- B. Prior to energizing circuitry, test wiring devices for electrical continuity and proper polarity connections. After energizing circuitry, test wiring devices to demonstrate compliance with requirements.
- C. Inspect each wiring device for damage and defects.
- D. Test each GFCI receptacle for proper tripping operation according to manufacturer's instructions.
- E. Correct wiring deficiencies and replace damaged or defective wiring devices.

**3.05 ADJUSTING**

- A. Adjust devices and wall plates to be flush and level.

**3.06 CLEANING**

- A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

**END OF SECTION**

**SECTION 265100  
INTERIOR LIGHTING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Interior luminaires.
- B. Emergency lighting units.
- C. Exit signs.
- D. Ballasts and drivers.
- E. Lamps.
- F. Accessories.

**1.02 RELATED REQUIREMENTS**

- A. Section 260529 - Hangers and Supports for Electrical Systems.
- B. Section 260533.16 - Boxes for Electrical Systems.
- C. Section 260553 - Identification for Electrical Systems: Identification products and requirements.
- D. Section 262726 - Wiring Devices: Manual wall switches and wall dimmers.
- E. Section 265600 - Exterior Lighting.

**1.03 REFERENCE STANDARDS**

- A. 47 CFR 15 - Radio Frequency Devices; current edition.
- B. ANSI C82.4 - American National Standard for Lamp Ballasts - Ballasts for High-Intensity-Discharge and Low-Pressure Sodium Lamps; 2017, with Editorial Revision (2022).
- C. ANSI C82.11 - American National Standard for Lamp Ballasts - High Frequency Fluorescent Lamp Ballasts; 2023.
- D. IEEE C62.41.2 - IEEE Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and less) AC Power Circuits; 2002 (Corrigendum 2012).
- E. IES LM-63 - Approved Method: IES Standard File Format for the Electronic Transfer of Photometric Data and Related Information; 2019.
- F. IES LM-79 - Approved Method: Optical and Electrical Measurements of Solid-State Lighting Products; 2019.
- G. IES LM-80 - Approved Method: Measuring Maintenance of Light Output Characteristics of Solid-State Light Sources; 2021.
- H. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- I. NECA/IESNA 500 - Standard for Installing Indoor Lighting Systems; 2006.
- J. NECA/IESNA 502 - Standard for Installing Industrial Lighting Systems; 2006.
- K. NEMA LE 4 - Recessed Luminaires, Ceiling Compatibility; 2012 (Reaffirmed 2018).
- L. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- M. NFPA 101 - Life Safety Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- N. UL 844 - Luminaires for Use in Hazardous (Classified) Locations; Current Edition, Including All Revisions.
- O. UL 924 - Emergency Lighting and Power Equipment; Current Edition, Including All Revisions.
- P. UL 935 - Fluorescent-Lamp Ballasts; Current Edition, Including All Revisions.

- Q. UL 1029 - High-Intensity-Discharge Lamp Ballasts; Current Edition, Including All Revisions.
- R. UL 1598 - Luminaires; Current Edition, Including All Revisions.
- S. UL 8750 - Light Emitting Diode (LED) Equipment for Use in Lighting Products; Current Edition, Including All Revisions.

#### **1.04 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:
  - 1. Coordinate the installation of luminaires with mounting surfaces installed under other sections or by others. Coordinate the work with placement of supports, anchors, etc. required for mounting. Coordinate compatibility of luminaires and associated trims with mounting surfaces at installed locations.
  - 2. Coordinate the placement of luminaires with structural members, ductwork, piping, equipment, diffusers, fire suppression system components, and other potential conflicts installed under other sections or by others.
  - 3. Coordinate the placement of exit signs with furniture, equipment, signage or other potential obstructions to visibility installed under other sections or by others.
  - 4. Notify Engineer/Architect of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.

#### **1.05 SUBMITTALS**

- A. Shop Drawings:
  - 1. Indicate dimensions and components for each luminaire that is not a standard product of the manufacturer.
  - 2. Provide photometric calculations where luminaires are proposed for substitution 10 days prior to bid date for Engineer Approval.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, installed accessories, and ceiling compatibility; include model number nomenclature clearly marked with all proposed features.
  - 1. LED Luminaires:
    - a. Include estimated useful life, calculated based on IES LM-80 test data.
    - b. Include IES LM-79 test report upon request.
  - 2. Provide electronic files of photometric data certified by a National Voluntary Laboratory Accreditation Program (NVLAP) lab or independent testing agency in IES LM-63 standard format upon request.
  - 3. Lamps: Include rated life, color temperature, color rendering index (CRI), and initial and mean lumen output.
- C. Field quality control reports.
- D. 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.
- E. Operation and Maintenance Data: Instructions for each product including information on replacement parts.
- F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
  - 1. See Section 016000 - Product Requirements, for additional provisions.
  - 2. Extra Lamps: Ten percent of total quantity installed for each type, but not less than two of each type.

#### **1.06 QUALITY ASSURANCE**

- A. Comply with requirements of NFPA 70.

- B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- D. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

### **1.07 DELIVERY, STORAGE, AND PROTECTION**

- A. Receive, handle, and store products according to NECA/IESNA 500 (commercial lighting), NECA/IESNA 502 (industrial lighting), and manufacturer's written instructions.
- B. Keep products in original manufacturer's packaging and protect from damage until ready for installation.

### **1.08 FIELD CONDITIONS**

- A. Maintain field conditions within manufacturer's required service conditions during and after installation.

## **PART 2 PRODUCTS**

### **2.01 LUMINAIRE TYPES**

- A. Furnish products as indicated in luminaire schedule included on the drawings.

### **2.02 LUMINAIRES**

- A. Provide products that comply with requirements of NFPA 70.
- B. Provide products that are listed and labeled as complying with UL 1598, where applicable.
- C. Provide products listed, classified, and labeled as suitable for the purpose intended.
- D. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.
- E. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, supports, trims, accessories, etc. as necessary for a complete operating system.
- F. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.
- G. Recessed Luminaires:
  - 1. Ceiling Compatibility: Comply with NEMA LE 4.
  - 2. Luminaires Recessed in Insulated Ceilings: Listed and labeled as IC-rated, suitable for direct contact with insulation and combustible materials.
  - 3. Luminaires Recessed in Sloped Ceilings: Provide suitable sloped ceiling adapters.
- H. 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.
- I. Luminaires Mounted in Continuous Rows: Provide quantity of units required for length indicated, with all accessories required for joining and aligning.

### **2.03 EMERGENCY LIGHTING UNITS**

- A. Description: Emergency lighting units complying with NFPA 101 and all applicable state and local codes, and listed and labeled as complying with UL 924.

- B. Operation: Upon interruption of normal power source or brownout condition exceeding 20 percent voltage drop from nominal, solid-state control automatically switches connected lamps to integral battery power for minimum of 90 minutes of rated emergency illumination, and automatically recharges battery upon restoration of normal power source.
- C. Battery:
  - 1. Sealed maintenance-free lead calcium unless otherwise indicated.
  - 2. Size battery to supply all connected lamps, including emergency remote heads where indicated.
- D. Diagnostics: Provide power status indicator light and accessible integral test switch to manually activate emergency operation.
- E. Provide low-voltage disconnect to prevent battery damage from deep discharge.
- F. Self-Diagnostics: Provide units that self-monitor functionality and automatically perform testing required by NFPA 101 where indicated; provide indicator light(s) to report test and diagnostic status.
- G. Accessories:
  - 1. Provide compatible accessory mounting brackets where indicated or required to complete installation.
  - 2. Provide compatible accessory high impact polycarbonate vandal shields where indicated.
  - 3. Provide compatible accessory wire guards where indicated.
  - 4. Where indicated, provide emergency remote heads that are compatible with the emergency lighting unit they are connected to and suitable for the installed location.

#### 2.04 EXIT SIGNS

- A. Description: Internally illuminated exit signs with LEDs unless otherwise indicated; complying with NFPA 101 and all applicable state and local codes, and listed and labeled as complying with UL 924.
  - 1. Number of Faces: Single or double as indicated or as required for the installed location.
  - 2. Directional Arrows: As indicated or as required for the installed location.
- B. Self-Luminous Exit Signs: Internally illuminated by tritium gas sealed inside phosphor lined gas tubes, requiring no electrical power to operate, with a service life of 20 years unless otherwise indicated.

#### 2.05 BALLASTS AND DRIVERS

- A. Ballasts/Drivers - General Requirements:
  - 1. Provide ballasts containing no polychlorinated biphenyls (PCBs).
  - 2. Minimum Efficiency/Efficacy: Provide ballasts complying with all current applicable federal and state ballast efficiency/efficacy standards.
- B. Fluorescent Ballasts:
  - 1. All Fluorescent Ballasts: Unless otherwise indicated, provide high frequency electronic ballasts complying with ANSI C82.11 and listed and labeled as complying with UL 935.
    - a. Input Voltage: Suitable for operation at voltage of connected source, with variation tolerance of plus or minus 10 percent.
    - b. Total Harmonic Distortion: Not greater than 10 percent.
    - c. Power Factor: Not less than 0.95.
    - d. Ballast Factor: Normal ballast factor between 0.85 and 1.15, unless otherwise indicated.
    - e. Sound Rating: Class A, suitable for average ambient noise level of 20 to 24 decibels.
    - f. Lamp Compatibility: Specifically designed for use with the specified lamp, with no visible flicker.
    - g. Lamp Current Crest Factor: Not greater than 1.7.



- h. Provide end of lamp life automatic shut down circuitry for T5 and smaller diameter lamp ballasts.
- i. Surge Tolerance: Capable of withstanding characteristic surges according to IEEE C62.41.2, location category A.
- j. Electromagnetic Interference/Radio Frequency Interference (EMI/RFI) Limits: Comply with FCC requirements of 47 CFR 15, for Class A, non-consumer application.
- k. Ballast Marking: Include wiring diagrams with lamp connections.

## **2.06 LAMPS**

- A. Lamps - General Requirements:
  - 1. Unless explicitly excluded, provide new, compatible, operable lamps in each luminaire.
  - 2. Verify compatibility of specified lamps with luminaires to be installed. Where lamps are not specified, provide lamps per luminaire manufacturer's recommendations.
  - 3. Minimum Efficiency: Provide lamps complying with all current applicable federal and state lamp efficiency standards.
  - 4. Color Temperature Consistency: Unless otherwise indicated, for each type of lamp furnish products which are consistent in perceived color temperature. Replace lamps that are determined by the Engineer/Architect to be inconsistent in perceived color temperature.

## **2.07 ACCESSORIES**

- A. Stems for Suspended Luminaires: Steel tubing, minimum 1/2" size, factory finished to match luminaire or field-painted as directed.
- B. Threaded Rods for Suspended Luminaires: Zinc-plated steel, minimum 1/4" size, field-painted as directed.
- C. Provide accessory plaster frames for luminaires recessed in plaster ceilings.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that field measurements are as indicated.
- B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate conductors in accordance with NFPA 70.
- C. Verify that suitable support frames are installed where required.
- D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to luminaires.
- E. Verify that conditions are satisfactory for installation prior to starting work.

### **3.02 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.

### **3.03 INSTALLATION**

- A. Coordinate locations of outlet boxes provided under Section 260533.16 as required for installation of luminaires provided under this section.
- B. Install products in accordance with manufacturer's instructions.
- C. Install luminaires securely, in a neat and workmanlike manner, as specified in NECA 500 (commercial lighting) and NECA 502 (industrial lighting).
- D. Provide required support and attachment in accordance with Section 260529.
- E. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.

- F. Furnish and set all inserts, anchors, studs, and hangers for the support of lighting fixtures and respective equipment, and make all necessary adjustments as required.
- G. In acoustical tile ceiling with concealed mechanical suspension system and in gypsum or plaster ceilings, recessed troffers shall be flanged type fixtures. In acoustical tile ceilings with exposed mechanical suspension systems, troffers shall be lay-in type.
- H. For any type ceiling provide sufficient support for fixtures, either arrange with other subcontractors to strengthen ceiling or support fixtures from structure above independently of ceiling. Regardless of whether or not the ceiling can support the fixtures, provide securing wiring on fixture to structure. Provide a minimum of two securing wires to 2x4, 2x2, etc. NOTE: Securing wires are not the same as support wires. Securing wires are for preventing a fixture from falling into a space if the ceiling fails under a fire situation.
- I. All lay-in fixtures shall be connected to grid system with hurricane clips.
- J. Fixtures to be installed in or on painted ceilings and/or walls shall not be installed until painting is completed. Fixtures installed with paint applied over factory finishes will be rejected.
- K. Suspended Ceiling Mounted Luminaires:
  - 1. Do not use ceiling tiles to bear weight of luminaires.
  - 2. Do not use ceiling support system to bear weight of luminaires unless ceiling support system is certified as suitable to do so.
  - 3. Secure surface-mounted and recessed luminaires to ceiling support channels or framing members or to building structure.
  - 4. Secure pendant-mounted luminaires to building structure.
  - 5. Secure lay-in luminaires to ceiling support channels using listed safety clips at four corners.
  - 6. In addition to ceiling support wires, provide two galvanized steel safety wire(s), minimum 12 gage, connected from opposing corners of each recessed luminaire to building structure.
- L. Recessed Luminaires:
  - 1. Install trims tight to mounting surface with no visible light leakage.
  - 2. Non-IC Rated Luminaires: Maintain required separation from insulation and combustible materials according to listing.
  - 3. Luminaires Recessed in Fire-Rated Ceilings: Install using accessories and firestopping materials to meet regulatory requirements for fire rating.
- M. Suspended Luminaires:
  - 1. Unless otherwise indicated, specified mounting heights are to bottom of luminaire.
  - 2. Install using the suspension method indicated, with support lengths and accessories as required for specified mounting height.
  - 3. Provide minimum of two supports for each luminaire equal to or exceeding 4 feet nominal length, with no more than 4 feet (1.2 m) between supports.
  - 4. Install canopies tight to mounting surface.
  - 5. Unless otherwise indicated, support pendants from swivel hangers.
- N. Wall-Mounted Luminaires: Unless otherwise indicated, specified mounting heights are to center of luminaire.
- O. Install accessories furnished with each luminaire.
- P. Bond products and metal accessories to branch circuit equipment grounding conductor.
- Q. Emergency Lighting Units:
  - 1. Unless otherwise indicated, connect unit to unswitched power from same circuit feeding normal lighting in same room or area. Bypass local switches, contactors, or other lighting controls.
- R. Install lamps in each luminaire.

- S. Lamp Burn-In: Operate lamps at full output for prescribed period per manufacturer's recommendations prior to use with any dimming controls. Replace lamps that fail prematurely due to improper lamp burn-in.
- T. Night Lights shall be on non-motorized breakers.

**3.04 FIELD QUALITY CONTROL**

- A. Inspect each product for damage and defects.
- B. Operate each luminaire after installation and connection to verify proper operation.
- C. Test self-powered exit signs, emergency lighting units, and fluorescent emergency power supply units to verify proper operation upon loss of normal power supply.
- D. Correct wiring deficiencies and repair or replace damaged or defective products. Repair or replace excessively noisy ballasts as determined by Engineer/Architect.

**3.05 ADJUSTING**

- A. Aim and position adjustable luminaires to achieve desired illumination as indicated or as directed by Engineer/Architect. Secure locking fittings in place.
- B. Aim and position adjustable emergency lighting unit lamps to achieve optimum illumination of egress path as required or as directed by Engineer/Architect or authority having jurisdiction.
- C. Exit Signs with Field-Selectable Directional Arrows: Set as indicated or as required to properly designate egress path as directed by Engineer/Architect or authority having jurisdiction.

**3.06 CLEANING**

- A. Clean surfaces according to NECA 500 (commercial lighting), NECA 502 (industrial lighting), and manufacturer's instructions to remove dirt, fingerprints, paint, or other foreign material and restore finishes to match original factory finish.

**3.07 CLOSEOUT ACTIVITIES**

- A. Demonstration: Demonstrate proper operation of luminaires to Engineer/Architect, and correct deficiencies or make adjustments as directed.
- B. Just prior to Substantial Completion, replace all lamps that have failed.

**3.08 PROTECTION**

- A. Protect installed luminaires from subsequent construction operations.

**END OF SECTION**



**SECTION 265600  
EXTERIOR LIGHTING****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Exterior luminaires.
- B. Ballasts.
- C. Lamps.
- D. Luminaire accessories.

**1.02 RELATED REQUIREMENTS**

- A. Section 260526 - Grounding and Bonding for Electrical Systems.
- B. Section 260529 - Hangers and Supports for Electrical Systems.
- C. Section 260533.16 - Boxes for Electrical Systems.
- D. Section 265100 - Interior Lighting.

**1.03 REFERENCE STANDARDS**

- A. ANSI O5.1 - American National Standard for Wood Poles: Specifications and Dimensions; 2022.
- B. IEEE C2 - National Electrical Safety Code(R) (NEC(R)); 2023.
- C. IES LM-63 - Approved Method: IES Standard File Format for the Electronic Transfer of Photometric Data and Related Information; 2019.
- D. IES LM-79 - Approved Method: Optical and Electrical Measurements of Solid-State Lighting Products; 2019.
- E. IES LM-80 - Approved Method: Measuring Maintenance of Light Output Characteristics of Solid-State Light Sources; 2021.
- F. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- G. NECA/IESNA 501 - Standard for Installing Exterior Lighting Systems; 2000 (Reaffirmed 2006).
- H. NEMA LE 4 - Recessed Luminaires, Ceiling Compatibility; 2012 (Reaffirmed 2018).
- I. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- J. UL 1598 - Luminaires; Current Edition, Including All Revisions.
- K. UL 8750 - Light Emitting Diode (LED) Equipment for Use in Lighting Products; Current Edition, Including All Revisions.

**1.04 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:
  - 1. Coordinate placement of poles and associated foundations with utilities, curbs, sidewalks, trees, walls, fences, striping, etc. installed under other sections or by others. Coordinate elevation to obtain specified foundation height.
  - 2. Notify Engineer/Architect of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.

**1.05 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, weight, effective projected

area (EPA), and installed accessories; include model number nomenclature clearly marked with all proposed features.

1. LED Luminaires:
    - a. Include estimated useful life, calculated based on IES LM-80 test data.
    - b. Include IES LM-79 test report upon request.
  2. Provide electronic files of photometric data certified by a National Voluntary Laboratory Accreditation Program (NVLAP) lab or independent testing agency in IES LM-63 standard format upon request.
  3. Lamps: Include rated life and initial and mean lumen output.
- C. Field Quality Control Reports.
1. Include test report indicating measured illumination levels.

#### **1.06 QUALITY ASSURANCE**

- A. Comply with requirements of NFPA 70.
- B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- D. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

#### **1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Receive, handle, and store products according to NECA/IESNA 501 and manufacturer's written instructions.
- B. Keep products in original manufacturer's packaging and protect from damage until ready for installation.
- C. Receive, handle, and store wood poles in accordance with ANSI O5.1.

#### **1.08 WARRANTY**

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.

### **PART 2 PRODUCTS**

#### **2.01 LUMINAIRE TYPES**

- A. Furnish products as indicated in luminaire schedule included on the drawings.

#### **2.02 LUMINAIRES**

- A. Provide products that comply with requirements of NFPA 70.
- B. Provide products that are listed and labeled as complying with UL 1598, where applicable.
- C. Provide products listed, classified, and labeled as suitable for the purpose intended.
- D. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.
- E. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, poles, foundations, supports, trims, accessories, etc. as necessary for a complete operating system.
- F. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.
- G. Provide luminaires listed and labeled as suitable for wet locations unless otherwise indicated.
- H. Recessed Luminaires:

1. Ceiling Compatibility: Comply with NEMA LE 4.
  2. Luminaires Recessed in Insulated Ceilings: Listed and labeled as IC-rated, suitable for direct contact with insulation and combustible materials.
  3. Luminaires Recessed in Sloped Ceilings: Provide suitable sloped ceiling adapters.
- I. 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.
- J. Exposed Hardware: Stainless steel.

### **2.03 BALLASTS AND DRIVERS**

- A. Ballasts/Drivers - General Requirements:
1. Provide ballasts containing no polychlorinated biphenyls (PCBs).
  2. Minimum Efficiency/Efficacy: Provide ballasts complying with all current applicable federal and state ballast efficiency/efficacy standards.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that field measurements are as indicated.
- B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate conductors in accordance with NFPA 70.
- C. Verify that suitable support frames are installed where required.
- D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to luminaires.
- E. Verify that conditions are satisfactory for installation prior to starting work.

### **3.02 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.

### **3.03 INSTALLATION**

- A. Coordinate locations of outlet boxes provided under Section 260533.16 as required for installation of luminaires provided under this section.
- B. Install products in accordance with manufacturer's instructions.
- C. Install luminaires in accordance with NECA/IESNA 501.
- D. Provide required support and attachment in accordance with Section 260529.
- E. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.
- F. Wall-Mounted Luminaires: Unless otherwise indicated, specified mounting heights are to center of luminaire.
- G. Install accessories furnished with each luminaire.
- H. Bond products and metal accessories to branch circuit equipment grounding conductor.
- I. Install lamps in each luminaire.

### **3.04 FIELD QUALITY CONTROL**

- A. See Section 014000 - Quality Requirements, for additional requirements.
- B. Inspect each product for damage and defects.

- C. Operate each luminaire after installation and connection to verify proper operation.
- D. Correct wiring deficiencies and repair or replace damaged or defective products. Repair or replace excessively noisy ballasts as determined by Engineer/Architect.

**3.05 ADJUSTING**

- A. Aim and position adjustable luminaires to achieve desired illumination as indicated or as directed by Engineer/Architect. Secure locking fittings in place.
- B. Luminaires with Field-Rotatable Optics: Position optics according to manufacturer's instructions to achieve lighting distribution as indicated or as directed by Engineer/Architect.

**3.06 CLEANING**

- A. Clean surfaces according to NECA/IESNA 501 and manufacturer's instructions to remove dirt, fingerprints, paint, or other foreign material and restore finishes to match original factory finish.

**3.07 CLOSEOUT ACTIVITIES**

- A. See Section 017800 - Closeout Submittals, for closeout submittals.
- B. See Section 017900 - Demonstration and Training, for additional requirements.
- C. Demonstration: Demonstrate proper operation of luminaires to Engineer/Architect, and correct deficiencies or make adjustments as directed.
- D. Just prior to Substantial Completion, replace all lamps that have failed.

**3.08 PROTECTION**

- A. Protect installed luminaires from subsequent construction operations.

**END OF SECTION**



**SECTION 271000  
STRUCTURED CABLING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Communications system design requirements.
- B. Communications pathways.
- C. Copper cable and terminations.
- D. Fiber optic cable and interconnecting devices.
- E. Communications equipment room fittings.
- F. Communications outlets.
- G. Communications grounding and bonding.
- H. Communications identification.

**1.02 RELATED REQUIREMENTS**

- A. Section 078400 - Firestopping.
- B. Section 260526 - Grounding and Bonding for Electrical Systems.
- C. Section 260533.13 - Conduit for Electrical Systems.
- D. Section 260533.16 - Boxes for Electrical Systems.
- E. Section 260553 - Identification for Electrical Systems: Identification products.
- F. Section 262726 - Wiring Devices.

**1.03 REFERENCE STANDARDS**

- A. EIA/ECA-310 - Cabinets, Racks, Panels, and Associated Equipment; 2005e.
- B. NECA/BICSI 568 - Standard for Installing Commercial Building Telecommunications Cabling; 2006.
- C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- D. TIA-455-21 - FOTP-21 - Mating Durability of Fiber Optic Interconnecting Devices; 1988a (Reaffirmed 2012).
- E. TIA-526-14 - Optical Power Loss Measurement of Installed Multimode Fiber Cable Plant; IEC 61280-4.1 Edition 3.1, Fiber Optic Communications Subsystem Test Procedures- Part 4-1: Installed Cable Plant- Multimode Attenuation Measurement; 2023d.
- F. TIA-568 (SET) - Commercial Building Telecommunications Cabling Standard Set; 2020.
- G. TIA-568.2 - Balanced Twisted-Pair Telecommunications Cabling and Components Standards; 2018d, with Addenda (2020).
- H. TIA-569 - Telecommunications Pathways and Spaces; 2019e, with Addendum (2022).
- I. TIA-606 - Administration Standard for Telecommunications Infrastructure; 2021d.
- J. TIA-607 - Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises; 2019d, with Addendum (2021).
- K. UL 444 - Communications Cables; Current Edition, Including All Revisions.
- L. UL 514C - Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers; Current Edition, Including All Revisions.
- M. UL 1651 - Fiber Optic Cable; Current Edition, Including All Revisions.
- N. UL 1863 - Communications-Circuit Accessories; Current Edition, Including All Revisions.

**1.04 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:
  - 1. Coordinate requirements for service entrance and entrance facilities with Communications Service Provider. Pay for all utility work.
  - 2. Coordinate the work with other trades to avoid placement of other utilities or obstructions within the spaces dedicated for communications equipment.
  - 3. Coordinate arrangement of communications equipment with the dimensions and clearance requirements of the actual equipment to be installed.
  - 4. Notify Engineer of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.
- B. Arrange for Communications Service Provider to provide service.
- C. Preinstallation Meeting: Convene one week prior to commencing work of this section to review service requirements and details with Communications Service Provider representative.

**1.05 SUBMITTALS**

- A. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product.
- B. Shop Drawings: Show compliance with requirements on isometric schematic diagram of network layout, showing cable routings, telecommunication closets, rack and enclosure layouts and locations, service entrance, and grounding, prepared and approved by BICSI Registered Communications Distribution Designer (RCDD).
- C. Evidence of qualifications for installer.
- D. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and operation of product.
- E. Test Plan: Complete and detailed plan, with list of test equipment, procedures for inspection and testing, and intended test date; submit at least 60 days prior to intended test date.
- F. Field Test Reports.
- G. Project Record Documents: Prepared and approved by BICSI Registered Communications Distribution Designer (RCDD).
  - 1. Record actual locations of outlet boxes and distribution frames.
  - 2. Show as-installed color coding, pair assignment, polarization, and cross-connect layout.
  - 3. Identify distribution frames and equipment rooms by room number on drawings.
- H. Operation and Maintenance Data: List of all components with part numbers, sources of supply, and operation and maintenance instructions; include copy of project record documents.

**1.06 QUALITY ASSURANCE**

- A. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- B. Manufacturer Qualifications: At least 3 years experience manufacturing products of the type specified.
- C. Installer Qualifications: A company having at least 3 years experience in the installation and testing of the type of system specified, and:
  - 1. Employing a BICSI Registered Communications Distribution Designer (RCDD).
  - 2. Supervisors and installers factory certified by manufacturers of products to be installed.
  - 3. Employing BICSI Registered Cabling Installation Technicians (RCIT) for supervision of all work.
- D. Products: Listed, classified, and labeled as suitable for the purpose intended.

- E. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

### **1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Keep stored products clean and dry.

### **1.08 WARRANTY**

- A. Correct defective Work within a 2 year period after Date of Substantial Completion.

## **PART 2 PRODUCTS**

### **2.01 SYSTEM DESIGN**

- A. Provide a complete permanent system of cabling and pathways for voice and data communications, including cables, conduits and wireways, pull wires, support structures, enclosures and cabinets, and outlets.
  - 1. Comply with TIA-568 (SET) (cabling) and TIA-569 (pathways) (commercial standards).
  - 2. Comply with Communications Service Provider requirements.
  - 3. Provide fixed cables and pathways that comply with NFPA 70 and TIA-607 and are UL listed or third party independent testing laboratory certified.
  - 4. In this project, the term plenum is defined as return air spaces above ceilings, inside ducts, under raised floors, and other air-handling spaces.
- B. Main Distribution Frame (MDF): Centrally located support structure for terminating horizontal cables that extend to telecommunications outlets, functioning as point of presence to external service provider.
  - 1. Locate main distribution frame as indicated on the drawings.
  - 2. Capacity: As required to terminate all cables required by design criteria plus minimum 25 percent spare space.
- C. Cabling to Outlets: Specified horizontal cabling, wired in star topology to distribution frame located at center hub of star; also referred to as "links".

### **2.02 PATHWAYS**

- A. Conduit: As specified in Section 260533.13; provide pull cords in all conduit.
- B. Underground Service Entrance: Rigid polyvinyl chloride (PVC) conduit, Schedule 40.

### **2.03 COPPER CABLE AND TERMINATIONS**

- A. Copper Horizontal Cable:
  - 1. Description: 100 ohm, balanced twisted pair cable complying with TIA-568.2 and listed and labeled as complying with UL 444.
  - 2. Cable Type - Voice and Data: TIA-568.2 Category 6 UTP (unshielded twisted pair); 23 AWG.
  - 3. Cable Capacity: 4-pair.
  - 4. Cable Applications: Use listed NFPA 70 Type CMP plenum cable unless otherwise indicated.
- B. Copper Cable Terminations: Insulation displacement connection (IDC) type using appropriate tool; use screw connections only where specifically indicated.
- C. Jacks and Connectors: Modular RJ-45, non-keyed, terminated with 110-style insulation displacement connectors (IDC); high impact thermoplastic housing; suitable for and complying with same standard as specified horizontal cable; UL 1863 listed.
  - 1. Performance: 500 mating cycles.
  - 2. Voice and Data Jacks: 8-position modular jack, color-coded for both T568A and T568B wiring configurations.

**2.04 FIBER OPTIC CABLE AND INTERCONNECTING DEVICES**

- A. Fiber Optic Backbone Cable:
  - 1. Cable is existing and shall be re-used.
- B. Fiber Optic Interconnecting Devices:
  - 1. Connector Type: Type ST.

**2.05 COMMUNICATIONS EQUIPMENT ROOM FITTINGS**

- A. Copper Cross-Connection Equipment:
  - 1. Patch Panels for Copper Cabling: Sized to fit EIA/ECA-310 standard 19 inch (482.6 mm) wide equipment racks; 0.09 inch (2.2 mm) thick aluminum; cabling terminated on Type 110 insulation displacement connectors; printed circuit board interface.
    - a. Jacks: Non-keyed RJ-45, suitable for and complying with same standard as cable to be terminated; maximum 48 ports per standard width panel.
    - b. Capacity: Provide ports sufficient for cables to be terminated plus 25 percent spare.
    - c. Labels: Factory installed laminated plastic nameplates above each port, numbered consecutively; comply with TIA-606.
    - d. Provide incoming cable strain relief and routing guides on back of panel.
- B. Fiber Optic Cross-Connection Equipment:
  - 1. Patch Panels for Fiber Optic Cabling: Sized to fit EIA/ECA-310 standard 19 inch (482.6 mm) wide equipment racks; 0.09 inch (2.2 mm) thick aluminum.
    - a. Adapters: As specified above under FIBER OPTIC CABLE AND INTERCONNECTING DEVICES; maximum of 24 duplex adaptors per standard panel width.
    - b. Labels: Factory installed laminated plastic nameplates above each port, numbered consecutively; comply with TIA-606.
    - c. Provide incoming cable strain relief and routing guides on back of panel.
    - d. Provide rear cable management tray at least 8 inches (203 mm) deep with removable cover.
    - e. Provide dust covers for unused adapters.
- C. Backboards: Interior grade plywood without voids, 3/4 inch (19 mm) thick; UL-labeled fire-retardant.
  - 1. Size: As indicated on drawings.
  - 2. Do not paint over UL label.
- D. Equipment Frames, Racks and Cabinets:
  - 1. Component Racks: EIA/ECA-310 standard 19 inch (482.6 mm) wide.
  - 2. Floor Mounted Racks: Aluminum or steel construction with corrosion resistant finish; vertical and horizontal cable management channels, top and bottom cable troughs, and grounding lug.

**2.06 COMMUNICATIONS OUTLETS**

- A. Outlet Boxes: Comply with Section 260533.16.
  - 1. Provide depth as required to accommodate cable manufacturer's recommended minimum conductor bend radius.
- B. Wall Plates:
  - 1. Comply with system design standards and UL 514C.
  - 2. Accepts modular jacks/inserts.
  - 3. Wall Plate Material/Finish - Flush-Mounted Outlets: Match wiring device and wall plate finishes specified in Section 262726.

**2.07 GROUNDING AND BONDING COMPONENTS**

- A. Comply with TIA-607.

- B. Comply with Section 260526.

## **2.08 IDENTIFICATION PRODUCTS**

- A. Comply with TIA-606.
- B. Comply with Section 260553.

## **2.09 SOURCE QUALITY CONTROL**

- A. Factory test cables according to TIA-568 (SET).

## **PART 3 EXECUTION**

### **3.01 INSTALLATION - GENERAL**

- A. Comply with latest editions and addenda of TIA-568 (SET) (cabling), TIA-569 (pathways), TIA-607 (grounding and bonding), NECA/BICSI 568, NFPA 70, and SYSTEM DESIGN as specified in PART 2.
- B. Comply with Communication Service Provider requirements.
- C. Grounding and Bonding: Perform in accordance with TIA-607 and NFPA 70.
- D. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 078400.

### **3.02 INSTALLATION OF PATHWAYS**

- A. Install pathways with the following minimum clearances:
  - 1. 48 inches (1220 mm) from motors, generators, frequency converters, transformers, x-ray equipment, and uninterruptible power systems.
  - 2. 12 inches (300 mm) from power conduits and cables and panelboards.
  - 3. 5 inches (125 mm) from fluorescent and high frequency lighting fixtures.
  - 4. 6 inches (150 mm) from flues, hot water pipes, and steam pipes.
- B. Conduit, in Addition to Requirements of Section 260533.13:
  - 1. Arrange conduit to provide no more than the equivalent of two 90 degree bend(s) between pull points.
  - 2. Conduit Bends: Inside radius not less than 10 times conduit internal diameter.
  - 3. Arrange conduit to provide no more than 100 feet (30 m) between pull points.
  - 4. Minimum Cover - Underground Service Entrance: Comply with NFPA 70 and Communications Service Provider requirements.
- C. Outlet Boxes:
  - 1. Coordinate locations of outlet boxes provided under Section 260533.16 as required for installation of telecommunications outlets provided under this section.
    - a. Mounting Heights: Unless otherwise indicated, as follows:
      - 1) Telephone and Data Outlets: 18 inches (450 mm) above finished floor.
    - b. Orient outlet boxes for vertical installation of wiring devices unless otherwise indicated.
    - c. Provide minimum of 24 inches (600 mm) horizontal separation between flush mounted outlet boxes installed on opposite sides of fire rated walls.
    - d. Unless otherwise indicated, provide separate outlet boxes for line voltage and low voltage devices.
    - e. Locate outlet boxes so that wall plate does not span different building finishes.
    - f. Locate outlet boxes so that wall plate does not cross masonry joints.

### **3.03 INSTALLATION OF EQUIPMENT AND CABLING**

- A. Cabling:
  - 1. Do not bend cable at radius less than manufacturer's recommended bend radius; for unshielded twisted pair use bend radius of not less than 4 times cable diameter.
  - 2. Do not over-cinch or crush cables.

3. Do not exceed manufacturer's recommended cable pull tension.
  4. When installing in conduit, use only lubricants approved by cable manufacturer and do not chafe or damage outer jacket.
- B. Service Loops (Slack or Excess Length): Provide the following minimum extra length of cable, looped neatly:
1. At Distribution Frames: 120 inches (3000 mm).
  2. At Outlets - Copper: 12 inches (305 mm).
- C. Copper Cabling:
1. Category 5e and Above: Maintain cable geometry; do not untwist more than 1/2 inch (12 mm) from point of termination.
  2. For 4-pair cables in conduit, do not exceed 25 pounds (110 N) pull tension.
  3. Use T568B wiring configuration.
- D. Fiber Optic Cabling:
1. Prepare for pulling by cutting outer jacket for 10 inches (250 mm) from end, leaving strength members exposed. Twist strength members together and attach to pulling eye.
  2. Support vertical cable at intervals as recommended by manufacturer.
- E. Floor-Mounted Racks and Enclosures: Permanently anchor to floor in accordance with manufacturer's recommendations.
- F. Identification:
1. Use wire and cable markers to identify cables at each end.
  2. Use manufacturer-furnished label inserts, identification labels, or engraved wallplate to identify each jack at communications outlets with unique identifier.
  3. Use identification nameplate to identify cross-connection equipment, equipment racks, and cabinets.

### 3.04 FIELD QUALITY CONTROL

- A. Comply with inspection and testing requirements of specified installation standards.
- B. Visual Inspection:
1. Inspect cable jackets for certification markings.
  2. Inspect cable terminations for color coded labels of proper type.
  3. Inspect outlet plates and patch panels for complete labels.
- C. Testing - Copper Cabling and Associated Equipment:
1. Test backbone cables for DC loop resistance, shorts, opens, intermittent faults, and polarity between connectors and between conductors and shield, if cable has overall shield.
  2. Test operation of shorting bars in connection blocks.
  3. Category 5e and Above Backbone: Perform near end cross talk (NEXT) and attenuation tests.
  4. Category 5e and Above Links: Perform tests for wire map, length, attenuation, NEXT, and propagation delay.
- D. Testing - Fiber Optic Cabling:
1. Backbone: Perform optical fiber end-to-end attenuation test using an optical time domain reflectometer (OTDR) and manufacturer's recommended test procedures; perform verification acceptance tests and factory reel tests.
  2. Multimode Backbone: Perform tests in accordance with TIA-526-14.
- E. Final Testing: After all work is complete, including installation of telecommunications outlets, and telephone dial tone service is active, test each voice jack for dial tone.

**END OF SECTION**

**SECTION 311000  
SITE CLEARING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. The furnishing of all labor, materials, and equipment required for clearing, grubbing, removing, and proper disposal of all items within the limits of the site or right-of-way, except things designated to remain or to be removed by others. This shall also include the preservation from injury or defacement of trees, vegetation, objects, or materials designated to remain or to be salvaged.

**PART 2 PRODUCTS -- NOT USED**

**PART 3 EXECUTION**

**3.01 SITE CLEARING**

- A. Comply with other requirements specified in Section 017000.
- B. Minimize production of dust due to clearing operations; do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.

**3.02 EXISTING UTILITIES AND BUILT ELEMENTS**

- A. Coordinate work with utility companies; notify before starting work and comply with their requirements; obtain required permits.
- B. Protect existing utilities to remain from damage.
- C. Do not disrupt public utilities without permit from authority having jurisdiction.
- D. Protect existing structures and other elements that are not to be removed.

**3.03 VEGETATION**

- A. Do not remove or damage vegetation beyond the limits indicated on drawings.
- B. Install substantial, highly visible fences at least 3 feet high (at least 1 m high) to prevent inadvertent damage to vegetation to remain:
  - 1. At vegetation removal limits.
- C. In areas where vegetation must be removed but no construction will occur other than pervious paving, remove vegetation with minimum disturbance of the subsoil.
- D. Vegetation Removed: Do not burn, bury, landfill, or leave on site, except as indicated.
  - 1. Chip, grind, crush, or shred vegetation for mulching, composting, or other purposes; preference should be given to on-site uses.
  - 2. Trees: Sell if marketable; if not, treat as specified for other vegetation removed; remove stumps and roots to depth of 18 inches (450 mm).
  - 3. Sod: Re-use on site if possible; otherwise sell if marketable, and if not, treat as specified for other vegetation removed.
- E. Restoration: If vegetation outside removal limits or within specified protective fences is damaged or destroyed due to subsequent construction operations, replace at no cost to Owner.

**3.04 DEBRIS**

- A. Remove debris, junk, and trash from site.
- B. Leave site in clean condition, ready for subsequent work.
- C. Clean up spillage and wind-blown debris from public and private lands.

**END OF SECTION**





**SECTION 312200  
GRADING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Rough grading the site .
- B. Finish grading.

**1.02 QUALITY ASSURANCE**

- A. Perform Work in accordance with State of Mississippi, Highway Department standards.

**PART 2 PRODUCTS**

**2.01 MATERIALS**

- A. Topsoil: Topsoil shall consist of natural friable soil that is representative of soils in the vicinity which produce heavy growths of crops, grass, or other vegetation and is reasonably free from underlying subsoil, clay lumps, objectionable weeds, litter, brush, matted roots, toxic substances, or any material that might be harmful to plan growth or be hindrance to grading, planting, or maintenance operations.
- B. Obtain approved topsoil material off-site when satisfactory topsoil materials are not available on-site.
  - 1. Graded.
  - 2. Free of roots, rocks larger than 1/2 inch (12 mm), subsoil, debris, large weeds and foreign matter.

**PART 3 EXECUTION**

**3.01 EXAMINATION**

- A. Verify that survey bench mark and intended elevations for the Work are as indicated.
- B. Verify the absence of standing or ponding water.
- C. Poor soils conditions and groundwater may be encountered and should be expected on the site.

**3.02 PREPARATION**

- A. Identify required lines, levels, contours, and datum.
- B. Stake and flag locations of known utilities.
- C. Locate, identify, and protect from damage above- and below-grade utilities to remain.
- D. Notify utility company to remove and relocate utilities.
- E. Provide temporary means and methods to remove all standing or ponding water from areas prior to grading.
- F. Protect site features to remain, including but not limited to bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs, from damage by grading equipment and vehicular traffic.
- G. Protect trees to remain by providing substantial fencing around entire tree at the outer tips of its branches; no grading is to be performed inside this line.
- H. Protect plants, lawns, rock outcroppings, and other features to remain as a portion of final landscaping.

**3.03 TOPSOIL STRIPPING**

**3.04 SOIL STOCKPILING**

- A. Stockpile topsoil to be re-used on site; remove remainder from site.

- B. Locate stockpiles where they will not interfere with the construction phases and at least 15 feet away from areas of concentrated flows or pavements.
- C. Protect stockpiles from erosion.

### **3.05 FINISH GRADING**

- A. Before Finish Grading:
  - 1. Verify building and trench backfilling have been inspected.
  - 2. Verify subgrade has been contoured and compacted.
- B. Remove debris, roots, branches, stones, in excess of 1/2 inch (13 mm) in size. Remove soil contaminated with petroleum products.
- C. Where topsoil is to be placed, scarify surface to depth of 3 inches (75 mm).
- D. Place topsoil in areas where sodding are indicated.
- E. Place topsoil where required to level finish grade.
- F. Place topsoil to thickness as indicated.
- G. Place topsoil during dry weather.
- H. Remove roots, weeds, rocks, and foreign material while spreading.
- I. Near plants spread topsoil manually to prevent damage.
- J. Fine grade topsoil to eliminate uneven areas and low spots. Maintain profiles and contour of subgrade.
- K. Lightly compact placed topsoil.
- L. Maintain stability of topsoil during inclement weather. Replace topsoil in areas where surface water has eroded thickness below specifications.

### **3.06 TOLERANCES**

- A. Top Surface of Subgrade: Plus or minus 0.10 foot (1-3/16 inches) (30 mm) from required elevation.
- B. Top Surface of Finish Grade: Plus or minus 0.04 foot (1/2 inch) (13 mm).

### **3.07 REPAIR AND RESTORATION**

- A. Existing Facilities, Utilities, and Site Features to Remain: If damaged due to this work, repair or replace to original condition.
- B. Trees to Remain: If damaged due to this work, trim broken branches and repair bark wounds; if root damage has occurred, obtain instructions from Engineer/Architect as to remedy.
- C. Other Existing Vegetation to Remain: If damaged due to this work, replace with vegetation of equivalent species and size.
- D. Protecting Graded Areas: Protect newly graded areas from traffic and erosion.
- E. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.

### **3.08 FIELD QUALITY CONTROL**

- A. See Section 312323 for compaction density testing.

### **3.09 CLEANING**

- A. Leave site clean and raked, ready to receive landscaping.

**END OF SECTION**

**SECTION 312316.13  
TRENCHING****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. The furnishing of all labor, materials, and equipment required for preparation of grade for proposed construction activities depicted in the construction documents.

**1.02 REFERENCE STANDARDS**

- A. AASHTO T 180 - Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop; 2022, with Errata .
- B. ASTM C136/C136M - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates; 2019.
- C. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup> (600 kN-m/m<sup>3</sup>)); 2012 (Reapproved 2021).
- D. ASTM D1556/D1556M - Standard Test Method for Density and Unit Weight of Soil in Place by Sand-Cone Method; 2015, with Editorial Revision (2016).
- E. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup> (2,700 kN-m/m<sup>3</sup>)); 2012 (Reapproved 2021).
- F. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method; 2015.
- G. ASTM D2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System); 2017, with Editorial Revision (2020).
- H. ASTM D4318 - Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils; 2017, with Editorial Revision (2018).
- I. ASTM D6938 - Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth); 2023.
- J. Mississippi Standard Specifications for Road and Bridge Construction, 2004.

**1.03 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Materials Sources: Submit name of imported materials source.
- C. Fill Composition Test Reports: Results of laboratory tests on proposed and actual materials used.
- D. Compaction Density Test Reports.

**1.04 DELIVERY, STORAGE, AND HANDLING**

- A. When necessary, store materials on site in advance of need.
- B. When fill materials need to be stored on site, locate stockpiles where they will not interfere with the construction phases and at least 15 feet away from areas of concentrated flows or pavemtns.
  - 1. Separate differing materials with dividers or stockpile separately to prevent intermixing.
  - 2. Prevent contamination.
  - 3. Protect stockpiles from erosion and deterioration of materials.

**PART 2 PRODUCTS****2.01 BEDDING AND FILL MATERIALS**

- A. Select Foundation Material: Select Foundation Material shall meet the requirements of MDOT Size II Course Stabilizer Aggregate.

- B. Select Bedding Material: Select Bedding material shall consist of clean sand with less than 10 percent passing the No. 200 sieve.
- C. Select Backfill Material: Select Backfill material shall meet the requirements per Section 312323.
- D. See Section 312323 for additional fill material requirements.

## **2.02 ACCESSORIES**

- A. Warning Tape: Warning tape shall be metallic or polyethylene film warning tape manufactured for making and identifying underground utilities, 3 inches wide and 4 mils thick, continuously inscribed with a description of the utility.
- B. Locator Wire: Locator wire shall be fourteen (14) gauge solid copper insulated wire.

## **2.03 SOURCE QUALITY CONTROL**

- A. See Section 014000 - Quality Requirements, for general requirements for testing and analysis of soil material.
- B. Where fill materials are specified by reference to a specific standard, test and analyze samples for compliance before delivery to site.
- C. If tests indicate materials do not meet specified requirements, change material and retest.
- D. Provide materials of each type from same source throughout the Work.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that survey bench marks and intended elevations for the work are as indicated.

### **3.02 PREPARATION**

- A. Identify required lines, levels, contours, and datum locations.
- B. Grade top perimeter of trenching area to prevent surface water from draining into trench. Provide temporary means and methods, as required, to maintain surface water diversion until no longer needed, or as directed by the Engineer/Architect.

### **3.03 TRENCHING**

- A. Excavate trenches to indicated widths, gradients, lines, depths, and elevations as indicated on the drawings.
- B. All pipe and associated fittings/structures will be installed in accordance with manufacturer's recommendations unless more stringent requirements are imposed by the drawings and these specifications.
- C. Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape sub-grade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.
- D. Remove projecting stones and sharp objects along trench sub-grade.
- E. Provide temporary means and methods, as required, to remove all water from trenching until directed by the Engineer/Architect. Remove and replace soils deemed unsuitable by classification and which are excessively moist due to lack of dewatering or surface water control.
- F. Determine the prevailing groundwater level prior to trenching. If the proposed trench extends less than 1 foot (305 mm) into the prevailing groundwater, control groundwater intrusion with perimeter drains routed to sump pumps, or as directed by the Engineer/Architect.

### **3.04 FOUNDATION FOR UTILITY PLACEMENT**

- A. When native material at the bottom of the trench is not a suitable foundation for the pipe or conduit, excavate trench an additional 6 inches and replace with approved Foundation Material.

**3.05 BEDDING FOR UTILITY PLACEMENT**

- A. Place and compact bedding material on trench bottoms as indicated on the drawings. Shape bedding material to provide continuous support of bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.
- B. The bedding material shall be Suitable Soil secured from the trench excavation and shall be thoroughly compacted to a minimum 95 percent of Standard Proctor Density (ASTM D 698).
- C. When the native soil is not suitable for bedding material then a minimum of 4 inches of Select Bedding Material shall be compacted to a minimum of 95 percent of the Standard Proctor Density (ASTM D 698).

**3.06 INITIAL BACKFILLING**

- A. Coordinate backfilling with utility testing.
- B. Place and compact initial backfill to a height of 12 inches over the utility pipe or conduit. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of utility piping or conduit to avoid damage or displacement of piping or conduit.
- C. The backfill material shall be Suitable Soil secured from the trench excavation and shall be thoroughly compacted to a minimum 95 percent of Standard Proctor Density (ASTM D 698).
- D. When the native soil is not suitable for backfill material then backfill with Select Backfill Material compacted to a minimum of 95 percent of the Standard Proctor Density (ASTM D 698).
- E. See Section 312323 for further backfill requirements.
- F. Correct areas that are over-excavated.
- G. Reshape and re-compact fills subjected to vehicular traffic.

**3.07 TOLERANCES**

- A. Top Surface of General Backfilling: Plus or minus 1 inch (25 mm) from required elevations.
- B. Top Surface of Backfilling Under Paved Areas: Plus or minus 1 inch (25 mm) from required elevations.

**3.08 FIELD QUALITY CONTROL**

- A. See Section 014000 - Quality Requirements, for general requirements for field inspection and testing.
- B. Perform compaction density testing on compacted fill in accordance with ASTM D1556, ASTM D2167, or ASTM D6938.
- C. Evaluate results in relation to compaction curve determined by testing uncompacted material in accordance with ASTM D1557 ("modified Proctor"), AASHTO T 180, or ASTM D698 ("standard Proctor").
- D. If tests indicate work does not meet specified requirements, remove work, replace and retest.

**3.09 CLEANING**

- A. Leave unused materials in a neat, compact stockpile.
- B. Remove unused stockpiled materials, leave area in a clean and neat condition. Grade stockpile area to prevent standing surface water.
- C. Leave borrow areas in a clean and neat condition. Grade to prevent standing surface water.

**END OF SECTION**



**SECTION 312316  
EXCAVATION****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A.
- B. Section 015713 - Temporary Erosion and Sediment Control: Slope protection and erosion control.
- C. Section 017000 - Execution and Closeout Requirements: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products; temporary bracing and shoring. General requirements for dewatering of excavations and water control.
- D. Section 024100 - Demolition: Shoring and underpinning existing structures.
- E. Section 312316.13 - Trenching: Excavating for utility trenches as shown on the plans.
- F. Section 312316.26 - Rock Removal: Removal of rock during excavating.

**1.02 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Field Quality Control Submittals: Document visual inspection of load-bearing excavated surfaces.

**1.03 DEFINITIONS**

- A. Unclassified Excavation: Unclassified Excavations will consist of all excavation and processing, stockpiling, or disposal of all materials of whatever character encountered on the work, except for those for which additional pay items are provided. Processing shall include haul, drying if required, placing, and compacting of suitable excavated materials to areas requiring backfill material. Stockpiling, if allowed, shall consist of the hauling and spreading of all suitable surplus unclassified excavation as shown on the plans. Disposal shall include haul for proper disposal of all unclassified excavation unsuitable for backfill material, as deemed by Project Engineer. Contractor shall provide, at his own expense, the location for the disposal of unsuitable material.
- B. Muck Excavation: Muck Excavation will consist of the excavation removal, hauling, and disposal of natural deposits of soils and organic matter.
- C. Borrow Excavation: Borrow Excavation will consist of approved material required for construction obtained from an outside source.
- D. Excess Excavation: Excess Excavation will consist of excavation, removal, and disposal of all soils which cannot be satisfactorily used or disposed of within the project limits. Excess Excavation may include any type, kind, or class of excavation determined by the Engineer that must be removed.
- E. Stripping Excavation: Stripping Excavation will consist of the excavation, removal, and stockpiling of the upper six (6) inches of organic material of the project site. This material will be hauled off or stockpiled as directed by the engineer and the cost for hauling should be absorbed in the pay item. Stockpiled material should be free of all trash and debris and rocks or rock fragments greater than 3 inches in diameter.

**PART 2 PRODUCTS****PART 2 EXECUTION****3.01 EXAMINATION**

- A. Verify that survey bench mark and intended elevations for the work are as indicated.

### **3.02 EXCAVATING**

- A. Excavate to accommodate construction operations.
- B. Notify Engineer/Architect of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.
- C. Do not interfere with 45 degree bearing splay of foundations.
- D. Remove lumped subsoil, boulders, and rock up to 1/3 cubic yard (0.25 cu m) measured by volume. See Section 312316.26 for removal of larger material.
- E. Provide temporary means and methods, as required, to remove all water from excavations until directed by Engineer/Architect. Remove and replace soils deemed suitable by classification and which are excessively moist due to lack of dewatering or surface water control.

### **3.03 FIELD QUALITY CONTROL**

- A. See Section 014000 - Quality Requirements, for general requirements for field inspection and testing.
- B. Provide for visual inspection of load-bearing excavated surfaces by Engineer/Architect before placement of foundations.

### **3.04 PROTECTION**

- A. Divert surface flow from rains or water discharges from the excavation.
- B. Prevent displacement of banks and keep loose soil from falling into excavation; maintain soil stability.
- C. Protect open excavations from rainfall, runoff, freezing groundwater, or excessive drying so as to maintain foundation subgrade in satisfactory, undisturbed condition.
- D. Protect bottom of excavations and soil adjacent to and beneath foundation from freezing.
- E. Keep excavations free of standing water and completely free of water during concrete placement.

**END OF SECTION**



**SECTION 312323**  
**FILL****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. The furnishing of all labor, materials, and equipment required for preparation of grade for proposed construction activities depicted in the construction documents.

**1.02 REFERENCE STANDARDS**

- A. ASTM C136/C136M - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates; 2019.
- B. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup> (600 kN-m/m<sup>3</sup>)); 2012 (Reapproved 2021).
- C. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup> (2,700 kN-m/m<sup>3</sup>)); 2012 (Reapproved 2021).
- D. ASTM D2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System); 2017, with Editorial Revision (2020).
- E. ASTM D4318 - Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils; 2017, with Editorial Revision (2018).

**1.03 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Fill Composition Test Reports: Results of laboratory tests on proposed and actual materials used, including manufactured fill.

**1.04 DELIVERY, STORAGE, AND HANDLING**

- A. When necessary, store materials on site in advance of need.
- B. When fill materials need to be stored on site, locate stockpiles where they will not interfere with the construction phases and at least 15 feet away from areas of concentrated flows or pavements.
  - 1. Separate differing materials with dividers or stockpile separately to prevent intermixing.
  - 2. Prevent contamination.
  - 3. Protect stockpiles from erosion and deterioration of materials.

**PART 2 PRODUCTS****2.01 FILL MATERIALS**

- A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations free from debris, roots, wood, scrap materials, vegetable matter, refuse or frozen material. Obtain approved fill materials off-site when satisfactory soil materials are not available on site.
- B. Structural Fill: Approved material with less than about 25 percent of the soil particles (by weight) passing the No. 200 mesh sieve, less than about 65 percent of the soil particles (by weight) passing the No. 40 mesh sieve and a liquid limit of less than 25..
  - 1. Fill materials should be placed above clean sand and compacted in 8-inch loose lifts to at least 95 percent of the maximum dry unit weight according to ASTM D698 (Standard Proctor).
- C. Sand: Clean sand with less than ten percent (10%) passing the No. 200 sieve.
- D. Topsoil: See Section 312200.

**2.02 ACCESSORIES**

- A. Geotextile Fabric: non-woven, geotextile; N-Series manufactured by Mirafi or approved equal.

- B. Vapor Retarder: 10 mil (0.25 mm) thick, polyethylene.

### **2.03 SOURCE QUALITY CONTROL**

- A. See Section 014000 - Quality Requirements, for general requirements for testing and analysis of soil material.
- B. Where fill materials are specified by reference to a specific standard, test and analyze samples for compliance before delivery to site.
- C. If tests indicate materials do not meet specified requirements, change material and retest.
- D. Provide materials of each type from same source throughout the Work.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that survey bench marks and intended elevations for the Work are as indicated.
- B. Identify required lines, levels, contours, and datum locations.
- C. Verify areas to be filled are not compromised with surface or ground water.

### **3.02 PREPARATION**

- A. Scarify and proof roll subgrade surface to a depth of 24 inches (600 mm) to identify soft spots.
- B. Cut out soft areas of subgrade not capable of compaction in place. Backfill with general fill.
- C. Compact subgrade to density equal to or greater than requirements for subsequent fill material.
- D. Until ready to fill, maintain excavations and prevent loose soil from falling into excavation.

### **3.03 DRAINAGE**

- A. Effective drainage, including ditching and/or positive grading, should be established during the initial stages of site development and modified as necessary during construction.
- B. Groundwater may be encountered and should be expected during excavation work. When required the Contractor shall provide a system for controlling groundwater below excavations.
- C. Surface water shall be prevented from flowing into excavations and from flooding the project site and surrounding areas by methods approved by the Engineer.
- D. Contractor shall not allow water to accumulate in excavations. Remove water to prevent softening of foundation soils, undercutting of footings, and soil changes detrimental to the stability of sub-grades and foundations. Contractor shall not use trench excavation as temporary drainage ditches.
- E. Maintain grades so that the surface is well drained. When required the Contractor shall provide dewatering system necessary to convey water away from excavations.

### **3.04 EXCAVATION**

- A. After clearing, grubbing, and stripping excavation are completed, excavate existing soils to depths necessary to accommodate site structures and install the required pavement sections.
- B. Suitable excavation materials shall be used as general fill in areas outside building or pavement areas as approved by the Engineer. If the site conditions permit, additional suitable excavation material may be wasted on site as approved by the Engineer.

### **3.05 UNAUTHORIZED EXCAVATION**

- A. The Contractor will not be compensated for excavation beyond the dimensions and elevations as shown on the plans or that has been directed and approved by the Engineer.
- B. Any unauthorized excavation that requires filling shall be corrected at the Contractor's expense.
- C. No payment will be made for the removal, disposal, or replacement of material determined to be loosened or undercut through carelessness or negligence on the part of the Contractor.

**3.06 SUB-GRADE INSPECTION AND PREPARATION**

- A. After clearing, grubbing, and stripping excavations are completed, proof-roll the entire site using a loaded dump truck, having an axle weight of at least 10 tons to aid in identifying any additional localized soft or unsuitable material that should be removed.
- B. The existing sub-grade soils shall be thoroughly compacted until the soils at a depth of 12 inches achieve at least 95 percent of maximum dry density according to Standard Proctor Density (ASTM D 698).
- C. If unsatisfactory sub-grades are encountered or if the required compaction of in place soils cannot be achieved, additional undercutting and placement of appropriate fill material will be required.

**3.07 REMOVAL OF UNSUITABLE MATERIALS**

- A. When excavations encounter unsuitable materials below the bottom of the stripping or excavation to the depths required to accommodate the grading plan and other improvements, the Contractor will be required to remove the materials and backfill with appropriate fill material as approved by the Engineer.
- B. The depth and width of unsuitable or muck excavation will be as directed or approved by the Engineer.
- C. All muck and fill formations below the bottom of the stripping or excavation to the depths required to accommodate the grading plan and other improvements shall be measured as unit price pay item, Muck Excavation, see section 312316.

**3.08 GENERAL FILL PLACEMENT AND COMPACTION**

- A. Fill materials shall be placed on prepared and inspected sub-grade to contours and elevations indicated using appropriate materials.
- B. Employ a placement method that does not disturb or damage other work.
- C. Do not fill over porous, wet, frozen or spongy subgrade surfaces.
- D. Maintain optimum moisture content of fill materials to attain required compaction density.
- E. In areas where groundwater or saturated soil conditions are encountered during the required fill excavations, the initial lift of fill material should consist of Clean Sand placed to at least 2 feet above the static water table or to a distance to adequately bridge over the saturated soils. during placement below the groundwater table, the Clean Sand may be thoroughly "tracked" with a bulldozer in lieu of measured compaction tests.
- F. Fill material meeting the requirements of Suitable Soils shall be placed to obtain final grade outside of building and pavement areas. This material should be compacted in 6 inch loose lifts to not less than 95 percent of the maximum dry unit weight according to ASTM D 698 (Standard Proctor).
- G. Correct areas that are over-excavated.
- H. Reshape and re-compact fills subjected to vehicular traffic.

**3.09 FILL PLACEMENT AND COMPACTION FOR SITE STRUCTURES AND PAVEMENTS**

- A. Fill material meeting the requirements of Structural Fill shall be placed to the required grades, lines, cross sections, and thickness as shown on the plans. This material should be compacted in 8 inch loose lifts to not less than 95 percent of the maximum dry unit weight according to ASTM D 698 (Standard Proctor).

**3.10 FILL AT SPECIFIC LOCATIONS****3.11 TOLERANCES**

- A. Top Surface of General Filling: Plus or minus 1 inch (25 mm) from required elevations.

**3.12 CLEANING AND PROTECTION**

- A. Remove unused stockpiled materials, leave area in a clean and neat condition. Grade stockpile area to prevent standing surface water.
- B. Leave borrow areas in a clean and neat condition. Grade to prevent standing surface water.
- C. Protect newly graded areas from traffic and erosion.
- D. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.

**END OF SECTION**

**SECTION 321123  
AGGREGATE BASE COURSES****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. The furnishing of all labor, materials, and equipment required for preparation of grade for proposed construction activities depicted in the construction documents.

**1.02 RELATED REQUIREMENTS**

- A. Section 312200 - Grading: Preparation of site for base course.
- B. Section 312316.13 - Trenching: Compacted fill over utility trenches under base course.
- C. Section 312323 - Fill: Compacted fill under base course.
- D. Section 321216 - Asphalt Paving: Finish and binder asphalt courses.

**1.03 REFERENCE STANDARDS**

- A. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup> (600 kN-m/m<sup>3</sup>)); 2012 (Reapproved 2021).
- B. ASTM D1556/D1556M - Standard Test Method for Density and Unit Weight of Soil in Place by Sand-Cone Method; 2015, with Editorial Revision (2016).
- C. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup> (2,700 kN-m/m<sup>3</sup>)); 2012 (Reapproved 2021).
- D. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method; 2015.
- E. ASTM D2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System); 2017, with Editorial Revision (2020).
- F. ASTM D6938 - Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth); 2023.

**1.04 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Materials Sources: Submit name of imported materials source.
- C. Aggregate Composition Test Reports: Results of laboratory tests on proposed and actual materials used.
- D. Compaction Density Test Reports.

**1.05 DELIVERY, STORAGE, AND HANDLING**

- A. When necessary, store materials on site in advance of need.
- B. Aggregate Storage, General:
  - 1. Separate differing materials with dividers or stockpile separately to prevent intermixing.
  - 2. Prevent contamination.
  - 3. Protect stockpiles from erosion and deterioration of materials.

**PART 2 PRODUCTS****2.01 MATERIALS**

- A. Crushed Aggregate Base Course: Crushed Aggregate Base Course: Crushed Aggregate Base Course material shall dense-graded plant mixed crushed limestone, conforming to State of Mississippi Highway Department requirements for 610 Limestone.

**2.02 SOURCE QUALITY CONTROL**

- A. See Section 014000 - Quality Requirements, for general requirements for testing and analysis of aggregate materials.
- B. Where aggregate materials are specified using ASTM D2487 classification, test and analyze samples for compliance before delivery to site.
- C. If tests indicate materials do not meet specified requirements, change material and retest.
- D. Provide materials of each type from same source throughout the Work.

**PART 3 EXECUTION****3.01 EXAMINATION**

- A. Verify that survey bench marks and intended elevations for the work are as indicated.
- B. Verify substrate has been inspected, gradients and elevations are correct, and is dry.

**3.02 PREPARATION**

- A. Correct irregularities in substrate gradient and elevation by scarifying, reshaping, and re-compacting.
- B. Do not place aggregate on soft, muddy, or frozen surfaces.

**3.03 INSTALLATION**

- A. Spread Crushed Aggregate Base Course material over prepared substrate and compact at optimum moisture content to not less than the percentage of maximum dry unit weight as shown on the drawings.
- B. Under all paving:
  - 1. Compact to 95 percent of material's maximum dry density as determined by ASTM D698.
  - 2. Moisture content must be within +/- 2% of optimum moisture content. If test is not within moisture content passing requirements, scarify material, compact and retest per ASTM D6938 In Place Density and water Content Determination by Nuclear Gauge.
- C. Level and contour surfaces to elevations and gradients indicated.
- D. Add small quantities of fine aggregate to coarse aggregate as appropriate to assist compaction.
- E. Add water to assist compaction. If excess water is apparent, remove aggregate and aerate to reduce moisture content.
- F. Use mechanical tamping equipment in areas inaccessible to compaction equipment.

**3.04 TOLERANCES**

- A. Flatness: Maximum variation of 1/4 inch (6.4 mm) measured with 10 foot (3 m) straight edge.
- B. Scheduled Compacted Thickness: Within 1/4 inch (6.4 mm).
- C. Variation From Design Elevation: Within 1/2 inch (12.8 mm).

**3.05 FIELD QUALITY CONTROL**

- A. See Section 014000 - Quality Requirements, for general requirements for field inspection and testing.
- B. Compaction density testing will be performed on compacted aggregate base course in accordance with ASTM D1556, ASTM D2167, ASTM D2922, or ASTM D3017 as applicable.
- C. If tests indicate work does not meet specified requirements, remove work, replace and retest.
- D. Frequency of Tests: Perform at least one test for every 2,000 square feet of paved area but in no case fewer than three test.
- E. Prior to construction of pavements, proof roll compacted aggregate at surfaces that will be under paving.

**3.06 CLEANING**

- A. Remove unused stockpiled materials, leave area in a clean and neat condition. Grade stockpile area to prevent standing surface water.

**END OF SECTION**





**SECTION 321313  
CONCRETE PAVING****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. The furnishing of all labor, materials, and equipment required for construction of concrete sidewalks, parking areas, curbs and site paving on a prepared subgrade in accordance with the plans and specifications.
- B. All pedestrian traffic areas including sidewalks and ramps shall conform to the requirements of the Americans with Disabilities Act (ADA).

**1.02 RELATED REQUIREMENTS**

- A. Section 031000 - Concrete Forming and Accessories.
- B. Section 033000 - Cast-in-Place Concrete for concrete reinforcing.

**1.03 REFERENCE STANDARDS**

- A. ACI 301 - Specifications for Concrete Construction; 2020.
- B. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete; 2000 (Reapproved 2009).
- C. ACI 305R - Guide to Hot Weather Concreting; 2020.
- D. ACI 306R - Guide to Cold Weather Concreting; 2016.
- E. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2022.
- F. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens; 2023.
- G. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete; 2019.

**1.04 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on joint filler, admixtures, and curing compound.

**PART 2 PRODUCTS****2.01 PAVING ASSEMBLIES**

- A. Comply with applicable requirements of ACI 301.

**2.02 FORM MATERIALS**

- A. Form Materials: As specified in Section 031000, comply with ACI 301.

**2.03 REINFORCEMENT**

- A. Reinforcing Steel and Welded Wire Reinforcement: Types specified in plans.
- B. Reinforcing Steel: ASTM A615/A615M, Grade 80 (80,000 psi) (550 MPa) yield strength; deformed billet steel bars; unfinished.
- C. Steel Welded Wire Reinforcement: Plain type, ASTM A1064/A1064M; in flat sheets; unfinished.

**2.04 CONCRETE MATERIALS**

- A. Concrete: Class B, MDOT Specifications
- B. Concrete Materials: Provide in accordance with State of Mississippi Highways standards.

**2.05 ACCESSORIES**

- A. Curing Compound: ASTM C309, Type 1, Class A.
- B. Joint Filler: Bituminous, 1/2-inch thick, AASHTO M-213.
- C. Joint Sealant: Lion D-200, or equal.

**PART 3 EXECUTION****3.01 EXAMINATION**

- A. Verify compacted subgrade is acceptable and ready to support paving and imposed loads.
- B. Verify gradients and elevations of base are correct.

**3.02 SUBBASE**

- A. See Section 321123 for construction of base course for work of this Section.

**3.03 FORMING**

- A. Place and secure forms to correct location, dimension, profile, and gradient.
- B. Assemble formwork to permit easy stripping and dismantling without damaging concrete.
- C. Place joint filler vertical in position, in straight lines. Secure to formwork during concrete placement.

**3.04 REINFORCEMENT**

- A. Place reinforcement as indicated.

**3.05 COLD AND HOT WEATHER CONCRETING**

- A. Follow recommendations of ACI 305R when concreting during hot weather.
- B. Follow recommendations of ACI 306R when concreting during cold weather.
- C. Do not place concrete when base surface temperature is less than 40 degrees F (4 degrees C), or surface is wet or frozen.

**3.06 PLACING CONCRETE**

- A. Place concrete in accordance with ACI 304R.
- B. Ensure reinforcement, inserts, embedded parts, formed joints are not disturbed during concrete placement.
- C. Place concrete continuously over the full width of the panel and between predetermined construction joints. Do not break or interrupt successive pours such that cold joints occur.
- D. Apply surface retarder to all exposed surfaces in accordance with manufacturer's instructions.

**3.07 JOINTS**

- A. Align curb, gutter, and sidewalk joints.
- B. Place 3/8 inch (10 mm) wide expansion joints at 40 foot (12 m) intervals and to separate paving from vertical surfaces and other components and in pattern indicated.
  - 1. Form joints with joint filler extending from bottom of pavement to within 1/2 inch (13 mm) of finished surface.
  - 2. Secure to resist movement by wet concrete.
- C. Provide scored joints as indicated.
- D. Provide keyed joints as indicated.
- E. Saw cut contraction joints 1/4 inch (6 mm) wide at an optimum time after finishing. Cut 1/3 into depth of slab.

**3.08 FINISHING**

- A. Area Paving: Light broom, texture perpendicular to pavement direction.

- B. Sidewalk Paving: Light broom, texture perpendicular to direction of travel with troweled and radiused edge 1/4 inch radius ( 6 mm radius).
- C. Curbs and Gutters: Light broom, texture parallel to pavement direction.
- D. Place curing compound on exposed concrete surfaces immediately after finishing. Apply in accordance with manufacturer's instructions.

**3.09 TOLERANCES**

- A. Maximum Variation of Surface Flatness: 1/4 inch (6 mm) in 10 ft (3 m).

**3.10 FIELD QUALITY CONTROL**

- A. An independent testing agency will perform field quality control tests, as specified in Section 014000 - Quality Requirements.
  - 1. Provide free access to concrete operations at project site and cooperate with appointed firm.
  - 2. Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of concrete operations.
  - 3. Tests of concrete and concrete materials may be performed at any time to ensure compliance with specified requirements.
- B. Compressive Strength Tests: ASTM C39/C39M; for each test, mold and cure three concrete test cylinders. Obtain test samples for every 100 cu yd (76 cu m) or less of each class of concrete placed.
  - 1. Take one additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.
  - 2. Perform one slump test for each set of test cylinders taken.
- C. Maintain records of placed concrete items. Record date, location of pour, quantity, air temperature, and test samples taken.

**3.11 PROTECTION**

- A. Immediately after placement, protect pavement from premature drying, excessive hot or cold temperatures, and mechanical injury.
- B. Do not permit pedestrian traffic over pavement for 7 days minimum after finishing.

**END OF SECTION**



**SECTION 329219  
SEEDING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Preparation of subsoil.
- B. Hydroseeding, mulching and fertilizer.

**1.02 RELATED REQUIREMENTS**

- A. Section 312200 - Grading: Preparation of subsoil and placement of topsoil in preparation for the work of this section.
- B. Section 312323 - Fill:

**1.03 DEFINITIONS**

- A. Weeds: Include Dandelion, Jimsonweed, Quackgrass, Horsetail, Morning Glory, Rush Grass, Mustard, Lambsquarter, Chickweed, Cress, Crabgrass, Canadian Thistle, Nutgrass, Poison Oak, Blackberry, Tansy Ragwort, Bermuda Grass, Johnson Grass, Poison Ivy, Nut Sedge, Nimble Will, Bindweed, Bent Grass, Wild Garlic, Perennial Sorrel, and Brome Grass.

**1.04 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Certificate: Certify seed mixture approval by authority having jurisdiction.

**1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver grass seed mixture in sealed containers. Seed in damaged packaging is not acceptable. Deliver seed mixture in containers showing percentage of seed mix, year of production, net weight, date of packaging, and location of packaging.
- B. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer.

**PART 2 PRODUCTS**

**2.01 REGULATORY REQUIREMENTS**

- A. Comply with regulatory agencies for fertilizer and herbicide composition.
- B. Provide certificate of compliance from authority having jurisdiction indicating approval of seed mixture.

**2.02 SEED MIXTURE**

- A. Seed Mixture:
  - 1. Planting Between March 1 and October 15:

Common Bermuda Grass	55 lbs./acre
Brown Top Millet	30 lbs./acre
  - 2. Planting between October 15 and March 1:

Common Bermuda Grass	55 lbs./acre
Rye Grass	30 lbs./acre

**2.03 ACCESSORIES**

- A. Mulching Material: Oat or wheat straw, free from weeds, foreign matter detrimental to plant life, and dry. Hay or chopped cornstalks are not acceptable.
- B. Fertilizer: Recommended for grass, with 50 percent of the elements derived from organic sources; of proportion necessary to eliminate deficiencies of topsoil, as indicated by analysis.
  - 1. Fertilizer shall be commercial combination, 19-19-19 (Nitrogen, Phosphorous, and Potash) and shall be distributed at a rate of 500 lbs./acre.

- C. Water: Clean, fresh and free of substances or matter that could inhibit vigorous growth of grass.
- D. Erosion Fabric: Jute matting, open weave.

**PART 3 EXECUTION**

**3.01 EXAMINATION**

- A. Verify that prepared soil base is ready to receive the work of this Section.

**3.02 PREPARATION**

- A. Prepare subgrade in accordance with Section 312200.

**3.03 FERTILIZING**

- A. Apply fertilizer in accordance with manufacturer's instructions.
- B. Apply after smooth raking of topsoil and prior to roller compaction.
- C. Do not apply fertilizer at same time or with same machine as will be used to apply seed.
- D. Mix thoroughly into upper 2 inches (50 mm) of topsoil.
- E. Lightly water to aid the dissipation of fertilizer.

**3.04 HYDROSEEDING**

- A. Do not hydroseed area in excess of that which can be mulched on same day.
- B. Immediately following seeding, apply mulch to a thickness of 1/8 inches (3 mm). Maintain clear of shrubs and trees.
- C. Apply water with a fine spray immediately after each area has been mulched. Saturate to 4 inches (100 mm) of soil.
- D. Following germination, immediately re-seed areas without germinated seeds that are larger than 4 by 4 inches (100 by 100 mm).

**3.05 MAINTENANCE**

- A. Maintain seeded areas immediately after placement until grass is well established and exhibits a vigorous growing condition.
- B. Mow grass at regular intervals to maintain at a maximum height of 2-1/2 inches (65 mm). Do not cut more than 1/3 of grass blade at any one mowing.
- C. Water to prevent grass and soil from drying out.
- D. Roll surface to remove minor depressions or irregularities.
- E. Control growth of weeds. Apply herbicides in accordance with manufacturer's instructions. Remedy damage resulting from improper use of herbicides.
- F. Protect seeded areas with warning signs during maintenance period.

**END OF SECTION**

**SECTION 329223  
SODDING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Fertilizing.
- B. Sod installation.
- C. Maintenance.

**1.02 DEFINITIONS**

- A. Weeds: Includes Dandelion, Jimsonweed, Quackgrass, Horsetail, Morning Glory, Rush Grass, Mustard, Lambsquarter, Chickweed, Cress, Crabgrass, Canadian Thistle, Nutgrass, Poison Oak, Blackberry, Tansy Ragwort, Bermuda Grass, Johnson Grass, Poison Ivy, Nut Sedge, Nimble Will, Bindweed, Bent Grass, Wild Garlic, Perennial Sorrel, and Brome Grass.

**1.03 REFERENCE STANDARDS**

- A. TPI (SPEC) - Guideline Specifications to Turfgrass Sodding; 2006.

**1.04 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Certificate: Certify grass species and location of sod source.
- C. Maintenance Data: Include maintenance instructions, cutting method and maximum grass height; types, application frequency, and recommended coverage of fertilizer .

**1.05 QUALITY ASSURANCE**

- A. Sod Producer: Company specializing in sod production and harvesting with minimum five years experience, and certified by the State of Mississippi.
- B. Installer Qualifications: Company approved by the sod producer.

**1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver sod on pallets. Protect exposed roots from dehydration.
- B. Do not deliver more sod than can be laid within 24 hours.

**PART 2 PRODUCTS**

**2.01 MATERIALS**

- A. Sod: TPI (SPEC), Certified Turfgrass Sod quality; cultivated grass sod; type indicated in plant schedule on Drawings; with strong fibrous root system, free of stones, burned or bare spots; containing no more than 5 weeds per 1000 sq ft (100 sq m). Minimum age of 18 months, with root development that will support its own weight without tearing, when suspended vertically by holding the upper two corners.
  - 1. Eremochloa ophiuroides (Centipede) Grass Type: 98 percent.
- B. Fertilizer: Organic, granular controlled release fertilizer; recommended for grass, with equal percentages of nitrogen, phosphoric acid, and potassium.
- C. Water: Clean, fresh and free of substances or matter that could inhibit vigorous growth of grass.
- D. PVC Sleeves: Schedule 80 PVC sleeves used for future irrigation.

**2.02 SOURCE QUALITY CONTROL**

- A. Provide analysis of topsoil fill under provisions of Section 014000.
- B. Analyze to ascertain percentage of nitrogen, phosphorus, potash, soluble salt content, organic matter content, and pH value.

- C. Submit minimum 10 oz (280 g) sample of topsoil proposed. Forward sample to approved testing laboratory in sealed containers to prevent contamination.
- D. Testing is not required if recent tests are available for imported topsoil. Submit these test results to the testing laboratory for approval. Indicate, by test results, information necessary to determine suitability.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify that prepared soil base is ready to receive the work of this section.

#### **3.02 PREPARATION**

- A. Prepare subgrade in accordance with Section 312200.

#### **3.03 FERTILIZING**

- A. Apply fertilizer in accordance with manufacturer's instructions.
- B. Apply after smooth raking of topsoil and prior to installation of sod.
- C. Apply fertilizer no more than 48 hours before laying sod.
- D. Mix thoroughly into upper 2 inches (50 mm) of topsoil.
- E. Lightly water to aid the dissipation of fertilizer.

#### **3.04 LAYING SOD**

- A. Moisten prepared surface immediately prior to laying sod.
- B. Lay sod immediately after delivery to site to prevent deterioration.
- C. Lay sod smooth and tight with no open joints visible, and no overlapping; stagger end joints 12 inches (300 mm) minimum. Do not stretch or overlap sod pieces.
- D. Where new sod adjoins existing grass areas, align top surfaces.
- E. Where sod is placed adjacent to hard surfaces, such as curbs, pavements, etc., place top elevation of sod 1/2 inch (13 mm) below top of hard surface.
- F. Water sodded areas immediately after installation. Saturate sod to 4 inches (100 mm) of soil.
- G. After sod and soil have dried, roll sodded areas to ensure good bond between sod and soil and to remove minor depressions and irregularities. Roll sodded areas with roller not exceeding 90 lbs. (Roll sodded areas with roller not exceeding \_\_\_\_ kg.) for each foot of roller width.

#### **3.05 MAINTENANCE**

- A. Provide maintenance at no extra cost to Owner.
- B. Mow grass at regular intervals to maintain at a maximum height of 2-1/2 inches (65 mm). Do not cut more than 1/3 of grass blade at any one mowing.
- C. Neatly trim edges and hand clip where necessary.
- D. Immediately remove clippings after mowing and trimming.
- E. Water to prevent grass and soil from drying out.
- F. Roll surface to remove irregularities.
- G. Control growth of weeds. Apply herbicides in accordance with manufacturer's instructions. Remedy damage resulting from improper use of herbicides.
- H. Immediately replace sod to areas that show deterioration or bare spots.
- I. Protect sodded areas with warning signs during maintenance period.

**END OF SECTION**



**SECTION 330110.58  
DISINFECTION OF WATER UTILITY PIPING SYSTEMS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Disinfection of site domestic water lines and site fire water lines specified in Section 331416.

**1.02 REFERENCE STANDARDS**

- A. AWWA B300 - Hypochlorites; 2018.
- B. AWWA B301 - Liquid Chlorine; 2018.
- C. AWWA B302 - Ammonium Sulfate; 2023.
- D. AWWA B303 - Sodium Chlorite; 2018.
- E. AWWA C651 - Disinfecting Water Mains; 2014, with Addendum (2020).

**1.03 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Test Reports: Indicate results comparative to specified requirements.
- C. Certificate: Certify that cleanliness of water distribution system meets or exceeds specified requirements.
- D. Disinfection report:
  - 1. Type and form of disinfectant used.
  - 2. Date and time of disinfectant injection start and time of completion.
  - 3. Test locations.
  - 4. Initial and 24 hour disinfectant residuals (quantity in treated water) in ppm for each outlet tested.
  - 5. Date and time of flushing start and completion.
  - 6. Disinfectant residual after flushing in ppm for each outlet tested.
- E. Bacteriological report:
  - 1. Date issued, project name, and testing laboratory name, address, and telephone number.
  - 2. Time and date of water sample collection.
  - 3. Name of person collecting samples.
  - 4. Test locations.
  - 5. Initial and 24 hour disinfectant residuals in ppm for each outlet tested.
  - 6. Coliform bacteria test results for each outlet tested.
  - 7. Certification that water complies, or fails to comply, with bacterial standards of \_\_\_\_\_.

**1.04 QUALITY ASSURANCE**

- A. Water Treatment Firm: Company specializing in disinfecting potable water systems specified in this Section with minimum three years documented experience.
- B. Testing Firm: Company specializing in testing potable water systems, certified by governing authorities of the State in which the Project is located.
- C. Submit bacteriologist's signature and authority associated with testing.

**PART 2 PRODUCTS**

**2.01 DISINFECTION CHEMICALS**

- A. Chemicals: AWWA B300 Hypochlorite, AWWA B300 Hypochlorite, AWWA B300 Hypochlorite, and AWWA B300 Hypochlorite.

**PART 3 EXECUTION**

**3.01 EXAMINATION**

- A. Verify that piping system has been cleaned, inspected, and pressure tested.
- B. Schedule disinfecting activity to coordinate with start-up, testing, adjusting and balancing, demonstration procedures, including related systems.

**3.02 DISINFECTION**

- A. Use method prescribed by the applicable state or local codes, or health authority or water purveyor having jurisdiction, or in the absence of any of these follow AWWA C651.
- B. Provide and attach equipment required to perform the work.
- C. Inject treatment disinfectant into piping system.
- D. Maintain disinfectant in system for 24 hours.
- E. Flush, circulate, and clean until required cleanliness is achieved; use municipal domestic water.
- F. Replace permanent system devices removed for disinfection.
- G. Pressure test system to a minimum of 100 psi (\_\_\_\_ kPa). Repair leaks and re-test.

**3.03 FIELD QUALITY CONTROL**

- A. Perform field inspection and testing in accordance with Section 014000.
- B. Test samples in accordance with AWWA C651.

**END OF SECTION**

**SECTION 331416**  
**SITE WATER UTILITY DISTRIBUTION PIPING****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Water pipe for site conveyance lines.
- B. Pipe valves.
- C. Fire hydrants.

**1.02 RELATED REQUIREMENTS**

- A. Section 033000 - Cast-in-Place Concrete: Concrete for thrust restraints.
- B. Section 099113 - Exterior Painting.
- C. Section 211100 - Facility Fire-Suppression Water-Service Piping.
- D. Section 312316.13 - Trenching: Excavating, bedding, and backfilling.
- E. Section 330110.58 - Disinfection of Water Utility Piping Systems: Disinfection of site service utility water piping.

**1.03 REFERENCE STANDARDS**

- A. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; 2021.
- B. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; 2021.
- C. ASTM B88 - Standard Specification for Seamless Copper Water Tube; 2022.
- D. ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120; 2021a.
- E. ASTM D2466 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40; 2023.
- F. ASTM D2467 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80; 2020.
- G. ASTM D2855 - Standard Practice for the Two-Step (Primer and Solvent Cement) Method of Joining Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Piping Components with Tapered Sockets; 2020.
- H. ASTM D3139 - Standard Specification for Joints for Plastic Pressure Pipes using Flexible Elastomeric Seals; 2019.
- I. AWS A5.8M/A5.8 - Specification for Filler Metals for Brazing and Braze Welding; 2019.
- J. AWWA C111/A21.11 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings; 2023.
- K. AWWA C502 - Dry-Barrel Fire Hydrants; 2018.
- L. AWWA C509 - Resilient-Seated Gate Valves for Water Supply Service; 2023.
- M. AWWA C600 - Installation of Ductile-Iron Mains and Their Appurtenances; 2017.
- N. AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 In. through 60 In. (100 mm through 1500 mm); 2022.
- O. UL 246 - Hydrants for Fire-Protection Service; Current Edition, Including All Revisions.

**1.04 ADMINISTRATIVE REQUIREMENTS**

- A. Preinstallation Meeting: Conduct a preinstallation meeting one week prior to the start of the work of this section; require attendance by all affected installers.
- B. Sequencing: Ensure that utility connections are achieved in an orderly and expeditious manner.

**1.05 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on pipe materials, pipe fittings, valves and accessories.
- C. Project Record Documents: Record actual locations of piping mains, valves, connections, thrust restraints, and invert elevations. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

**1.06 QUALITY ASSURANCE**

- A. Perform Work in accordance with utility company requirements.

**1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver and store valves in shipping containers with labeling in place.

**PART 2 PRODUCTS****2.01 WATER PIPE**

- A. Copper Tubing: ASTM B88, Type K, Annealed:
  - 1. Fittings: ASME B16.18, cast copper, or ASME B16.22, wrought copper.
  - 2. Joints: Compression connection or AWS A5.8M/A5.8, BCuP silver braze.
- B. PVC Pipe: ASTM D1785 Schedule 80.
  - 1. Fittings: ASTM D2466, PVC.
  - 2. Joints: ASTM D2855, solvent weld.
- C. PVC Pipe: AWWA C900 Class 100:
  - 1. Fittings: AWWA C111/A21.11, Schedule 40 per ASTM D2466 or schedule 80 per ASTM D2467.
  - 2. Joints: ASTM D3139 compression gasket ring.
- D. Trace Wire: Magnetic detectable conductor, clear plastic covering, imprinted with "Water Service" in large letters.

**2.02 VALVES**

- A. Gate Valves Up To 3 Inches (75 mm):
  - 1. Brass or Bronze body, non-rising stem, inside screw, single wedge or disc, compression ends, with control rod, post indicator, valve key, and extension box.
- B. Gate Valves 3 Inches (75 mm) and Over:
  - 1. AWWA C509, iron body, bronze trim, non-rising stem with square nut, single wedge, resilient seat, flanged ends, control rod, post indicator, valve key, and extension box.

**2.03 HYDRANTS**

- A. Hydrants: AWWA C502, UL 246, dry barrel type.

**2.04 BEDDING AND BACKFILL MATERIALS**

- A. Bedding: As specified in Section 312316.13.
- B. Backfill: As specified in Section 312316.13.

**2.05 ACCESSORIES**

- A. Concrete for Thrust Restraints: Concrete type specified in Section 033000.

**PART 3 EXECUTION****3.01 EXAMINATION**

- A. Verify that building service connection and municipal utility water main size, location, and invert are as indicated.

**3.02 PREPARATION**

- A. Cut pipe ends square, ream pipe and tube ends to full pipe diameter, remove burrs.
- B. Remove scale and dirt on inside and outside before assembly.
- C. Prepare pipe connections to equipment with flanges or unions.

**3.03 TRENCHING**

- A. See the sections on excavation and fill for additional requirements.
- B. Hand trim excavation for accurate placement of pipe to elevations indicated.
- C. Backfill around sides and to top of pipe with cover fill, tamp in place and compact, then complete backfilling.

**3.04 INSTALLATION - PIPE**

- A. Group piping with other site piping work whenever practical.
- B. Install pipe to indicated elevation to within tolerance of 5/8 inches (16 mm).
- C. Install ductile iron piping and fittings to AWWA C600.
- D. Route pipe in straight line.
- E. Install pipe to allow for expansion and contraction without stressing pipe or joints.
- F. Slope water pipe and position drains at low points.
- G. Install trace wire 6 inches (150 mm) above top of pipe; coordinate with Section 312316.13.
- H. Install warning tape 12 inches above top of pipe; coordinate with Section 312316.13.

**3.05 INSTALLATION - VALVES AND HYDRANTS**

- A. Set valves on solid bearing.
- B. Center and plumb valve box over valve. Set box cover flush with finished grade.
- C. Set hydrants plumb; locate pumper nozzle perpendicular to and facing roadway in accordance with Section 211100.
- D. Set hydrants to grade, with nozzles at least 20 inches (500 mm) above ground in accordance with Section 211100.
- E. Locate control valve 4 inches (100 mm) away from hydrant.
- F. Provide a drainage pit 36 inches (900 mm) square by 24 inches (600 mm) deep filled with 2 inches (50 mm) washed gravel. Encase elbow of hydrant in gravel to 6 inches (150 mm) above drain opening. Do not connect drain opening to sewer.
- G. Paint hydrants in accordance with Section 099113.

**3.06 FIELD QUALITY CONTROL**

- A. See Section 014000 - Quality Requirements, for additional requirements.
- B. Perform field inspection and testing in accordance with Section 014000.
- C. Pressure test water piping to \_\_\_\_ pounds per square inch (\_\_\_\_ kPa).
- D. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to Owner.

**END OF SECTION**



**SECTION 333113**  
**SITE SANITARY SEWERAGE GRAVITY PIPING**

**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Sanitary sewerage drainage piping, fittings, and accessories.
- B. Connection of building sanitary drainage system to municipal sewers.

**1.02 RELATED REQUIREMENTS**

- A. Section 312316.13 - Trenching: Excavating, bedding, and backfilling.
- B. Section 312323 - Fill: Bedding and backfilling.

**1.03 REFERENCE STANDARDS**

- A. ASTM D2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications; 2020.
- B. ASTM D3034 - Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings; 2023.

**1.04 ADMINISTRATIVE REQUIREMENTS**

- A. Preinstallation Meeting: Conduct a preinstallation meeting one week prior to the start of the work of this section; require attendance by all affected installers.
- B. Sequencing: Ensure that utility connections are achieved in an orderly and expeditious manner.

**1.05 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data indicating pipe, pipe accessories.
- C. Manufacturer's Installation Instructions: Indicate special procedures required to install Products specified.
- D. Project Record Documents:
  - 1. Record location of pipe runs, connections, manholes, cleanouts, and invert elevations.
  - 2. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

**PART 2 PRODUCTS****2.01 SEWER PIPE MATERIALS**

- A. Provide products that comply with applicable code(s).
- B. Plastic Pipe: ASTM D3034, Type PSM, Poly(Vinyl Chloride) (PVC) material; minimum inside nominal diameter of 4 inches (\_\_\_\_ mm), bell and spigot style solvent sealed joint end.
- C. Fittings: Same material as pipe molded or formed to suit pipe size and end design, in required tee, bends, elbows, cleanouts, reducers, traps and other configurations required.

**2.02 PIPE ACCESSORIES**

- A. Trace Wire: Magnetic detectable conductor, clear plastic covering, imprinted with "Sewer Service" in large letters.

**2.03 BEDDING AND BACKFILL MATERIALS**

- A. Pipe Bedding Material: As specified in Section 312323.
- B. Pipe Backfill Material: As specified in Section 312323.

### **PART 3 EXECUTION**

#### **3.01 GENERAL**

- A. Perform work in accordance with applicable code(s).

#### **3.02 TRENCHING**

- A. See Section 312316.13 for additional requirements.
- B. Backfill around sides and to top of pipe with cover fill, tamp in place and compact, then complete backfilling.

#### **3.03 INSTALLATION - PIPE**

- A. Verify that trench cut is ready to receive work and excavations, dimensions, and elevations are as indicated on layout drawings.
- B. Install pipe, fittings, and accessories in accordance with manufacturer's instructions. Seal watertight.
  - 1. Plastic Pipe: Also comply with ASTM D2321.
- C. Lay pipe to slope gradients noted on layout drawings; with maximum variation from true slope of 1/8 inch (3 mm) in 10 feet (3 m).
- D. Connect to building sanitary sewer outlet and municipal sewer system , through installed sleeves.
- E. Install trace wire 6 inches (150 mm) above top of pipe; coordinate with Section 312316.13.

#### **3.04 INSTALLATION - CLEANOUTS**

- A. Form bottom of excavation clean and smooth to correct elevation.
- B. Form and place cast-in-place concrete base pad, with provision for sanitary sewer pipe end sections.
- C. Establish elevations and pipe inverts for inlets and outlets as indicated.
- D. Mount lid and frame level in grout, secured to top cone section to elevation indicated.

#### **3.05 FIELD QUALITY CONTROL**

- A. Perform field inspection and testing in accordance with Section 014000.
- B. Infiltration Test: Test in accordance with ASTM C 924.

#### **3.06 PROTECTION**

- A. Protect pipe and bedding cover from damage or displacement until backfilling operation is in progress.

**END OF SECTION**